The 2008–2009 University Catalog

Although this catalog was prepared on the basis of the best information available at the time of publication, all information, including statements of tuition and fees, course offerings, and admission and graduation requirements, is subject to change without notice or obligation.

The catalog is produced by the Office of University Relations, in cooperation with university administration.

Equal Opportunity/Affirmative Action

George Mason University is an equal opportunity/affirmative action institution. See the General Policies chapter in this catalog for a full statement of the university’s equal opportunity/affirmative action policies.
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Programs of Study

Organized by Degree Type

Undergraduate Degrees
Accounting BS
Administration of Justice BS
Anthropology BA
Applied Computer Science BS
Art and Visual Technology BA, BFA
Art History BA
Astronomy BA, BS
Athletic Training BS
Biology BA, BS
Chemistry BA, BS
Civil and Infrastructure Engineering BS
Communication BA
Community Health BS (pending SCHEV approval)
Computational and Data Sciences BS
Computer Engineering BS
Computer Science BS
Conflict Analysis and Resolution BA, BS
Dance BA, BFA
Earth Science BS
Economics BA, BS
Electrical Engineering BS
Electronics and Communications Engineering BS
English BA
Film and Video Studies BA
Finance BS
Foreign Languages BA
Geography BA, BS
Geology BA
Global Affairs BA
Global and Environmental Change BS
Government and International Politics BA
Health, Fitness, and Recreation Resources BS
Health Science BS
History BA
Individualized Study BIS
Information Systems and Operations Management BS
Information Technology BS
Integrative Studies BA, BS
Latin American Studies BA
Management BS
Marketing BS
Mathematics BA, BS
Medical Technology BS
Music BA, BM
Neuroscience BS
Nursing BSN
Philosophy BA
Physical Education BSEd
Physics BS
Psychology BA, BS
Public Administration BS
Religious Studies BA
Russian Studies BA
Social Work BS
Sociology BA
Systems Engineering BS
Theater BA
Tourism and Events Management BS (pending SCHEV approval)

Undergraduate Certificate Programs
Accounting
Applied Statistics
Environmental Chemistry
Environmental Management
Gerontology
Information Technology
Islamic Studies
Nutrition
Operations Research and Engineering
Outdoor Adventure
Postbachelor Computer Science

Interdisciplinary Minors
African American Studies
Ancient Mediterranean Art and Archaeology
Asia-Pacific Studies
Film and Media Studies
Folklore and Mythology
Global Affairs
Global Systems
Immigration Studies
Islamic Studies
Latin American Studies
Linguistics
Middle East Studies
Multimedia
Native American and Indigenous Studies
New Europe
Political Philosophy
Science and Society
Urban and Suburban Studies
Women and Gender Studies
World Music

Minors
Administration of Justice
American Government
Anthropology
Art and Visual Technology
Art History
Arts Administration
Assistive Technology
Astronomy
Bioinformatics
Biography
Business
Chemistry
Chinese
Classical Studies
Communication

Computational and Data Sciences
Computer Science
Conflict Analysis and Resolution
Conservation Biology
Dance
Data Analysis
Early Childhood Special Education
Earth Science
Economics
Economic Systems Design
Education Studies
Electronic Journalism
English
Environmental Policy
Exercise Science
French
Geographic Information Systems
Geography
Geology
German
Health Promotion
History
Information Technology
International/Comparative Studies
Japanese Studies
Jazz Studies
Judaic Studies
Latin
Leadership
Legal Studies
Mathematics
Mathematics for School of Management Students
Mild Disabilities
Music
Nonprofit Studies
Nutrition
Ocean and Estuarine Sciences
Parks, Recreation, and Leisure Studies
Philosophy
Philosophy and Law
Programs of Study

Graduate and Professional Degrees

Accounting MS
Anthropology MA
Applied and Engineering Physics MS
Applied Information Technology MS (pending SCHEV approval)
Art and Visual Technology MA, MFA
Art History MA
Art Education MAT
Arts Management MA
Biodefense MS, PhD
Bioinformatics and Computational Biology MS, PhD
Bioinformatics Management MS
Biology MS
Biosciences PhD
Business Administration MBA
Chemistry MS
Civil and Infrastructure Engineering MS, PhD (pending SCHEV approval)
Climate Dynamics PhD
Communication MA, PhD
Community College Education DA
Computational Science MS
Computational Sciences and Informatics PhD
Computational Social Science PhD
Computer Engineering MS
Computer Science MS, PhD
Conflict Analysis and Resolution MS, PhD

Curriculum and Instruction MEd
- ASTL: Advanced International Baccalaureate
- ASTL: Alternative Education
- ASTL: Art Education
- ASTL: Early Childhood Education
- ASTL: Elementary Mathematics
- ASTL: Foreign Language French
- ASTL: Foreign Language Spanish
- ASTL: Gifted Child Education
- ASTL: History
- ASTL: Individualized Concentration
- ASTL: Instructional Technology
- ASTL: Literacy PK–12 Classroom Teachers
- ASTL: Literacy Reading Specialist (Licensure)
- ASTL: Mathematics (Middle/Secondary)
- ASTL: Physical Education
- ASTL: Science
- ASTL: Special Education
- ASTL: Teacher Leadership
- Early Childhood Education (PK–3)
- Early Childhood Education (Unified Transformative Early Education Model—UTEEM)
- Educational Psychology: Assessment, Evaluation, and Testing
- Educational Psychology: Learning, Cognition, and Motivation
- Educational Psychology: Teacher Preparation
- Elementary Education (PK–6 Initial Teacher Licensure)
- English as a Second Language (PK–12)
- Foreign Language or Latin (PK–12)
- Instructional Technology: Assistive and Special Education Technology
- Instructional Technology: Instructional Design and Development Immersion
- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Instructional Design and Development (Part-Time)
- International Education
- FAST TRAIN (Elementary) PK–6
- International Education
- FAST TRAIN ESOL (English as a Second Language PK–12)
- Multilingual and Multicultural Education
- Secondary Education (6–12) Biology
- Secondary Education (6–12) Chemistry
- Secondary Education (6–12) Earth Science
- Secondary Education (6–12) English
- Secondary Education (6–12) History and Social Sciences
- Secondary Education (6–12) Mathematics
- Secondary Education (6–12) Physics
- Dance MFA

Earth Systems and Geoinformation Sciences PhD
Earth Systems Science MS
E-commerce MS
Economics MA, PhD
Education PhD
Education Leadership MEd
- Mathematics Education Leadership (K–8)
- Math Specialist Leader (K–8)
- Science Education Leadership (PK–12)

Ecological Psychology, MS (pending SCHEV approval)
- Assessment, Evaluation, and Testing
- Learning, Cognition, and Motivation
- Teacher Preparation

Electrical and Computer Engineering PhD
Electrical Engineering MS
English MA
- Cultural Studies
- Linguistics
- Literature
- Professional Writing and Rhetoric
- Teaching of Writing and Literature

Environmental Science and Policy MS
Environmental Science and Public Policy PhD
Epidemiology and Biostatistics MS
Executive MBA
Exercise, Fitness, and Health Promotion MS
Foreign Languages MA
- French
- Spanish
- Spanish and French
- Spanish/Bilingual-Multicultural Education

Geographic and Cartographic Sciences MS
Global Health, MS (pending SCHEV approval)
Health Science MS
International Health
Health Systems Management MS
- Assisted Living/Senior Housing Administration
- Executive Management
- Health Care Security and Privacy
- Health Information Systems
- Health Policy Analysis
- Risk Management and Patient Safety

History MA, PhD
Information Security and Assurance MS
Information Systems MS
Information Technology Engineer Degree
Information Technology PhD
- Civil and Infrastructure Engineering
- Information Security and Assurance
• Information Systems
• Operations Research
• Software Engineering
• Systems Engineering

Interdisciplinary Studies

MAIS
• Community College Teaching
• Folklore
• Global Interaction
• Higher Education
• Individualized Studies
• Religion, Culture, and Values
• Video-Based Production
• Women and Gender Studies
• Zoo and Aquarium Leadership

International Commerce and Policy MA
Justice, Law, and Crime Policy, MA, PhD
Law (For information about degree programs, call the School of Law at 703-993-4000.)

Mathematics MS, PhD
Mathematics and Statistical Science Dual Degree MS
Music MM
Musical Arts DMA (pending SCHEV approval)
Music Education PhD (pending SCHEV approval)

New Professional Studies

MA
• Knowledge Management
• Teaching

New Professional Studies

MS
• Organization Development and Knowledge Management
• Peace Operations

Neuroscience PhD
Nursing MSN, MSN/MBA, PhD, DNP (pending SCHEV approval)
• Adult/Gerontological Nurse Practitioner in Primary Care MSN
• Adult Nurse Practitioner in Primary Care MSN
• Advanced Clinical Nursing MSN
• Clinical Nurse Leader MSN

Graduate Certificate Programs


ASTL: Alternative Education

ASTL: Art Education

ASTL: Early Childhood Education

ASTL: Foreign Language French

ASTL: Gifted Child Education

ASTL: History

ASTL: Instructional Technology

ASTL: Literacy PK–12 Classroom Teachers

ASTL: Literacy Reading Specialist (Licensure)

ASTL: Mathematics (Middle/Secondary)

ASTL: Physical Education

ASTL: Science

ASTL: Teacher Leadership Applied Behavior Analysis

Architecture-Based Systems Engineering

Artist: Instrumental Performance

Artist: Piano Performance

Artist: Vocal Performance

Arts Entrepreneurship

Assisted Living/Senior Housing Administration

Assistive Technology Association Management

Aviation Psychology Bioinformatics and Computational Biology Biometrics

Bioinformatics

Civil Infrastructure and Security Engineering

Cognitive Neuroscience Collaboration and Learning in Policy Organizations

College Teaching

Command, Control, Communications, Computing, and Intelligence

Communications and Networking

Computational Modeling

Computational Social Science

Computational Techniques and Applications

Computer Games Technology

Computer Networking

Conflict Analysis and Resolution Advanced Skills

Conflict Analysis and Resolution for Collaborative Leadership in Community Planning

Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Contexts

Culture and Values in Social Policy

Database Management

Data Mining

Discovery, Design, and Innovation

Early Childhood Education

Early Childhood Special Education Licensure

E-Commerce

Economic Systems Design

E-Learning

Emergency Management and Homeland Security

English as a Second Language Licensure

Environmental Management

Epidemiology

ESL/Special Education

FAST TRAIN Advanced International Baccalaureate (Studies)

FAST TRAIN Special Education

Federal Statistics

Folklore

Forensics

Forensic Nursing

Foundations of Information Systems

Geographic Information Sciences

Geospatial Intelligence

Global Health

Global Medical Policy

Global Trade Management

Governance Systems and Policy Management

Health Care Security and Privacy

Health Information Systems

Higher Education Administration

Information Engineering

Information Security and Assurance
Teaching English as a Second Language
Teaching Students with Autism
Telecommunications
Forensics and Security
Telecommunications
Systems Modeling
Transportation and Logistics Policy
Usability (Psychology)
Visual Impairments PK–12 Licensure
VLSI Design/Manufacturing
Web-Based Software Engineering
Wireless Communications
Women and Gender Studies
World Religions,
Diplomacy, and Conflict Resolution

Organized by Unit
Note: Several interdisciplinary programs, coming from more than one academic unit, are administered by the following divisions of the university: Institute for Conflict Analysis and Resolution, the Volgenau School of Information Technology and Engineering, College of Humanities and Social Sciences, Office of the Provost, College of Science, and School of Public Policy.
Refer to the listing under the following units to see degrees offered.

Institute for Conflict Analysis and Resolution
Conflict Analysis and Resolution Advanced Skills Certificate
Conflict Analysis and Resolution for Collaborative Leadership in Community Planning Certificate
Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Contexts Certificate
Conflict Analysis and Resolution Certificate
Conflict Analysis and Resolution Minor, BA, BS, MS, PhD
World Religions, Diplomacy, and Conflict Resolution Certificate

College of Education and Human Development
Graduate School of Education
Counseling and Development MEd
• Community Agency Counseling
• School Counseling PK–12
Curriculum and Instruction MEd
• ASTL: Advanced International Baccalaureate
• ASTL: Alternative Education
• ASTL: Art Education
• ASTL: Early Childhood Education
• ASTL: Elementary Mathematics
• ASTL: Foreign Language French
• ASTL: Foreign Language Spanish
• ASTL: Gifted Child Education
• ASTL: History
• ASTL: Individualized Concentration
• ASTL: Instructional Technology
• ASTL: Literacy PK–12 Classroom Teachers
• ASTL: Literacy: Reading Specialist
• ASTL: Mathematics (Middle/Secondary)
• ASTL: Physical Education
• ASTL: Science
• ASTL: Special Education
• ASTL: Teacher Leadership
• Early Childhood Education PK–3
• Early Childhood Education (Unified Transformative Early Education Model—UTEEM)
• (Educational Psychology) Assessment, Evaluation, and Testing
• (Educational Psychology) Learning, Cognition, and Motivation
• (Educational Psychology) Teacher Preparation
• Elementary Education (PK–6 Initial Teacher Licensure)
• English as a Second Language (PK–12)
• Foreign Language or Latin (PK–12)
• Instructional Technology: Assistive and Special Education Technology
• Instructional Technology: Instructional Design and Development (Part-Time)
• International Education
• FAST TRAIN (Elementary) PK–6
• International Education FAST TRAIN ESOL (English as a Second Language PK–12)
• Multilingual and Multicultural Education
• Secondary Education (6–12) Biology
• Secondary Education (6–12) Chemistry
• Secondary Education (6–12) Earth Science
• Secondary Education (6–12) English
• Secondary Education (6–12) History and Social Sciences
• Secondary Education (6–12) Mathematics
• Secondary Education (6–12) Physics
• Educational Psychology MS (pending SCHEV approval)
• New Professional Studies MA
Graduate Certificates:
- Special Education MEd
- Concentrations:
  - Assistive Technology
  - Severely Handicapped
  - Visual Impairments
  - Students with Severe Disabilities
  - Teaching Students with Severely Handicapped
  - Special Education
  - Online Academic for Secondary Education
  - Integration of Technology in Schools
  - Physical Education
  - Science
  - Teacher Leadership
  - Applied Behavior Analysis
  - Assistive Technology
  - E-Learning
  - English as a Second Language Licensure
  - ESL/Special Education
  - FAST TRAIN
  - Advanced International Baccalaureate (Studies)
  - FAST TRAIN Special Education
  - Integration of Technology in Schools
  - Online Academic for Teachers
  - Post-master’s Counseling Licensure
  - Secondary Education Licensure
  - Severe Disabilities (Licensure)
  - Special Education Leadership
  - Students with Disabilities who Access the General Curriculum Licensure
  - Teaching Students with Autism
  - Visual Impairments
  - PK–12 Licensure

Minors (Undergraduate):
- Assistive Technology

Global and Community Health
- Community Health BS
- Epidemiology and Biostatistics MS
- Global Health MS

Concentrations:
- Community Health BS
- Gerontology BS
- International Health MS

Nutrition Minor

Undergraduate Certificates:
- Gerontology
- Nutrition

Graduate Certificates:
- Biostatistics
- Epidemiology
- Global Health
- Nutrition
- Rehabilitation Science

School of Nursing
- Nursing BSN, MSN, MSN/MBA, PhD, DNP
  (pending SCHEV approval)
- Concentrations:
  - Adult/Gerontological Nurse Practitioner in Primary Care MSN
  - Adult Nurse Practitioner in Primary Care MSN
  - Advanced Clinical Nursing MSN
  - Clinical Nurse Leader MSN
  - Family Nurse Practitioner in Primary Care MSN
  - Individualized Study PhD
  - Nurse Educator MSN
  - Nursing Administration MSN, PhD
  - Nursing Education PhD

Graduate Certificates:
- Forensic Nursing
- Nursing Administration
- Nursing Education

College of Health and Human Services

School of Recreation, Health, and Tourism
- Athletic Training BS
- Exercise, Fitness, and Health Promotion MS
- Physical Education BSEd
- Health, Fitness, and Recreation Resources BS

Minors:
- Exercise Science
- Health Promotion
- Parks, Recreation, and Leisure Studies
- Sport Management
- Tourism and Events Management

Undergraduate Certificate:
- Outdoor Adventure

Health Administration and Policy
- Health Science BS

Concentrations:
- Assisted Living Administration
- Health Systems Management

Health Systems Management MS
- Assisted Living/Senior Housing Administration
- Executive Management
- Health Information Systems
- Health Policy Analysis
- Health Care Security and Privacy
- Risk Management and Patient Safety

Graduate Certificates:
- Assisted Living/Senior Housing Administration
- Health Care Security and Privacy
- Health Information Systems
- Quality Improvement and Outcomes Management in Health Care Systems
- Risk Management and Patient Safety

Social Work

Concentrations:
- Clinical Practice
- Social Change

College of Humanities and Social Sciences

Administration of Justice
- Administration of Justice Minor, BS
- Justice, Law, and Crime Policy MA, PhD

Communication
- Communication Minor, BA, MA, PhD
- Electronic Journalism Minor

Economics
- Economics Minor, BA, BS, MA, PhD
- Economic Systems Design Minor, Certificate

English
- Creative Writing MFA
- English Minor, BA
- English as a Second Language Minor

English MA
- Cultural Studies
- Linguistics, BA/Accelerated MA
- Literature
- Professional Writing and Rhetoric
- Teaching of Writing and Literature

Graduate Certificates:
- Folklore
- Professional Writing and Editing
- Teaching English as a Second Language

History and Art History
- Art History Minor, BA, MA
- History Minor, BA, MA, PhD

Individualized Study
- Individualized Study BIS

Latin American Studies
- Latin American Studies Minor, BA
Modern and Classical Languages
Foreign Languages BA, MA
Minors:
- Chinese
- Classical Studies
- French
- German
- Japanese Studies
- Latin
- Russian
- Spanish

Philosophy
Philosophy Minor, BA, MA
Philosophy and Law Minor
Professional Ethics Certificate

Psychology
Neuroscience BS
Psychology Minor, BA, BS
Psychology MA, PhD
Concentrations:
- Applied Developmental MA, PhD
- Biopsychology Accelerated MA, PhD
- Clinical PhD
- Human Factors/Applied Cognition MA, PhD
- Industrial/Organizational MA, PhD
- School Psychology MA, Advanced
- Graduate Studies in School Psychology (Post-master's Certificate)

Graduate Certificates:
- Aviation Psychology
- Cognitive Neuroscience
- Usability

Public and International Affairs
Biodefense MS, PhD
Government and International Politics BA
Political Science Applicable BA/Accelerated MA, MA, PhD
Public Administration BS, BA/Accelerated Masters, MPA
Minors:
- American Government
- International/Comparative Studies
- Legal Studies
- Public Policy and Management

Graduate Certificates:
- Administration of Justice
- Association Management
- Emergency Management and Homeland Security
- Nonprofit Management
- Public Management

Religious Studies
Judaic Studies Minor
Religious Studies Minor, BA

Sociology and Anthropology
Anthropology Minor, BA, MA
Sociology Minor, BA, BA/Accelerated MA, MA, PhD

New Century College
Integrative Studies BA, BS
Concentrations for BA
- Advertising
- Arts & Culture
- Child & Family Studies
- Conservation Studies
- Elementary Education
- Individualized
- Information & Society
- International Studies
- Language Arts for Education
- Leadership Studies
- Legal Studies
- Organizational Administration
- Public & Community Engagement
- Social Science for Education

Concentrations for BS
- Conservation Studies
- Individualized
- Life Sciences (Pre-Medicine & other Health Professions)
- Natural Science for Education

Minors:
- Leadership Minor
- Multimedia Minor
- Nonprofit Studies Minor

Interdisciplinary Programs
College Teaching Graduate Certificate
Community College Education DA
Cultural Studies PhD

Global Affairs Minor, BA
Higher Education Administration Graduate Certificate
Interdisciplinary Studies MAIS
- Community College Teaching
- Folklore
- Higher Education
- Individualized Studies
- Religion, Culture, and Values
- Video-Based Production
- Women and Gender Studies
- Zoo and Aquarium Leadership

Russian Studies BA
Women and Gender Studies Certificate

Interdisciplinary Minors:
- African American Studies
- Ancient Mediterranean Art and Archaeology
- Asia-Pacific Studies
- Film and Media Studies
- Folklore and Mythology
- Global Systems
- Immigration Studies
- Islamic Studies
- Linguistics
- Middle East Studies
- Multimedia
- Native American and Indigenous Studies
- New Europe
- Nonprofit Studies
- Political Philosophy
- Urban and Suburban Studies
- Women and Gender Studies

The Volgenau School of Information Technology and Engineering

Applied Information Technology
Applied Information Technology MS (pending SCHEV approval)
Information Technology Minor, Certificate, BS, BA/Accelerated MS in Information Security and Assurance, BS/

Accelerated MS in Information Systems, BS/Accelerated MS in Software Engineering, BS/Accelerated MS in Telecommunications, MS

Civil, Environmental, and Infrastructure Engineering
Civil and Infrastructure Engineering BS, BS/Accelerated MS, MS, PhD (pending SCHEV approval)
Civil Infrastructure and Security Engineering Certificate
Discovery, Design, and Innovation Certificate
Information Technology PhD

Concentration:
- Civil and Infrastructure Engineering

Computer Science
Applied Computer Science BS
Biometrics Certificate
Computer Games Technology Certificate
Computer Networking Certificate
Computer Science Minor, BS, BA/Accelerated MS, BS/Accelerated MS in Information Security and Assurance, BS/Accelerated MS in Information Systems, BS/Accelerated MS in Software Engineering, BS/Accelerated MS in Telecommunications, Certificate (Postbachelor), MS, PhD
Data Mining Certificate
Database Management Certificate
E-Commerce Certificate
Foundations of Information Systems Certificate
Information Engineering Certificate
Information Security and Assurance Certificate, Applicable BS/Accelerated MS, MS
Information Systems
Applicable BS/Accelerated MS, MS
Information Technology PhD
Concentrations:
• Information Security and Assurance
• Information Systems
• Software Engineering
Intelligent Agents Certificate
Software Architecture Certificate
Software Engineering Minor, Certificate, Applicable BS/ Accelerated MS, MS
Web-Based Software Engineering Certificate

Electrical and Computer Engineering
Communications and Networking Certificate
Computer Engineering BS, BS/Accelerated MS, MS
Electrical and Computer Engineering, PhD
Electrical Engineering BS, BS/Accelerated MS, MS
Electronics and Communications Engineering BS
Signal Processing Certificate
VLSI Design/Manufacturing Certificate

Statistics
Applied Statistics Certificate
Biostatistics Certificate
Data Analysis Minor
Epidemiology and Biostatistics MS
Federal Statistics Certificate
Signal Processing Certificate
Statistical Science MS, PhD, Applicable BS/ Accelerated MS
Statistical Science and Mathematics Dual Degree MS
Statistical Science and Operations Research Dual Degree MS

Systems Engineering and Operations Research
Architecture-Based Systems Integration Certificate
Command, Control, Communications, Computing, and Intelligence Certificate
Computational Modeling Certificate
Discovery, Design, and Innovation Certificate
Information Technology PhD
Concentrations:
• Civil Engineering
• Civil Infrastructure Engineering
• Information Security and Assurance
• Information Systems
• Operations Research
• Software Engineering
• Systems Engineering
Information Technology Engineer Degree (Post-master’s)
Network Technology and Applications Certificate
Operations Research and Statistical Science Dual Degree MS
Statistical Science and Mathematics Dual Degree MS
Telecommunications Applicable BS/ Accelerated MS, MS
Telecommunications Certificates:
• Advanced Networking Protocols for Telecommunications
• Network Technologies and Applications

Programs of Study

Krasnow Institute for Advanced Study
Computational Social Science Certificate, PhD

School of Management
Accounting BS, MS, Certificate
Business Administration MBA
Business Minor
Executive MBA, MBA
Finance BS
Information Systems and Operations Management BS
Management BS
Marketing BS
Technology Management MS

School of Public Policy
International Commerce and Policy MA
New Professional Studies MA
Concentration:
• Knowledge Management
New Professional Studies MS
Concentrations:
• Organization Development and Knowledge Management
• Peace Operations
Public Policy MPP, PhD
Transportation Policy, Operations, and Logistics MA

Certificates:
• Collaboration and Learning in Policy Organizations
• Culture and Values in Social Policy
• Global Medical Policy
• Global Trade Management
• Governance Systems and Policy Management
• International Business Planning

College of Science
Bioinformatics and Computational Biology
Bioinformatics, Minor
Biostatistics and Computational Biology Certificate, MS, PhD
Bioinformatics Management, MS

Chemistry and Biochemistry
Chemistry Minor, BA, BS, MS
Environmental Chemistry Certificate

Climate Dynamics
Climate Dynamics PhD

Computational and Data Sciences
Computational and Data Science Minor, BS
Computational Science MS
Computational Sciences and Informatics PhD
Computational Social Science Certificate, PhD
Computational Techniques and Applications Certificate

Environmental Science and Policy
Conservation Biology Minor
Earth Science Minor, BS
Earth Systems Science MS
Environmental Management Certificate
Environmental Policy Minor
Environmental Science and Policy MS
Environmental Science and Public Policy PhD
Geology Minor, BA
Global and Environmental Change BS
Ocean and Estuarine Science Minor
**Forensics**
Forensics Certificate

**Geography and Geoinformation Science**
Earth Systems and Geoinformation Science PhD
Earth Systems Science MS
Global and Environmental Change BS
Geographic and Cartographic Sciences MS
Geographic Information Sciences Certificate

Geographic Information Systems Minor
Geography Minor, BA, BS
Geospatial Intelligence Certificate
Remote Sensing and Earth Image Processing Certificate

**Mathematical Sciences**
Actuarial Sciences Certificate
Mathematics Minor, BA, BS, MS, PhD
Mathematics for School of Management Students Minor

**Molecular and Microbiology**
Biodefense MS, PhD
Biological Threat and Defense Certificate
Biology Minor, BA, BS, MS
Biosciences PhD
Medical Technology BS

**Neuroscience**
Neuroscience BS, PhD

**Physics and Astronomy**
Applied and Engineering Physics MS
Astronomy Minor, BA, BS
Physical Sciences PhD
Physics Minor, BS, PhD (pending SCHEV approval)

**College of Visual and Performing Arts**
Arts Administration Minor

**Art and Visual Technology**
Art and Visual Technology Minor, BA, BFA, MA, MFA
Art Education MAT Multimedia Minor

**Arts Management**
Arts Entrepreneurship Certificate
Arts Management MA

**Dance**
Dance Minor, BA, BFA, MFA

**Film and Video Studies**
Film and Video Studies, BA

**Music**
Artist Certificate: Instrumental Performance
Artist Certificate: Piano Performance
Artist Certificate: Vocal Performance
Jazz Studies Minor
Music Minor, BA, BM, MM
Music Education PhD (pending SCHEV approval)
Musical Arts DMA (pending SCHEV approval)
World Music Minor

**Theater**
Theater Minor, BA

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**Key text for the codes and symbols, for the Programs of Study list:**

**Program Codes**
Program codes and symbols have been added to the descriptive information found in college chapters.
- Degree program or certificate program: Solid square symbol, degree-major code.
- Concentration component: Solid triangle symbol, concentration code in parentheses.

**Pending program approval notations:**
SCHEV: State Council of Higher Education for Virginia
About George Mason University

Vision for the New Century

George Mason University will be the university needed by a region and a world driven by new social, economic, and technological realities.

We are in the right place: The nation’s capital region is the epicenter of the world’s political web, its information and communications network, and its new economy.

We are ready: In an age that demands originality and imagination, Mason is among the nation’s most innovative universities.

Mason will

• Be a magnet for outstanding faculty who will devise new ways to approach problems, invent new ways to teach, and develop new knowledge for the benefit of the region and nation.

• Attract inventive, industrious students of all ages and cultures, and produce citizens who are intellectually and technologically literate—people who will lead by the force of their ideas.

• Transform into knowledge and wisdom the vast amounts of information now accessible through new technologies.

• Build strong alliances that bring the know-how of business and the community into the university, and take the knowledge of the university into the workplace and the larger society.

• Be a center of inquiry, knowledge, and professional expertise in fields with vital implications for human needs and opportunities in the future.

• Remain innovative, resourceful, and responsive, while drawing on the intellectual and cultural heritage of the classical university.

Alan G. Merten
President, George Mason University

Faculty and Students

The university’s more than 1,000 full-time instructional and research faculty members are experts in a broad range of fields. They have published widely, contributed to major research findings, and consulted with government and business officials. Faculty members have received grants and awards from the Guggenheim Foundation, the Templeton Foundation, the National Science Foundation, the National Endowment for the Arts, and the National Endowment for the Humanities, and have won Fulbright Scholar grants and Mellon Fellowships.

Of particular interest to undergraduates are the Robinson Professors, outstanding scholars in the liberal arts and sciences who have come to Mason from prestigious positions elsewhere. They are concerned with broad and fundamental intellectual issues and are dedicated to undergraduate teaching. The Schedule of Classes printed every semester provides details about courses taught by Robinson Professors.

The majority of the university’s more than 30,000 students are from Virginia; however, all 50 states and Washington, D.C., as well as 130 countries, are represented in the student body. In the Princeton Review's most recent survey of more than 110,000 students at 357 top colleges, Mason ranks second in the nation in diversity.

While full-time undergraduates, 18 to 24 years in age, make up the largest student group, part-time graduate and undergraduate students account for nearly half of the student population. Mason welcomes qualified students with a wide range of interests and backgrounds.

Distributed University

Mason is a distributed university, with three campuses in Fairfax, Arlington, and Prince William counties, an international campus in the United Arab Emirates, and satellite sites in Loudoun, Herndon, Reston, and Front Royal. Each Mason campus has a distinctive academic focus that plays a critical role in the economy of its surrounding region. At each campus, students and faculty have access to all the university’s resources, while the duplication of programs and support services is minimized through the use of technology.

Fairfax Campus

Situated on 677 acres of wooded land, the Fairfax Campus offers a wealth of opportunities beyond the numerous academic programs and continues to be the principal center for undergraduate residence and life. The resident student population is expected to grow to more than 9,000 during the next five years as new residential units are constructed.
The George W. Johnson Center, the first building of its kind in the country, fosters university-wide learning by integrating students’ curricular and extracurricular activities and strengthening relationships among university communities.

The Center for the Arts and the Patriot Center offer numerous opportunities to experience the arts, as well as sports and other entertainment. Professional artistic events presented on campus include music and dance from around the world; Theater of the First Amendment, Mason’s professional equity theater company that celebrates free speech; and regional, national, and international visual art exhibitions. Free tickets are available to these events for full-time Mason students.

The Aquatics and Fitness Center provides state-of-the-art exercise equipment, as well as competitive and recreational swimming to the university community and outside teams.

**Arlington Campus**

Located near the heart of the Washington, D.C., metropolitan area, the Arlington Campus enjoys an alliance with approximately 200 high-technology firms. Mason’s commitment to form relationships with area businesses provides students with direct access to employment experience and career opportunities.

The newest building on this campus marks the beginning of a three-phase plan to develop the 5.2-acre site. Once complete, the Arlington Campus will include 750,000 square feet of space and many new facilities to accommodate its projected 8,000 undergraduate, graduate, and professional students.

The Arlington Campus offers courses that focus on economics, public policy, and public administration, and is home to the university’s School of Law and the Institute for Conflict Analysis and Resolution. The Volgenau School of Information Technology and Engineering offers special certification courses in information technology through its TechAdvance Program. While most of the programs offered on the Arlington Campus are on the graduate and professional levels, some undergraduate courses are available.

The Arlington Campus is the location of the Mercatus Center, the James M. Buchanan Center for Political Economy, and the Institute for Humane Studies, an independent entity affiliated with the university. These groups work together on projects of mutual interest.

**Prince William Campus**

The Prince William Campus is located on 124 acres in Manassas, near the intersection of I-66 and the Prince William Parkway. The campus serves all of Northern Virginia and offers convenient access to the university for citizens of Prince William, Fauquier, and western Fairfax counties; the cities of Manassas and Manassas Park; and adjoining areas to the west and south. The campus comprises four buildings: a research facility, two academic buildings, and a recreation and fitness center.

Through mutually beneficial partnerships with local government and area businesses, the campus has positioned itself to tap into the unique assets of the surrounding community while providing access to university resources and programs for students and citizens.

A major focus of the campus is research and academic programs in the life sciences, including biodefense and infectious diseases, cancer proteomics, genomics, and bioinformatics. Construction is expected to begin in 2009 on the university’s Biomedical Research Laboratory, a regional biocontainment facility funded in part by the National Institute of Allergy and Infectious Diseases. The laboratory will house research on emerging infectious diseases, as well as those caused by biological threat agents.

Programs in nursing, teacher education, administration of justice, business, information technology, health and fitness, recreation, exercise science, health promotion, parks and outdoor recreation, sport management, therapeutic recreation, tourism and events management, and athletic training also are offered on the campus. Professional certificate programs are available through the Office of Continuing Professional Education.

Campus resources that are available to all university students, faculty, and staff include a full-service library, a large drop-in computer lab, an information center, university police, a university bookstore, dining services, student lounge space, an intercampus shuttle bus between the Fairfax and Prince William Campuses, and a full complement of student and academic services. In addition, there are numerous opportunities to get involved in campus life through a variety of cocurricular and extracurricular activities.

Many campus facilities and services are available to serve both university and community needs. The 300-seat Verizon Auditorium boasts innovative audiovisual technologies suitable for presentations, meetings, and ceremonies, along with lobby space for receptions and displays.

The 110,000-square-foot Freedom Aquatic and Fitness Center offers state-of-the-art exercise equipment, group fitness programs, a full gymnasium with elevated track, and recreational and instructional swimming in a 50-meter competition pool. It is also home to Mason’s human performance lab, classrooms, and other meeting space.

The Mason Enterprise Center is part of the university’s network of enterprise centers that has played a major role in enhancing commerce and developing new programs in support of small businesses throughout Virginia. The center brings this experience and diversity of services to support growing businesses and entrepreneurs in the Manassas and Prince William County areas. It also offers a telework center for low-cost telecommuting in a professional office environment.

Prince William County, the City of Manassas, and Mason, along with the private sector, have joined together to create the region’s first state-of-the-art performing arts center, which will be completed in fall 2009. The Hylton Performing Arts Center will educate, entertain, and enrich the community by providing world-class venues and resources for community arts groups; business, civic, and service organizations in the region; Prince William County and Manassas school students and teachers; Mason students and faculty; and outstanding professional performances by artists from around the world that appeal to a broad audience.

**Ras Al Khaimah Campus**

Recognizing the need for higher education in various fields for the people of the Middle East, Mason, with the support of the government of Ras Al Khaimah (RAK), established a campus in Ras Al Khaimah, United Arab Emirates, to serve and promote higher education in the region.
The RAK Campus offers students bachelor’s degree programs in biology, business administration, electronics and communications engineering, economics, geography, tourism and events management, communication, and applied computer science. In addition, an English language program is offered to help students acquire the reading, writing, speaking, and listening skills they will need for success in their academic studies.

Mason at RAK is in temporary quarters while the permanent campus is under construction. Once construction is complete, the campus will shift to a picturesque site on the Emirates Highway at the Umm Al Quwain-RAK border. The RAK Campus will boast state-of-the-art facilities, including well-equipped labs and a library. Also planned for the site are a recreation and fitness center, sports facilities, a cafeteria, a student lounge, and a full complement of student and academic services.

Mason in Loudoun

Mason’s new Loudoun County operation—Mason in Loudoun—aims to connect students and businesses in one of the nation’s fastest-growing areas to one of the commonwealth’s premier universities. The goal of Mason in Loudoun is to provide courses that will introduce the Loudoun-area workforce and residents to study in a number of exciting areas, while offering current students a local option toward completion of degree program requirements.

Mason in Loudoun offers course work in nursing, health science, education, information technology, and management, along with undergraduate general education courses. Full programs are available in several fields. The operation will rapidly expand its range of courses as student demand and opportunities suggest. Students enrolled in Loudoun will enjoy the same rights, privileges, and access as those on Mason’s Fairfax, Arlington, and Prince William Campuses.

Satellite Sites

The Office of Continuing Professional Education’s Herndon Training Center, located off the Dulles Toll Road and Route 28, provides a wide range of yearly open-enrollment seminars and workshops in its meeting facilities. The Center for Innovative Technology (CIT) classrooms are fully electronic and include a groupware platform. The School of Management’s Executive MBA Program and the Volgenau School of Information Technology and Engineering’s TechAdvance Program are located here.

Each spring the university offers a Smithsonian Mason Semester at the National Zoo’s Conservation and Research Center in Front Royal, Virginia. Students live on site at one of the premier conservation facilities in the world and get to learn from prominent research scientists, educators, and conservation practitioners in a unique learning community.

As a result of his influence, the first 10 amendments, which we know as the Bill of Rights, were added to the U.S. Constitution. The universal significance of this action made the American Revolution much more than a war for independence from Great Britain; it enshrined in our most important public document the principle that a government must always respect the rights of the people.

George Mason, a slave owner, did not recognize that those rights extended to slaves. Nevertheless, his words were later used to demonstrate that slavery could not exist in a country that proclaimed its belief in human rights. While we as a country have not always adhered to George Mason’s great ideas, they remain the measure of the best in our national life.

University History

The university’s growing reputation as an innovative educational leader is rooted in Virginia’s strong educational tradition. By emphasizing high technology, public policy, and the fine and performing arts, Mason has created a curriculum and mission to meet the needs of Northern Virginia’s extraordinary cosmopolitan constituency.

The idea for George Mason University was born in 1949 when the Northern Virginia University Center, essentially an adult-education extension of the University of Virginia at Charlottesville, opened under the direction of John Norville Gibson Finley. In 1955 and again in 1956, the Board of Visitors of the University of Virginia and Virginia legislature authorized the establishment of a two-year branch college to serve Northern Virginia.

The university’s formal history began in 1957 as University College, the Northern Virginia branch of the University of Virginia, offering courses in engineering and the liberal arts. It opened in a renovated elementary school in the Bailey’s Crossroads area with an enrollment of 17 students.

Eager to support the fledgling institution, the Town (now City) of Fairfax purchased 150 acres in 1958 and donated the land to the University of Virginia for a permanent branch campus. The following year, the University of Virginia Board of Visitors selected the name George Mason College. Construction of the campus’ first four buildings was completed in 1964. In September of that year, 356 students began their studies in the new classrooms.

In March 1966, the General Assembly authorized the expansion of George Mason College into a four-year, degree-granting institution and gave it the long-range mandate to expand into a major regional university. The first senior class received degrees in June 1968. Graduate programs began in September 1970, with the first master’s degrees conferred in June 1971. The George Mason College Board of Control, supported by citizens of the cities of Alexandria and Falls Church, and Arlington and Fairfax counties, acquired an additional 422 acres. By the end of 1970, the college’s Fairfax Campus reached 572 acres; it is now 677 acres.

In 1972, the Board of Visitors of the University of Virginia recommended that the college separate from its parent institution. On April 7 of that year, the governor signed the General Assembly legislation that established George Mason University as an independent member of Virginia’s system of colleges and universities.

George Mason, the Man

When George Mason (1725–92) wrote the Virginia Declaration of Rights in 1776, he gave America the noble concept that the rights of the individual must be protected against the power of government. By placing in Virginia’s first constitution a list of rights that could never be taken away from citizens, George Mason sought to ensure a society in which government could not become all-powerful.
Since 1972, the university’s development has been marked by rapid growth and innovative planning. In 29 years, enrollment has risen from 4,166 to more than 30,000 students in 2007. In 1979, Mason was given the authority to grant doctoral degrees and began offering programs at this level. In the same year, the university acquired what became George Mason University School of Law, located on the Arlington Campus.

In 1984, the first Robinson Professors, a group of outstanding scholars committed to undergraduate teaching and interdisciplinary scholarship, joined the faculty as the result of a generous bequest from the estate of Clarence J. Robinson. Drawing prominent scholars from all fields, Mason’s outstanding faculty includes Pulitzer Prize winners; Nobel laureates; Institute of Electrical and Electronics Engineers Centennial Medalists; and recipients of numerous Fulbright, National Science Foundation, and National Endowment of the Arts grants and awards, among others. More than 30 endowed chairs at the university have also brought many artists and scholars to campus.

In 1985, Mason partnered with area businesses to develop an engineering program geared toward the emerging information technology field and started what is now the Volgenau School of Information Technology and Engineering. With the Volgenau School, Mason was the first institution in the country to offer a doctoral degree in information technology.

The establishment in 1990 of the Institute of the Arts, which became the College of Visual and Performing Arts in 2000, solidified the university’s commitment to make the arts an integral part of students’ lives. The Center for the Arts and the arts complex, which includes art galleries, studio and rehearsal space, and performing venues such as Harris Theater and TheaterSpace, are all components of the college.

On the Fairfax Campus, the innovative George W. Johnson Center was dedicated in April 1996. By combining student life resources with educational support facilities such as an interactive library, Mason created the learning workspace of the future. Educational administrators from around the world have toured the center.

The university’s facilities continue to grow. Innovation Hall on the Fairfax Campus was completed in 2003 and holds state-of-the-art electronic classrooms and a television studio. In 2006, the university opened its first facility dedicated to research. Research I contains an observatory and laboratories for a number of campus research centers. Plans for Research II are already under way.

The university has achieved national distinction in many areas. Its reputation continues to grow as Mason provides educational, cultural, and economic resources not only for the people of Virginia, but also the nation and the world.

### University’s Mission

The mission statement of the Board of Visitors was adopted in 1991. It reads as follows:

“George Mason University will be an institution of international academic reputation providing superior education for students to develop critical, analytical, and imaginative thinking and to make well-founded ethical decisions. It will respond to the call for interdisciplinary research and teaching, not simply by adding programs but by rethinking the traditional structure of the academy.

“The university will prepare students to address the complex issues facing them in society and to discover meaning in their own lives. It will encourage diversity in its student body and will meet the needs of students by providing them with interdisciplinary and innovative undergraduate, graduate, and professional courses. The university will energetically seek ways to interact with and serve the needs of the student body.

“The university will nurture and support a faculty that is diverse, innovative, excellent in teaching, active in pure and applied research, and responsive to the needs of students and the community. The faculty will embody the university’s interactive approach to change both in the academy and in the world.

“The university will be a resource of the Commonwealth of Virginia, serving both private and public sectors. It will be an intellectual and cultural nexus between Northern Virginia, the nation, and the world.”

### Accreditation

Mason is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award bachelor’s, master’s, and doctoral degrees. The university is a member of the Council of Graduate Schools in the United States.

### University Foundation

Established in 1966, the George Mason University Foundation works to advance the aims and purposes of the university. It is a 501(c)(3) nonprofit foundation organized and operated exclusively for the benefit of the university.

The foundation assists Mason in generating private support and manages, invests, and administers private gifts, including endowment and real property. The foundation is governed by a volunteer Board of Trustees that is led by a chair. The vice president of university development and alumni affairs serves as the foundation president.
Admission

Undergraduate Admission Policies

Admission is competitive because the number of qualified candidates exceeds the number of new students who can be accommodated. Each candidate who presents sufficient admission qualifications is reviewed in the context of other qualified applicants. An offer of admission is valid only for the semester for which the student applied. Programs with limited space or special requirements may need a second review process for admission.

Applying for Admission

Application for undergraduate admission should be made to the Office of Admissions. Applications are available at admissions.gmu.edu/applynow. A nonrefundable and nontransferable fee must accompany the application.

Application Deadlines for Freshmen and Transfer Students

The application deadline for fall admission is January 15 for freshman applicants and April 1 for transfer applicants. The application deadline for the spring semester is October 15. Mason encourages early applications from prospective freshmen who wish to be considered for academic scholarships. The university reserves the right to close applications before published deadlines if conditions so warrant. Admission is contingent on satisfactory completion of in-progress course work and graduation from high school.

Early Admission

High school juniors who have completed high school graduation requirements except for senior English and government courses may, with the approval of their high school guidance counselor or principal, apply for admission and thereby enter the university one year early. Applicants should present exceptional grades, Scholastic Assessment Test (SAT) or American College Test (ACT) scores, and a high school course of study demonstrating rigorous academic preparation for university-level work. Candidates for this program must arrange an interview with the dean or director of admissions.

Admissions Committee

The Admissions Committee reviews undergraduate admission decisions and appeals. In addition, the Admissions Committee or the Office of Admissions may make other stipulations or recommendations regarding admission of an individual.

Freshman Requirements

The following factors are considered when reviewing freshman applications for admission:

- Cumulative high school grade point average (GPA) for course work completed in grades 9 through 12
- Level of difficulty of course work elected throughout the high school years, particularly in English, mathematics, laboratory science, social science, and foreign language
- Scores from SAT I or ACT (see exceptions under Score Optional Consideration below)
- All non-native English speakers are required to submit scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) exam.
- Essay(s)
- List of extracurricular activities
- Teacher and guidance counselor recommendations

Fall semester applicants whose applications are complete by the application deadline are notified of decisions by April 1. All other applicants are notified on a space-available basis.

The following table specifies the minimum units of college preparatory work required for admission, as well as the minimum units recommended. The recommended units reflect the typical high school program of students who have succeeded in competing for admission in recent years.

In the following chart, column (1) refers to students applying for a bachelor of arts, excluding those in column (3); bachelor of fine arts; bachelor of music program; or with an undeclared major. Column (2) refers to students applying to a bachelor of science degree program, excluding those in column (3). Column (3) refers to applicants who intend to major in prebusiness, chemistry, computer science, engineer-
ing, geology, mathematics, or physics. Note that one unit equals one academic year of study.

<table>
<thead>
<tr>
<th>Required Minimum</th>
<th>Recommended Minimum</th>
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<tr>
<td>(1) (2) (3)</td>
<td>(1) (2) (3)</td>
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<tr>
<td>English</td>
<td>4 4 4</td>
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<tr>
<td>Social Studies</td>
<td>3 3 3</td>
</tr>
<tr>
<td>Mathematics*</td>
<td>3 4 4</td>
</tr>
<tr>
<td>Laboratory Science**</td>
<td>2 3 4</td>
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<tr>
<td>Foreign Language</td>
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<tr>
<td>Other Academic Electives</td>
<td>3 3 3</td>
</tr>
<tr>
<td>Total</td>
<td>17 17 17</td>
</tr>
</tbody>
</table>

*Selected from algebra I, algebra II, geometry, trigonometry, analytic geometry, functions, math analysis, or calculus

**Selected from biology, chemistry, physics, or other advanced lab science

### Freshman Score Optional Consideration

Score optional review provides an opportunity for applicants to be considered for admission without submitting or in disregard of standardized test scores. Admission to Mason remains a highly competitive process, and score optional candidates will be considered on their own merits. Qualifying for score optional review does not guarantee admission to Mason. Qualifications required for score optional consideration can be found at admissions.gmu.edu/scoreoptional.

### Acceptance of Freshman Admission Offer

Mason complies with the national freshman candidate reply date of May 1. Students confirm by completing the enrollment confirmation form in the admission packet and submitting it to the university with an enrollment deposit. The deposit is nonrefundable after May 1.

### Transfer Requirements

Application for admission as a transfer student is competitive. Transfer applicants must submit official transcripts from each Collegiate institution attended. Transfer applicants with fewer than 30 transferable credits must also submit a copy of their secondary school record and test scores. All non-native English speakers are also required to submit a TOEFL or IELTS score or acceptable grades (C or better) in at least two English composition or literature classes taken at another U.S. university or college.

Students on active social or academic probation, suspension, or dismissal are not eligible for transfer admission. Transfer applicants who have been out of school for a semester or longer, excluding summers and school-designated breaks, must provide the Admissions Office with a statement describing activities during this period. A résumé may be submitted in lieu of a statement.

### Transfer Credit

A student transferring into Mason receives a formal evaluation of transfer credit after admission and receipt of enrollment confirmation by the Office of Admissions. The student is responsible for seeing that the Office of Admissions receives official final transcripts of all course work taken elsewhere.

In general, credits are accepted from regionally accredited institutions, provided that a grade of C or better has been earned in the course and the course content is equal to that offered at Mason. Note that only credits, not grades, are transferred; grades for transferred courses will not become a part of a student’s GPA at Mason. Transfer credit is not granted for study in unaccredited institutions.

Forty-five credits of upper-level course work must be completed in residence at Mason to qualify for graduation. While lower-level courses taken at previously attended institutions may meet the content requirement of some upper-level courses, they do not reduce the 45-credit requirement.

Students enrolled on a campus of the Virginia Community College System (VCCS) may access credit equivalency and articulation information at admissions.gmu.edu/TransferGuide. Students accepted into a degree program at Mason are usually not expected to pursue simultaneous course work elsewhere. For more information, go to the Credit to Be Earned at Other Institutions section in the Academic Policies chapter of this catalog.

### Application for a Second Bachelor's Degree

Application for a second bachelor’s degree after conferral of a first degree from any accredited institution must be conducted through the Office of Admissions. After admission, the student will work with the academic program to develop an approved contract or course of study of at least 30 credits beyond the first degree, taken after admission to the second degree to meet university residency requirements. While this contract will detail college level and major requirements to be met, these students do not have to meet Mason’s additional general education requirements.

### Enrollment after Previous Attendance

Students in good academic standing who have missed two or more consecutive semesters of enrollment (excluding summer term) at Mason and do not meet any of the excluded categories listed below may re-enter by completing a re-enrollment form available through the Registrar’s Office or at registrar.gmu.edu/forms/index.html. For graduate students and some undergraduate programs, academic department approval is also required.

### Readmission after Previous Attendance

Students who have missed two or more consecutive semesters of enrollment (excluding summer term) at Mason must apply for readmission through the Office of Admissions if any of the following conditions are true:

- The student is an undergraduate returning after any absence during which he or she studied at another institution, without prior written permission of his or her school or college. Such students must reapply as transfer students.
- The student is international with F-1 or J-1 immigration status.
- The student was suspended or dismissed from any college or university for nonacademic reasons.
- The student was academically dismissed from Mason.
- The student was ever convicted of a felony.
Right to Withdraw Offer
Mason reserves the right to withdraw offers of admission if applicants fail to satisfy all requirements or it is determined that admission was obtained through the use of incomplete, falsified, altered, or embellished information. In the case of withdrawal of admission from a matriculated student, credit earned at Mason may be withheld.

Graduate Admission Policies

Admission to graduate programs is competitive. Selection criteria differ by program and are established by departmental faculty. Applicants are evaluated on the strength of their academic background, results of standardized exams (if required by the program), work experience, and any additional evidence of potential success in the program. Each year, departmental faculty members determine the number of admission offers they may extend by the university resources available for their program.

Admission Standards
To be considered for degree status, the general university graduate admission requirements are as follows:

• An earned baccalaureate degree from a regionally accredited institution of higher education or international equivalent must be verified from official transcripts. (For details, see Admission of International Students section.)
• A 3.00 GPA on a 4.00 scale or better in baccalaureate study. The GPA requirement may be higher for some graduate programs. For students with postbaccalaureate credits, a separate GPA is calculated for each institution. Note: The difficulty of the baccalaureate degree and work experience may be considered in assessing the requirements for admission.

Provisional Admission
A degree-seeking graduate applicant with a baccalaureate degree who has not met all admission requirements may, at the discretion of the college or department, be offered provisional admission if sufficient evidence is presented to suggest the applicant has the ability to pursue graduate work. As a first priority when starting the graduate program, a provisionally admitted student must satisfy the conditions of admission. Once the student has satisfied the conditions specified in the offer of admission and submitted all admission credentials, the provisional qualifier will be removed from the student’s record. Written confirmation indicating the removal will be sent to the student from the college, school, or institute dean or director.

If the student does not meet the conditions within the first 12 credits (or a more restricted time frame specified by the department in the offer of provisional admission), the student will be terminated from the program. All applicants admitted provisionally are in degree-seeking status, and course work taken appears as part of their graduate-level transcript. Students in provisional status may not take courses in the consortium or elsewhere or transfer graduate course work into their program until the provisions of admission have been met.

Graduate Application Requirements
For full consideration for graduate admission, applicants must submit the following:

• Completed Application for Graduate Study
• Nonrefundable application fee
• Application for Virginia In-State Tuition Rates, if claiming entitlement to these rates
• Two official transcripts from all institutions attended for each program applied to unless the programs are in the same college or school
• Goals statement
• Letters of recommendation as required by the program
• Official exam scores, such as GRE or GMAT, reported directly from the appropriate testing service, as required by the program
• Other materials specified by the program, including departmental forms, portfolio, or interview

International applicants should read the Admission of International Students section for more information. Specific departmental admission requirements for degree-seeking students are listed in this catalog under the relevant discipline.

Application Processing Centers
The graduate admissions process is decentralized at Mason. Applicants should send their applications and support documents directly to the Graduate Admissions Application Processing Center assigned to their program. Specific mailing instructions are listed in the Application for Graduate Study, as well as below. Once a graduate application is complete and ready to be evaluated for admission, the graduate application file is sent to the academic department for review by the Faculty Admissions Committee. An applicant is notified by mail of the admission decision.

Below is a list of the Graduate Admissions Application Processing Centers with contact information. Graduate admission questions may be directed to the specific center assigned to an applicant’s program by school, college, or institute.

College of Humanities and Social Sciences (CHSS)
4400 University Drive, MS 2D2
Fairfax, VA 22030
Phone: 703-993-3699
Fax: 703-993-8714
E-mail: chss@gmu.edu

College of Health and Human Services (CHHS)
4400 University Drive, MS 5A8
Fairfax, VA 22030
Phone: 703-993-1736
Fax: 703-993-3606
E-mail: chhssgrad@gmu.edu
Graduate Admission Exams

Although some graduate programs do not require standardized tests, almost all use test scores as an additional measurement of an applicant’s qualifications. For departmental admissions test requirements, consult the table at admissions.gmu.edu/grad.

Information and registration bulletins for all national graduate admissions exams are available at the university Admissions Office.

The GRE may be taken in two forms: the general exam and subject exam. Some departments require official scores for both types of exams. Students may schedule the computer-based GRE general exam by calling 800-473-2255. Students may register for the GRE subject exam online at www.gre.org. To have GRE scores sent to Mason, please use school code 5827.

The GMAT is required of all applicants seeking admission to any SOM degree program and may be taken in lieu of the GRE for the MS in information systems. Students may schedule the computer-based GMAT online at www.mba.com. The various programs at Mason all have separate GMAT codes. For the appropriate code for your program of interest, go to www.mba.com.

The GMAT is also permitted for some programs in the Volgenau School for the master’s in information systems or the master’s in e-commerce programs. Be sure to send your score to Mason by using the correct program code.

The Miller Analogies Test (MAT) is a test of 100 analogies and may be a substitute for the GRE in some graduate programs. To have official MAT scores sent to Mason, use Mason’s MAT code 1768. For information about scheduling the MAT, call 800-622-3231 or go to www.tpcweb.com.

The Praxis I is required by the College of Education and Human Development for graduate applicants to initial teacher licensure programs. Students may schedule the Praxis I by calling 800-853-6773. Passing scores on both Praxis I and Praxis II exams are required for program completion.

The TOEFL is required of all applicants whose native language is not English and who have not received a degree from a university in the United States, Canada, United Kingdom, Australia, or New Zealand. To have TOEFL scores sent to Mason, use school code 5827.

The IELTS may be substituted for the TOEFL. Please see this chapter for additional information on English language testing requirements. Further information can be found at www.toefl.org and www.ielts.org.

Foreign Language Requirements

Certain graduate programs require students who have not already completed 12 undergraduate credits in a foreign language to satisfy a foreign language requirement, which may be accomplished by taking the appropriate courses or demonstrating the equivalent proficiency by passing an exam. Contact the academic program for information on demonstrating language proficiency. Exams are administered by the Department of Modern and Classical Languages.

Admission of Graduate Degree Holders

Those holding one or more graduate degrees may earn an additional graduate degree in another discipline. For admission to a second graduate degree program, students should

submit an application, transcripts, and other documents as required by the second degree program. Course credits used to satisfy the degree requirements for the first graduate degree may not be used to satisfy the degree requirements for the second graduate degree. In programs with overlapping or similar requirements, students will be advised in the subsequent degree program regarding appropriate course substitutions for subjects already covered.

Offer of Admission
The written offer of admission specifies the effective date of admission, category of admission offered, and name of the faculty advisor assigned to the applicant. This offer is good only for the semester for which the applicant applies. The offer must be accepted by returning an Intent to Enroll form and a deposit, if required by the school or college. Those whose offer of admission has lapsed must submit a new application and fee to be reconsidered for admission at a later date. Students may simultaneously apply for more than one graduate program, but if they are admitted to more than one program, they may accept only one offer and pursue only one degree program at a time.

Right to Withdraw Offer
Mason reserves the right to withdraw offers of admission if applicants fail to satisfy all requirements or it is determined that admission was obtained through the use of incomplete, falsified, altered, or embellished information. In the case of withdrawal of admission from a matriculated student, credit earned at Mason may be withheld.

Reactivation of Deferred Applications
Applicants are notified when action on an application has been deferred pending completion of courses that are prerequisite to graduate study in a chosen field. Applicants are encouraged to notify their program’s Graduate Admissions Processing Center in writing as soon as prerequisites have been met. Applicants are responsible for furnishing official transcripts confirming that prerequisite courses have been satisfactorily completed. An admission decision cannot be made until these grades are received.

Change in Field of Graduate Study
Admission for graduate study is admission to a specific program. Therefore, a student is not free to change graduate programs at will. Students seeking to change from one field of study to another must submit a new application, application fee, as well as official transcripts and proof of degree from prior institutions. Previous acceptance into one graduate program does not guarantee acceptance into another.

Graduate Study during Summer Term
Applicants planning to begin graduate work in a summer term must complete a standard application for graduate admission and be formally admitted before registering for classes. Note that not all graduate programs admit for summer term; however, students accepted for fall are considered admitted students, and some graduate programs may allow students to take courses during the preceding summer.

Records Maintenance and Disposal
All admission documents, including academic records sent from other institutions, become part of the official university file and cannot be returned nor duplicated for any purpose. Students should maintain copies of official credentials for other personal use.

Admission credentials are retained for only 12 months. They are subsequently destroyed if applicants do not register for courses within the period for which the offer of admission is valid; have been denied admission; do not respond to requests for additional information; or fail to submit complete applications, including all official transcripts and test results.

Admission of International Students

General Requirements
Application for admission by international students holding or seeking F-1 or J-1 visas should be made directly to the Office of Admissions. Deadlines for the fall semester are before January 1 for undergraduates and February 15 for graduates. For the spring semester, the deadline for all applicants is October 1. These deadlines ensure adequate time to process applications and prepare immigration documents. All international applications must be accompanied by a nonrefundable application fee. Items that must be submitted with the application form are official transcripts and degree certificates (in original language and, if applicable, certified English translation); evidence of English proficiency (via official score reports from the TOEFL or IELTS exam); the International Student Information Form; financial-support documents; copy of passport identification page; and for those present in the United States, copies of immigration documents verifying current nonimmigrant status. Please visit admissions.gmu.edu for full details on items required and deadlines.

Applications from international students are reviewed with all other applications. Admission to the university is competitive; therefore, while minimum standards ensure that an application will be considered, they do not guarantee admission. The number of applicants, qualifications of the applicant pool, and the amount of available space determine the number of admission offers that Mason can make. In addition to overall admission requirements, some schools and colleges have individual requirements for acceptance into the major. For more information, see school or college admission requirements.

Applicants who are accepted to a program will receive a written offer of admission. Most students come to the United States on an F-1 visa, but students who are sponsored by the U.S. government, their home government, or another organization may be required to enter the United States on a J-1 Exchange Visitor’s Visa. To be issued an immigration document (Form I-20 for F-1 status or Form DS2019 for J-1 status), students must prove they have sufficient financial support to cover their expenses while at Mason. If the documentation submitted is satisfactory, the university will issue Form I-20 for F-1 status or Form DS2019 for J-1 status and mail it to the address indicated on the International Student Information Form.

International students outside the United States must take the immigration document to the U.S. embassy or consulate nearest their place of residence and apply for an F-1 or J-1 student visa. The basic requirements for obtaining a student
Admission

visa are a letter of admission, evidence of financial support, an immigration document issued by the school they wish to attend, a valid passport, and proof of strong ties to the home country. For more information about the visa application process, check with the nearest U.S. embassy or consulate, or go to the Department of State’s web site: www.state.gov.

Students in a nonimmigrant visa category other than F-1 or J-1 may submit the International Student Information Form and copies of immigration documents indicating their immigration status. They do not need to submit financial-support documents unless they plan to change to a student visa. For more information pertaining to immigration status, contact the Office of International Programs and Services (OIPS) at 703-993-2970. Additional information is available on the OIPS web site: oips.gmu.edu.

Freshman and Transfer Requirements

A transfer student is one who has completed course work at a college or university after graduating from high school. In addition to the requirements defined for all applicants, international students must meet the following standards:

• Freshman applicants must submit certified official copies of all secondary or high school transcripts in the original language along with an English translation, if applicable. Results of any exit certificates or university entrance exams also must be submitted.

• All freshman applicants are required to submit satisfactory scores on the SAT I or ACT.

• Applicants must demonstrate English proficiency. Applicants whose native language is not English are required to submit TOEFL or IELTS results. To be considered for admission, applicants must have scored at least 230 on the computer-based TOEFL, 88 on the Internet-based TOEFL, 570 on the paper-based TOEFL and 4.5 on the TOEFL essay, or must have received a score of 6.5 or higher on the IELTS. Official test scores must be sent directly from the Educational Testing Service or IELTS. For more information, contact OIPS.

• All transcripts from colleges or universities outside the United States must be translated into English and evaluated by a recognized U.S. evaluation service free of charge for all international transcripts. Because of volume, more time may be needed to process applications requiring a Mason evaluation. For expedited service, applicants can submit their documents to a recognized U.S. evaluation service at their own expense. A list of recognized evaluation services is available in the Mason’s Admissions Office or at www.naces.org.

• Graduate students’ documents should show the award of either a bachelor’s degree or equivalent, or a graduate degree.

Special Conditions for International Applicants

In addition to the academic requirements listed above, international students must meet the following conditions:

• Federal regulations prohibit students on visitor visas (B-1 and B-2) from enrolling in school. Students who entered the United States on a visitor visa should not plan to study. For more information, contact OIPS.

• Federal regulations prohibit F-2 spouses of F-1 students from engaging in full-time study, and F-2 children may engage in full-time study only from kindergarten through 12th grade. F-2 dependents may engage in study that is avocational or recreational in nature. F-2 dependents seeking to pursue full-time or degree study in the United States must change their status to F-1. For more information, contact OIPS.

• Students enrolled at the university on F-1 or J-1 nonimmigrant status must maintain full-time enrollment each semester (12 credits for undergraduate, usually 9 credits for graduate), excluding summer term. Because of this requirement, F-1 or J-1 international students do not qualify for part-time programs nor can they begin their program in the summer.

• Prospective students who seek to enter the United States on F-1 or J-1 immigration status, or seek to transfer to Mason if already in the United States must complete the International Student Information Form, which can be downloaded from admissions.gmu.edu. The form and financial support documents must be submitted to the admissions office along with the application.

• For those students already in the United States, copies of immigration documents verifying current nonimmigrant status must be submitted with the application form.

• To be issued an immigration document, sufficient evidence of financial support, including an original bank statement, scholarship letter, sponsor’s salary statement, or graduate assistantship offer letter, must be provided to cover the first
year of study. Students must also demonstrate the source of financial support for all subsequent years of the program. The International Student Information Form gives an estimate of annual expenses, including tuition, living expenses, and health insurance. Students may not submit statements of stocks, bonds, or company assets. Financial support statements must show available cash and not be older than six months.

- All new students at the university must submit an Immunization Form Card signed by a health professional. The form, available at [www.gmu.edu/student/hcs/form.pdf](http://www.gmu.edu/student/hcs/form.pdf), verifies that immunizations are current. The immunizations required are measles/mumps/rubella and tetanus/diphtheria. Hepatitis B (series of three) and meningococcal vaccines are also encouraged. A tuberculosis screening is required of students from high-risk countries as determined by the Centers for Disease Control and Prevention.

- Financial sponsors who wish to be billed directly must provide a U.S. billing address. Mason does not bill third parties overseas. It is the student’s responsibility to make sure tuition and fees are paid on time.

Health Insurance
University policy requires all students on F-1 or J-1 visa immigration status to have health insurance. The plan must
- Include coverage for health care expenses of at least $50,000 per accident or illness.
- Have an annual deductible amount that does not exceed $500. (The deductible amount is the sum that must be paid by the person enrolled in the health care plan before the insurance company will start to pay any of the bills.)
- Be valid through August 15 of the following year.
- Cover the cost of medical evacuation ($10,000) and repatriation ($7,500).
- Have coverage provided by a company licensed to do business in the United States and has an U.S. claims office and telephone number. (Foreign state government plans that do not meet this requirement will not be accepted.)
- Provide coverage within a radius of 50 miles in the Fairfax area for outpatient and inpatient medical care. (A policy that provides coverage in the Fairfax area on an emergency-care-only basis does not meet this requirement.)
- Provide coverage within a radius of 50 miles in the Fairfax area for outpatient and inpatient medical care, including suicide attempts, as well as substance and alcohol abuse treatment.
- Be paid in full and cannot be cancelled for the remaining academic year. (Monthly payment plans do not qualify, and students need to show proof that insurance is paid in full.)
- Cover pre-existing conditions within six months of the student being insured.
- Include maternity and pregnancy care.

Federal law requires all students on a J-1 visa and their dependents to have health insurance that includes coverage for medical evacuation and repatriation. Medical evacuation coverage pays for returning seriously ill students to their home country, and repatriation coverage pays for returning students’ remains to their home country.

Mason offers health care insurance that meets the requirements for students on J-1 and F-1 visas. When international students register for classes, the cost of this coverage is automatically billed to their accounts by the Office of Student Accounts and is due with the tuition payment. Failure to pay or obtain an exemption may result in cancellation of class registration. Late fees up to $250 may be assessed if charges are not paid by the date established by the Cash Office.

International students are required to purchase insurance for the entire year; however, if a student graduates or terminates attendance before the end of the insurance year, the student may receive a prorated refund by submitting a written request along with proof of return to the home country.

Exemptions from Health Insurance
Exemptions from health insurance requirements for international students are granted by the university’s Student Health Insurance Office. Conditions under which exemptions may be granted include
- Students with the following sponsored foreign government plans are automatically eligible for exemptions: Kuwait, Saudi Arabia, Hariri Foundation, Oman, Qatar, United Arab Emirates, Egypt, and Malaysia (MSD or MARA plans only). Students must inform the insurance office accordingly.
- Students with evidence of an alternative insurance policy that meets the requirements for coverage may be eligible for an exemption. It is the student’s responsibility to apply for an exemption. During the student’s first semester at Mason, an exemption must be obtained from the Student Health Insurance Office no later than one week after the last day to add classes. A late waiver fee of $50 will be assessed if the application is received after that established deadline. No waivers will be processed after the end of the month of that established deadline.

A continuing student is required to establish eligibility for an exemption no later than one week after the last day to add classes of each fall semester. More information is available online at [www.gmu.edu/student/hcs/ins](http://www.gmu.edu/student/hcs/ins).

Nondegree Enrollment

Nondegree Status
Nondegree status enables students who have no immediate degree objective or may need to satisfy prerequisites for admission to a degree program to enroll in courses for which they are qualified without seeking formal admission to a degree program. Enrollment in specific courses is based on eligibility criteria and availability of space in courses; in high-demand fields, enrollment may be restricted or prohibited.

All nondegree applicants must complete a nondegree online application for admission and supply official transcripts from all postsecondary institutions they have attended. High school guest matriculant applicants must submit an official high school transcript, as well as SAT or ACT scores. Secondary school reports and a written recommendation from their guidance counselor are also preferred.
Nondegree applications and their established deadlines are available online at admissions.gmu.edu.

Standards for Admission
Admission to Mason as a nondegree student is competitive and also based on space availability. Nondegree admission is not automatically granted, and nondegree admission does not guarantee enrollment in any specific course or any future degree programs. Nondegree applicants must meet the standards for admission that would apply to the equivalent degree-seeking status.

Graduate Nondegree
Applicants seeking to take graduate-level courses or graduate prerequisite courses must meet graduate admission standards. These students will be considered graduate level even if they are taking undergraduate courses. Individual units and majors may have additional requirements for nondegree graduate status (see below). A student cannot graduate or receive a degree while in nondegree status. All master’s programs require at least 18 credits to be completed in degree status at Mason to be considered for graduation, and some graduate programs allow a maximum of 6 credits to be transferred from nondegree status. It is strongly recommended that students who plan to seek a degree from Mason apply for degree status admission as soon as possible.

Nondegree students are expected to meet the same academic standards as degree-seeking students. See Academic Termination in the Graduate Policies section of the Academic Policies chapter in this catalog.

Undergraduate Nondegree
Applicants who do not have a bachelor’s degree but have graduated from high school or received a GED and have earned a minimum of 24 semester hours of transferable credit may apply for nondegree admission. Transcripts from all colleges attended are required. High school transcripts and SAT or ACT scores may be requested.

Applicants with a bachelor’s degree seeking to take undergraduate courses toward a second bachelor’s degree or for personal development must meet the standards for admission for a bachelor’s degree. These students will be considered undergraduate students and are not eligible to take graduate courses or receive graduate academic advising. Students who later seek to enroll in graduate courses or wish to receive graduate academic advising must submit a new nondegree graduate application and be reconsidered for admission.

Nondegree Studies students are allowed to register for a maximum of 10 credits per semester. A maximum of 18 undergraduate credits may be applied to an undergraduate degree program upon approval of the undergraduate program’s dean.

All undergraduate nondegree students are subject to the academic standing regulations and sanctions described in the Requirements for Retention section in the Academic Policies chapter of this catalog.

High School Guest Matriculants
High school juniors or seniors who are currently enrolled in good standing in high school but have not yet graduated from high school and do not have a GED may be considered for admission as high school guest matriculants. These applicants will be evaluated based on their academic performance in high school. Recent SAT I or ACT test scores and recommendations from guidance counselors and teachers may also be requested. Only students who have excelled in high school and demonstrate the preparation and maturity indicative of the potential to succeed in Mason’s competitive course work will be admitted. Mason cannot guarantee that courses will fulfill high school graduation requirements or that courses taken while in High School Guest Matriculant status will transfer to other institutions.

Academic Advising, Action
Upon initial enrollment, nondegree students are assigned to one of the colleges, schools, or institutes at Mason according to their original course selection and level (graduate or undergraduate). Once assigned, the academic unit is responsible for advising and handling requests that require a dean’s permission.

Grades earned through Nondegree Studies remain a part of the student’s permanent nondegree record and are recorded on the standard university nondegree transcript. They will not appear on the degree transcript unless the student is accepted to a degree program and permission is given by the dean to apply the nondegree credit to the degree program.

Senior Citizens
Under terms of the Senior Citizen Higher Education Act of 1974, eligible Virginia residents 60 years of age or older, with a taxable income not exceeding $15,000, are entitled to enroll in courses offered for academic credit, on a space-available basis, without paying tuition and enrollment fees. Senior citizens who meet the income eligibility requirement and have completed a minimum of 75 percent of degree requirements may enroll in a degree program during normal registration periods without paying tuition and enrollment fees. The admissions application fee cannot be waived.

Citizens who wish to take advantage of this act must complete the online nondegree or degree application found at admissions.gmu.edu. Upon approval of their admissions application, senior citizens can request a waiver of tuition and enrollment fees by completing the Senior Citizen Tuition Waiver Form, available from the registrar’s office or online at registrar.gmu.edu/forms/index.html. To facilitate processing, senior citizens should provide their Mason student identification number on the waiver form.

In addition, the act allows senior citizens to audit courses (no academic credit is received) and enroll in up to three noncredit courses per semester without paying tuition and enrollment fees, regardless of the taxable income level. Students seeking to audit a class must notify the Registrar’s Office when registering for classes. Students seeking to enroll in noncredit courses should contact the Office of Continuing Professional Education at 703-993-2109. Fees for course materials may apply to senior citizen enrollees, and tuition may be charged for courses designed exclusively for senior citizen groups. Senior citizens must adhere to all registration policies and follow normal procedures to add and drop courses within the deadline dates outlined in each semester’s academic calendar.
Graduate Nondegree Status

The Volgenau School of Information Technology and Engineering

Admission for nondegree graduate study is suitable for those who do not want to pursue a degree but are interested in taking graduate courses from the Volgenau School of Information Technology and Engineering. The Volgenau School nondegree graduate application forms are available on the web at admissions.gmu.edu. The following application materials should be submitted for consideration:

- The Volgenau School online nondegree application
- Official transcripts indicating confirmation of bachelor’s degree
- Nonrefundable application fee

Approval for nondegree status does not guarantee admission to a degree program at a later date. Up to 12 credits taken in nondegree status may be transferred to a Volgenau School degree or certificate program, subject to the general rules for transfer of graduate credit. Students who do not register for the term for which they are accepted may have their enrollment postponed for one semester upon written request to the Admissions Office. More information about the Volgenau School programs and course offerings may be obtained from the Volgenau School departmental offices or the Volgenau School Graduate Admissions Office, Science and Technology II, Room 133, 703-993-1512.

College of Science (COS)

Nondegree status is available for professionals who are interested in taking a limited number of courses without committing to a degree or certificate program. Up to 12 credits taken in nondegree status may be transferred to one of the COS academic programs at a later date. Approval for nondegree status does not guarantee admission into an academic program. For admission into nondegree status, the student should have a 3.00 GPA or higher and a BS degree in mathematics, computer science, engineering, natural science, or a related field. Exceptions are reviewed on an individual basis.

The following application materials should be submitted for consideration:

- COS nondegree application
- Official transcripts
- A nonrefundable application fee
- Résumé

The COS nondegree application can be downloaded from cos.gmu.edu.

School of Public Policy (SPP)

Students are welcome to apply for nondegree study in SPP for fall and spring terms only. To apply, students should complete the nondegree application online at admissions.gmu.edu/applynow. In addition to completing the online application, students are required to submit official transcripts from all institutions attended. Nonnative English speakers must present a minimum TOEFL score of 230 on the computer-based exam or 575 on the paper version. For more information, call the SPP Admissions Office at 703-993-8099.

Summer Term

Phone: 703-993-2300
Fax: 703-993-8871
Web: summer.gmu.edu

Summer enrollment is open to eligible undergraduate, graduate, and nondegree students. Summer term offers day and evening classes in four five- to eight-week sessions. Academic departments take advantage of the summer term’s unique opportunities to schedule innovative, as well as traditional, courses. Many undergraduate and graduate students use summer term to continue their academic progress. Continuing Mason students can register for summer online. Students who are new to Mason need to apply for admission at admissions.gmu.edu/applynow.

Academic Testing

Advanced Placement and Credit by Exam

Academic departments frequently revise information regarding credit by exam. The most current information can be found at admissions.gmu.edu.

Mason Departmental Exams

Proficiency exams are offered in a number of courses usually taken during the first two years. Credit is recorded for grades of C or above, but it does not affect the student’s GPA. Students may not earn credit by exam for courses in which they are currently enrolled beyond the time allotted to add courses in that semester or in courses already audited or failed at the university. Transfer students may not earn by exam any part of the 30 credits that must be completed at Mason to earn a degree.

English 101 Proficiency Exam

Students who pass the English 101 Proficiency Exam will receive 3 credits for English 101. The three-hour essay is based on a choice of topics. The exam is scheduled periodically during the semester. For more information, go to the English Department’s proficiency exam web site at composition.gmu.edu/students/exemption.php.

English 302 Advanced Composition Exam

Students seeking exemption from English 302 may submit a written portfolio to the English Department. To qualify, the written portfolio must demonstrate proficiency equal to that of students who have successfully completed English 302. The prerequisite for taking the English 302 advanced composition exam is completion of 45 credits, completion of English 101 or 100, and completion of the literature requirement for the major. The English Department will accept a portfolio between September 1 and April 8. Additional information regarding the English 302 exam can be found at composition.gmu.edu/students/exemption.php.

Foreign Language Placement

The College Board SAT II test in a foreign language is used for placement in Chinese, French, German, classical Greek, Italian, Latin, Russian, and Spanish. Freshman applicants who wish to receive the appropriate foreign language placement should take this exam during their senior year in high school.

Students who wish to receive the appropriate foreign language placement should take this exam during their senior year in high school.
school. Students who have not taken the SAT II in a foreign language may take it in the foreign language lab once they are on campus. The SAT II exam is mandatory for anyone who has studied one of these languages for at least two years, has no previous college credit in the language, and seeks to continue study of the same language at Mason. Transfer students receiving credit for college-level foreign language study completed at other colleges usually do not need a placement test, but they must consult the Department of Modern and Classical Languages to determine correct placement.

It is the student’s responsibility to take a placement exam and obtain results before enrolling in a foreign language course. The placement exam is given in conjunction with orientation. The schedule can be found online at mcl.gmu.edu/resources/placement_testing.html. Specific information on interpreting test scores can be obtained from the Department of Modern and Classical Languages.

Students may not enroll for credit in a course at a level lower than the one in which they are placed. Students and instructors should attempt to identify and resolve cases of inappropriate placement during the first days of each course. For students whose degree program contains a foreign language requirement, the placement determines the maximum number of credits, if any, that will be needed to fulfill the requirement.

A foreign language placement is not required of international students who present evidence of having studied for four or more years in an educational institution where the primary language of instruction was other than English. These students will be considered to have fulfilled the foreign language requirement, but they are not eligible for credit below the 300 level.

If through transfer credit, a placement test score, or Mason course work a student meets the prerequisite for a lower-division foreign language course that is not offered during a particular semester, the dean usually grants permission to continue the foreign language sequence by allowing the student to take courses at another college or university.

**Math Placement Exam**

The Math Placement Exam is a computer-based test to help assess a student’s proficiency. Entering students are required to complete the exam successfully during orientation unless they have received AP credit or transfer credit. The web address for the math placement test schedule is cos.gmu.edu/academics/undergraduate/math_placement_testing.
Tuition and Fees

General Guidelines

- Students are responsible for maintaining current addresses via Patriot Web (patriotweb.gmu.edu), and for activating and checking their George Mason University e-mail accounts to receive official university communications.

- By registering for classes, students accept responsibility for the semester charges. Students are responsible for dropping, by the dates listed in the Schedule of Classes, all classes (including waitlisted classes) they do not plan to complete. Students must follow the drop and withdrawal procedures published in each term’s Schedule of Classes. Full or partial tuition liability may apply.

- Refer to the Payment Schedule and the Academic Calendar in each term’s Schedule of Classes for payment due dates and tuition penalties for dropping classes after the start of the semester.

- Failure to receive a reminder bill confirming charges does not waive the requirement for payment when due. Balances may be verified and paid via Patriot Web (patriotweb.gmu.edu).

- Payments are due in the Cash Office, Student Union Building I, Room 104, on or before 4:30 p.m. on due dates, regardless of postmark if mailed. Check, Visa and MasterCard payments made on Patriot Web must be completed by 10:30 p.m. to be considered in that day’s business.

- Students who have not completed the financial aid process must be prepared to pay for their courses by the tuition due date or a late payment fee will be charged. The amount of financial aid accepted and processed will be reflected in your balance. If the amount of aid awarded is less than the charges, the difference must be paid by the tuition due date. Federal Loan borrowers must submit a completed promissory note at least four weeks before the payment due date to the Financial Aid Office (South Chesapeake Module) for these funds to be considered in your balance. Federal work-study awards cannot be deducted from your balance. Financial aid recipients must also notify their financial aid counselor if they drop courses below the minimum required credits for their financial aid award.

- Out-of-state students with pending domicile requests are responsible for payment at the out-of-state rate. Students who are later determined to be in-state can request reimbursement for the difference in tuition rates.

- Payments not received by the due date will be assessed a late payment fee, which is 10 percent of the balance due up to $125.

- Students who add their first class on the first day of the semester or after are assessed a $125.00 late registration fee. The fee does not apply to students already registered prior to the start of classes who make schedule adjustments. Waitlisted classes are not considered class registration.

- Financial Good Standing: No Holds on Record – Financial good standing and a university record clear of holds are required for students to receive academic services. Services, including but not limited to transcript issuance, diploma release, and class registration (add, drop, withdrawal etc.) will not be provided to students with a financial balance due or a hold of any kind on their record. Holds are based on outstanding obligations and may be financial. Examples include unpaid telephone charges, fines owed from traffic/parking violations, incomplete immunization records, fines owed to the Mason or Consortium libraries, and other administrative holds.

- Non-returning students are responsible for dropping courses for the semester and ensuring they do not have an outstanding balance on their account. Any documentation or intent made to the Admissions Office that you are not returning does not withdraw you from the registered courses. Please drop courses and check your account status via Patriot Web.

- Students enrolling in Mason off-campus courses are assessed tuition and fees at the same rates as those for on-campus courses.

- A few Mason degree programs include academic credits that students must earn at other academic institutions.
Students enrolling for such credits assume all financial responsibility directly with the other institutions.

2008–09 Semester Tuition Charges (subject to change)
Approved tuition rates are available June 1. For more information, call Student Accounts at 703-993-2484, or go to studentaccounts.gmu.edu. Also, students are charged tuition rates according to their academic level; graduate rates vary.

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<th>In-State Undergraduate</th>
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<td>Full-time (12–16 credits)</td>
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<td>$845</td>
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* Graduate students are charged by the credit.

Related Fees
These are applicable to all students and are subject to change:
- Application Fee, Undergraduate $50
- Application Fee, Graduate $70
- Lab Fee $25
- AVT Arts Bus fee $50
- AVT, SOM Course Fee (per credit) $15
- VSITE, CVPA, SCS Course Fee (per credit) $10

Orientation/Undergraduate
- New Student Fee $160 (nonrefundable)
- Graduate New Student Fee $60 (nonrefundable)
- International Student Health Insurance Fee $1366

Note: The new student fees are mandatory, non-refundable. Late registration fees are nonrefundable and will not be removed, regardless of enrollment status.

Payment Information
Payment Deadline
Payment is due the first day of classes. See the payment schedule in the Schedule of Classes. Payments received at the Cash Office by 4:30 p.m. Monday to Friday will be considered in that day’s business. Check, Visa, and MasterCard payments made on Patriot Web must be completed by 10:30 p.m. to be considered in that day’s business. To confirm receipt of payment and balance due on account, go to patriotweb.gmu.edu. Allow ample time for processing payments.

Methods of Payment
Cash: At window only, Cash Office, SUB I, Room 104.
Check: Payable to George Mason University, with student ID number written on front. Third-party checks are not accepted. Checks must be payable in U.S. dollars.
MasterCard or Visa payments are accepted online through Patriot Web. Credit card payments can also be submitted by fax, using the fax payment authorization form. The form is available at studentaccounts.gmu.edu and the fax number is 703-993-2492.

Delivery Methods
Web: Patriot Web, patriotweb.gmu.edu online checks, MasterCard, or Visa
Window: Cash Office, SUB I, Room 104, Monday through Friday 9 a.m. to 4:30 p.m.
Drop Box: Outside Cash Office, SUB I, Room 104
U.S. Mail: George Mason University, Cash Office, 4400 University Drive, MS 2E1, Fairfax, VA 22030-4444.
Postmarks are not considered proof-of-payment date.

Semester Payment Plan
The Mason semester payment plan is available for students who need to budget a minimum of $500 and wish to make two payments. Payments for Study Abroad, Global Education, and International Student Health Insurance cannot be deferred. A payment contract, available on the Student Accounts web site, must be submitted to the Cash Office with a down payment of one-half of the contract amount plus fee. The contract fee is $25 and non-refundable. Failure to pay the outstanding balance will result in a financial hold, a late fee up to $125, and normal university collection activity. Failure to pay may prevent students from being eligible to use this contract in future semesters. Please refer to studentaccounts.gmu.edu for up-to-date payment plan options.

Third-Party Billing Authorizations
Students using a third-party billing authorization will be charged a $25 processing fee. Students must provide the third-party authorization or government training voucher to the Student Accounts Office, North Chesapeake Module, Room 11, or fax to 703-993-2460 before the payment due date. Students are ultimately responsible for any defaults in payments by the sponsoring agency. Call 703-993-2484 for a copy of third-party billing requirements, or check the web at studentaccounts.gmu.edu.

Penalties
A late registration fee of $125 is automatically assessed to students who add their first class for the semester on the first day of classes or after. It does not apply to students already enrolled prior to the start of classes who make schedule adjustments. Late registration fees are nonrefundable and will not be removed, regardless of enrollment status.

Failure to make any payment on or before the due date results in a late payment fee which is 10 percent of the balance due up to $125.
Registrations will not be canceled for nonpayment. Students must drop classes they do not plan to complete by the payment due date to avoid the late payment fee on those classes.

Returned Checks
A $25 returned check fee will be charged for each unpaid check returned by the bank. If the returned check results in an unpaid account, an additional late fee up to $125 may be charged and financial suspension will result.

Financial Good Standing; No Holds on Record
Financial good standing and a university record clear of holds are required for students to receive academic services. Services, including but not limited to transcript issuance, diploma release, and class registration (add, drop, withdrawal etc.) will
not be provided to students with a financial balance due or a hold of any kind on their record. Holds are based on outstanding obligations and may be financial. Examples include unpaid telephone charges, fines owed for traffic/parking violations, incomplete immunization records, fines owed to the Mason or Consortium libraries, and other administrative holds.

**Collections**

Failure to meet financial obligations to the university may result in the delinquent account being placed with a collection agency, the withholding of money from tax returns, and other collection procedures. Students are responsible for costs incurred by the university to collect delinquent accounts.

**Dropped Courses**

Students are required to pay full or partial tuition for courses they drop after the last day to drop with full tuition refund, including drops to change from one section of a course to another section. For more information, see the tuition liability dates in the Academic Calendar in the Schedule of Classes. In cases where tuition liability is less than the payments on the student’s account, a refund of the overpayment may be requested. A refund request form is available via the Student Accounts web site and Student Accounts Office. The university will mail check refunds payable to the student; credit card refunds are credited back to the card that was used for the original payment.

**Special Registration**

Students not enrolled in a credit-bearing course, but whose academic department certifies that they are pursuing an activity related to George Mason matriculation, can retain active status by having the Registrar’s Office process a registration for the Special Registration course(ZREG 200). A $45 fee is charged for this course, and students must pay this fee before the Registrar’s Office will process the registration. Written approval of the student’s advisor or instructor and the academic department chair is required. This special registration allows students to retain their library and computer privileges, receive a student ID, and buy a parking decal. Students must have active status to apply for or receive a degree, take an exam, or participate in cooperative education. Students pursing a master’s or doctoral degree must maintain continuous enrollment. For more information, see the “Graduate Policies” section in the Academic Policies chapter.

**International Student Health Insurance**

Health insurance is required for all F-1 and J-1 visa holders, and nonpayment may result in class cancellation. The health insurance fee is deducted from all payments received by the university before funds are applied to tuition or other charges. For more information, see the Admission of International Students section in the Admissions chapter.

**Music Instruction**

Private music instruction is arranged through the Department of Music on a fee-paying basis. A half-hour lesson (1 credit) is $164.50; an hour lesson (2 or 3 credits) is $329. Note that this fee is subject to change.

**In-State Tuition**

To be eligible for in-state tuition, a student must have been domiciled in Virginia for at least one full year before the semester for which in-state tuition is sought, or qualify through statutory exception. A person establishes domicile by demonstrating physical presence and the intention to remain indefinitely in accordance with Virginia domicile guidelines. Copies of the guidelines and other applicable state laws are available from the Office of the Registrar or at registrar.gmu.edu/domicile.

**Domicile Change**

Domicile classification is determined at the time of a student’s admission. To be considered for in-state status when applying to the university, students must file an application for in-state rates.

New and currently enrolled students classified as out-of-state who believe they qualify for in-state tuition after being admitted must file a domicile appeal form with the Office of the Registrar no later than the first day of classes for the semester in which in-state rates are sought. Appeal forms are available from the Office of the Registrar and at registrar.gmu.edu/domicile.

Students whose appeals are denied have the right to seek further review of their status by the Office of the Registrar or the Third Level Domicile Appeals Committee. These requests must be filed in a timely manner as stated in denial letters. Forms are available from the Registrar’s Office and the web site. In addition, students should be aware that university procedures for appealing domicile decisions have been established pursuant to state law and are subject to change. Out-of-state students with an appeal pending at the time of tuition billing are responsible for payment at that rate. Students subsequently determined to be in-state may request reimbursement of overpayment from the Office of Student Accounts. Also, any student who fraudulently or knowingly provides false information in an attempt to evade payment of out-of-state tuition will be charged out-of-state tuition for each term or semester attended, and may be subject to dismissal from the institution.

For more information regarding in-state eligibility, contact Domicile Administration in the Registrar’s Office in North Chesapeake Module, Room 8, phone: 703-993-2464, e-mail: domicile@gmu.edu.

**Tuition Surcharge: 125 Percent of Degree**

Undergraduate students who have established Virginia domicile and eligibility for in-state tuition will be subject to a surcharge if they exceed 125 percent of the credits required to complete a degree. The surcharge will be determined by the State Council for Higher Education in Virginia.

The following courses and credit hours shall be excluded in calculating the 125 percent credit threshold: remedial courses; transfer credits from another college or university that do not meet degree requirements for general education courses or the student’s chosen program of study; advanced placement or international baccalaureate credits that were obtained while in high school or another secondary school program; and dual enrollment, college-level credits obtained by the student prior to receiving a high school diploma.
Expenses

Housing
Office of Housing and Residence Life
Ground floor of Potomac Heights
Phone: 703-993-2720
Web: housing.gmu.edu

The university offers a variety of housing options to meet the diverse needs of students living on campus. Upper-class students may choose from traditional-style residence halls, suites, apartments, and townhouses. The university requires freshmen living on campus to live in Presidents Park or University Commons, which have traditional-style residence hall rooms that accommodate four, three, or two students. The estimated housing costs for the 2008–09 academic year are approximately $3,410 to $7,410 per year. Housing rates are subject to change; actual rates will be available early in the spring 2008 semester on the Office of Housing and Residence Life web site. All students in housing must provide a prepayment, which is applied to the spring semester rent. Housing assignments, including single rooms, are made on a priority and space-available basis.

Students living on campus are required to sign an academic (two-semester) year contract. Releases from the contract are granted only in cases of unforeseen hardship and carry a financial penalty. For more information, contact the Office of Housing and Residence Life, which is located on the ground floor of Potomac Heights in the wing closest to the Aquatic and Fitness Center.

Dining Services
SUB II, Room 2014
Phone: 703-993-2870
Web: www.gmu.edu/univ_ctr/services/dining
Meal Plan Office
SUB II, Lower Level, Room 1013
Phone: 703-993-2870
Web: www.gmu.edu/univserv/allunivcard

Dining Services offers a variety of food options for students living on campus or commuting to any of the three Mason campuses. The Dining Services locations on the Fairfax Campus include a brand new resident dining facility, Southside Dining, which will open in fall 2008 and offer alfresco dining and a first floor take-out window; Damon’s, Damon’s Express, Jazzman’s, and Chik-fil-A in SUB I; and several options including a food court featuring national names such as Charlie Chiang’s Ya-Ya’s, Burger King, and Taco Bell Express in the Johnson Center. Dining Services units are also located on the Arlington and Prince William Campuses.

For the 2008–09 academic year, meal plans for students living on campus range from approximately $2,470 to $3,450 per year (rates are subject to change). A variety of meal-plan options are available for resident students, off-campus students, faculty, and staff.

Dining Plan Changes
Meal Plan Office
SUB II, Lower Level, Room 1013
Phone: 703-993-2870

Increases in meal plans may be made at any time; however, the last day to decrease mandatory meal plans coincides with the last day to add classes. Seniors with 90 credits or students living in the townhouses, apartments, Liberty Square, or Potomac Heights are not required to have a meal plan. Changes must be made at the Meal Plan Office, located on the lower level in SUB II, 703-993-2870.

Parking Services
Sandy Creek Parking Office
Phone: 703-993-2710
Web: www.gmu.edu/univserv/parking

Students who park their vehicles on university property must register them with Parking Services and pay a fee for a parking permit. Permits are available on an annual, semester, or summer basis. For permit sales, fine payments, special requests, or problems, go to the Sandy Creek Parking Office. Hours are 8:30 a.m. to 5 p.m. on Monday, Wednesday, Thursday, and Friday, and 8:30 a.m. to 7 p.m. on Tuesday. For more information, read the Parking Policy section in the General Policies chapter of this catalog, or go to www.gmu.edu/univserv/parking for current information and rates.

Financial Aid

Office of Student Financial Aid
South Chesapeake Module
E-mail: finaid@gmu.edu
Phone: 703-993-2353
Fax: 703-993-2350
Web: financialaid.gmu.edu

The Office of Student Financial Aid provides a variety of services to help students finance their education. They include counseling, referral and information resources, and financial assistance. Student financial aid awards consist of grants, loans, and work-study. Awards are based primarily on financial need, although there are some alternative resources available for those who may not qualify for need-based aid.

The office has a comprehensive listing of various scholarship opportunities for students to research on the financial aid web page. Students are encouraged to review the scholarship information early and frequently to meet deadlines, since the listings are updated often.

Located in South Chesapeake Module, the office is open 9 a.m. to 5 p.m. Monday through Friday. Financial aid counselors are assigned to students alphabetically based on students’ last names and are available daily by appointment.

To apply for financial aid, each year new and currently enrolled students must complete a Free Application for Federal Student Aid (FAFSA). George Mason’s federal school code for the FAFSA is 003749. Priority consideration for all sources of financial aid is given to those students whose financial aid applications are on file with the Office of Student Financial Aid by March 1. To meet this priority filing date, students should file the FAFSA as soon as possible after January 1. The FAFSA can be filed online at www.fafsa.ed.gov or a paper copy can be obtained from the office.

Financial aid for summer is generally limited to students who have remaining Federal Pell Grant or federal loan eligibility. Contact the Office of Student Financial Aid for specifics regarding eligibility. The summer aid application is available online and in the office on April 1.
All students receiving financial aid must be enrolled in an eligible degree or certificate program for at least half-time in any given semester; maintain satisfactory academic progress as defined by the Office of Student Financial Aid, in accordance with federal guidelines (see below); and be a U.S. citizen or eligible noncitizen as defined by the U.S. Department of Education.

All aid recipients are responsible for becoming familiar and complying with applicable federal and state laws, university regulations, Mason student aid information resources, and the student aid satisfactory academic progress policy. This policy is detailed in the glossary section of the home page of financialaid.gmu.edu and in the Office of Student Financial Aid.

Academic Progress Standards
Federal legislation governing the administration of federal programs requires colleges and universities to define and enforce standards of progress for students receiving or applying for financial aid. To comply with this legislation, the Office of Student Financial Aid has established a formal satisfactory academic progress policy. For detailed information, go to the Student Financial Aid home page at financialaid.gmu.edu or contact the Office of Student Financial Aid.

Aid Programs
The university administers the following federal, state, and other aid programs:

- **Federal programs**: These include the Federal Pell Grant, Federal Supplemental Educational Opportunity Grant (FSEOG), Federal Work-Study (FWS), Federal Perkins Loan Program, Federal Subsidized Stafford Loans, and Federal Parent Loans for Undergraduate Students (FPLUS). For more information, refer to the Student Guide for Federal Financial Aid, which is available in the Office of Student Financial Aid, or go to the Student Financial Aid home page at financialaid.gmu.edu.

- **State programs for undergraduate Virginia residents**: Eligibility for all state programs is based on results received from the FAFSA. State grant funds are limited, so adherence to the March 1 priority filing date is critical.

- **Virginia Commonwealth Award**: This program is open to undergraduate students who have demonstrated financial need, are enrolled at least half time, and are domiciliary residents of Virginia.

- **Virginia Guaranteed Assistance Program (VGAP)**: This program is a component of the Virginia Commonwealth Award Program that is open to students who demonstrated academic achievement in high school. VGAP awards are renewable for up to four years.

- **College Scholarship Assistance Program (CSAP) Grant**: This program uses a combination of federal and state funds to provide additional assistance to students who are enrolled at least half time, are Virginia residents, and who demonstrate significant financial need.

- **Graduate student assistance**: Assistantships, fellowships, and scholarships exclusive of the federal financial aid programs identified earlier are administered by the individual graduate programs. Students interested in pursuing graduate assistantships, fellowships, or scholarships should contact their graduate program.

Emergency Loan Programs
- **Mary E. Ferguson Emergency Loan Program**: Currently enrolled students may borrow funds for legitimate emergencies, excluding tuition, fees, books, and supplies. Emergency loans must be repaid within 30 days; overdue payments result in a late charge of $5 for each 30 days past due. Failure to repay the loan within 30 days without requesting an extension for a reasonable justification will result in financial suspension. Students financially suspended for nonpayment of an emergency loan are ineligible for any future emergency loans. Application is made through the Office of Student Financial Aid.

- **Doug Beaman Emergency Loan Program**: The George Mason University Alumni Association established an emergency loan fund through which students may borrow up to $100 with repayment due within 30 days. The program is available to all students, with priority given to children of alumni. Application is made through the Office of Student Financial Aid.

- **Lisa Kenaga Memorial Student Emergency Loan Fund**: The Office of Student Financial Aid has established an emergency loan fund through which currently enrolled students may borrow funds for legitimate emergencies, excluding tuition and fees. Emergency loans must be repaid within 30 days with a $10 processing fee; overdue payment results in a late charge of $5 for each 30 days past due. Failure to repay the loan within 30 days without requesting an extension for a reasonable justification results in financial suspension. Students financially suspended for nonpayment of an emergency loan are ineligible for future emergency loans. Application is made through the Office of Student Financial Aid.

ROTC Scholarships
Please see the Reserve Officer Training Corps section in the Academic Programs and Resources chapter.
Academic Policies

Policies and Procedures Affecting All Students

Knowledge of University Policies
Each student is responsible for knowing Mason’s rules, regulations, requirements, and academic policies. This catalog is the normal repository of policy statements, but corrections, changes, or interpretations can be promulgated by other means, including electronic publication.

When the university or one of its academic units changes course requirements, grading procedures, or criteria for acceptance into particular programs, academic standing, or graduation, the changes apply to all students enrolled at the time of implementation of the change and thereafter.

Students have certain choices regarding the set of degree requirements under which they graduate, as detailed in the Catalog Requirements for Degrees section of this chapter.

The Special Collections and Archives section of the Fenwick Library has copies of all previous catalogs. They may not be checked out but may be photocopied. Any student in doubt about an academic matter should consult a faculty advisor or dean.

Students are subject to the university’s stated policies regarding patents and copyrights. These policies are available at www.gmu.edu/research/OSP/Policies.html.

Official Communication with Students

Web: mail.gmu.edu

Mason uses electronic mail to provide official information to students. Examples include notices from the library, notices about academic standing, financial aid information, class materials, assignments, questions, and instructor feedback. Students are responsible for the content of university communication sent to their Mason e-mail account and are required to activate that account and check it regularly.

Student Requests for Academic Actions

All requests for academic actions, such as special permissions or exceptions to published academic regulations, must be submitted to the head of the unit in which the student’s program is housed, for example, department chair, institute director, or school or college dean. Request forms and instructions on how to initiate an academic action are available in the academic unit and on the unit’s web site. For students who have not yet declared a major, the academic actions process is executed in the Office of Student Academic Affairs, Johnson Center, Room 245. Students will be informed of the average wait time for decisions on academic actions undertaken within their units. Those who need assistance with the academic actions form may consult their academic advisor, or they may be directed to the university ombudsman.

Appeals of Academic Procedures

Students have the right to appeal decisions regarding requests for academic actions. The appeals process begins in the academic unit. Each college, school, and institute at Mason has its own procedures, and students will be informed of those procedures in a clear and timely manner. Students who feel the final decision rendered by a college or school is unfair may appeal to the Provost’s Office. All appeals must be in writing, and they must demonstrate that the student has exhausted all options within the college or unit.

The Provost’s Office may refer the case to the University Academic Appeals Committee. The committee consists of five faculty members, including at least one member of the Faculty Senate and the provost (or designee), who serves in an ex officio, nonvoting capacity. The committee hears only those cases where procedural irregularities or a questionable application of university policies is demonstrable, or when the provost or the committee deems the case relevant to the application of university-wide policies. The burden of proof rests with the student, who must provide clear and convincing documentation to support the contention that the decision was unfair. The committee’s decision is final. Note that the University Academic Appeals Committee is not charged to hear grade appeals or appeals of Honor Committee decisions.

The Provost’s Office is responsible for maintaining appeals records, determining whether students have just cause, and ensuring that complete documentation is available for all committee members. The committee communicates its decision to the student, the relevant unit, and the provost.

University Ombudsman
Johnson Center, Room 245
Phone: 703-993-3006
E-mail: ombuds@gmu.edu
Web: www.gmu.edu/departments/ombudsman
Administration
Dolores Gomez-Moran, Ombudsman
The ombudsman is a neutral, independent, informal, and confidential party who provides assistance to students in resolving university-related concerns. The ombudsman is an advocate for fairness and the equitable treatment of students, operates independently of all formal grievance processes at the university, and considers all sides of an issue in an impartial and objective manner. The ombudsman has no authority to make exceptions or to grant requests but can perform informal investigations and, as a result, may recommend actions that lead to changes in processes and policies at the university. Meetings with the ombudsman are confidential. The ombudsman serves all undergraduate and graduate students at the university.

Privacy of Student Records
Office of the Registrar
Web: registrar.gmu.edu/ferpa.html
Each year, Mason informs students of the Family Educational Rights and Privacy Act (FERPA) of 1974. The university fully intends to comply with this act, which protects the privacy of education records, establishes the right of students to inspect and review their education records, and provides guidelines for amending inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the Family Policy Compliance Office (U.S. Department of Education) concerning alleged failures by Mason to comply with the act.
The Notification of Rights under FERPA and the Public Notice Designating Directory Information detail students’ rights and the procedures implemented by the university to comply with FERPA. Both notices are published in the Schedule of Classes and are available on the web. For more information about FERPA, contact the Office of the Registrar.

Academic Assessment
Students may be called on from time to time to participate in focus groups, complete questionnaires, or contribute in some other way to this process. At any time, students may contact the Office of Institutional Assessment at assessment@gmu.edu with concerns, comments, and recommendations about their educational experiences at Mason.
Furthermore, all academic programs have student learning goals that are reflected in the curriculum and extracurricular opportunities available to students. To find out more about the goals of a specific program, go to assessment.gmu.edu and click on “Academic Program Review.”

Student Identification Card
After registering, each student should obtain a university photo identification card. It must be presented to use library services and is required for admission to university events and when using facilities after normal operating hours. It is not transferable and is validated each semester after payment is made for classes. For more information, call the Photo ID Office at 703-993-1004, or go to the Photo ID Office section in the General Policies chapter of this catalog.

Change of Status, Address
Each student is required to maintain with Mason current contact and identifying information, including permanent and local addresses, telephone numbers, student number, and legal name. Each student must also maintain the university e-mail account assigned at the time of admission. Students are responsible for official communications directed to Mason e-mail accounts. For more information, go to mail.gmu.edu.
Addresses should be updated over the Internet using Patriot Web. Name and Social Security number changes require official documentation and must be processed in person at the Office of the Registrar or with the original copy of a notarized request.

Honor System and Code
Web: honorcode.gmu.edu
Mason shares in the tradition of an honor system that has existed in Virginia since 1842. The Honor Code is an integral part of university life. On the application for admission, students sign a statement agreeing to conform to and uphold the Honor Code. Students are responsible, therefore, for understanding the code’s provisions. In the spirit of the code, a student’s word is a declaration of good faith acceptable as truth in all academic matters. Cheating and attempted cheating, plagiarism, lying, and stealing of academic work and related materials constitute Honor Code violations. To maintain an academic community according to these standards, students and faculty must report all alleged violations to the Honor Committee. Any student who has knowledge of, but does not report, a violation may be accused of lying under the Honor Code.
The Honor Committee is independent of the student government and the university administration. It is composed of students selected by the student body, and it has the primary duty of espousing the values of the Honor Code. Its secondary function is to sit as a hearing committee on all alleged violations of the code.
At the beginning of each semester, faculty members have the responsibility of explaining to their classes their policy regarding the Honor Code. They must also explain the extent to which aid, if any, is permitted on academic work.
The complete Honor Code is as follows:
To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code: Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

Honor Committee
The Honor Committee is a group of Mason students selected to promote academic integrity as a core value for our university community. Members of the committee also serve on hearing panels established to investigate and resolve alleged violations of the code.
Membership will be limited to 100 members who apply for membership and are confirmed at an election held each spring. Members appointed by the chair of the Honor Committee may serve provisionally pending the next election. Members must have no Honor Code violations, maintain a cumulative GPA of 2.30, be in good academic standing, and successfully complete the training and orientation program. If more than 100 students apply for membership, a candidate list will be maintained according to the date of the application, and appointments will be made as vacancies occur. The term of office extends
from initial appointment until final graduation, provided the member is not found responsible for an Honor Code violation, serves on at least two hearing panels each semester, remains in good academic standing, and maintains the required GPA.

A chair and vice chair will be elected in April of each year by the members of the committee. The term of office will be one year. A faculty advisor, chosen jointly by the chair of the committee and the vice president for university life, will provide administrative assistance for committee business.

Student Responsibilities

Students should request an explanation of any aspect of the professor’s policies regarding the Honor Code that they do not fully understand. They also have an obligation not only to follow the code themselves, but also to encourage respect among their fellow students for the provisions of the code. This includes an obligation to report violations by other students to the Honor Committee.

Faculty Responsibilities

Faculty members are responsible for maintaining the integrity of the learning and testing process. They should explain at the beginning of each semester what would be considered an integrity violation in their courses. Special attention should be given to the subject of plagiarism. Faculty members may actively proctor exams in situations they believe warrant such action.

Procedures for Reporting Violations

Suspected violations should be reported to the Honor Committee in a timely manner using forms provided by the Honor Committee. The Honor Committee will promptly notify the involved students in writing. Those students will meet with a representative of the Honor Committee to review the information and arrange for resolution of the matter.

Hearing Panels

When a student disputes an allegation, a five-member panel of Honor Committee members, appointed by the chair of the Honor Committee, will meet with both the student and the person(s) reporting the alleged offense. Each side will present information, and the panel will determine whether clear and convincing evidence of a violation has been presented. At least four of the five panel members must judge that the evidence proves responsibility for the offense. If the student is found responsible, a sanction or sanctions will be determined by majority vote of the panel.

Counsel

The hearing panel will have a faculty member present during the hearing to offer assistance when requested by the chair of the panel. All other parties may have an advisor present if that advisor is a member of the George Mason University student body, other than a student from the School of Law.

Sanctions

The hearing panel may impose oral and written reprimands and other such nonacademic sanctions as it deems proportionate to the offense. It can recommend sanctions to the course professor that involve reduced grades. Recommendations for nonacademic suspension and nonacademic dismissal are forwarded to the provost’s delegate. In determining sanctions, panel members should keep in mind the nonpunitive educational purpose of the Honor Code process.

Appeals

Appeals of honor committee decisions must be submitted in writing within seven business days of the hearing. Appeals can be granted only on the basis of new evidence, procedural irregularity, or other grounds of sufficient gravity to call into serious doubt the original hearing panel’s decision. The decision to accept or deny the appeal will be made by three Honor Committee members who have had no prior contact with the case. In the event that a faculty member does not elect to follow the Honor Committee’s recommended sanction, students may appeal the faculty member’s action to the Academic Appeals Committee, via the Provost’s Office. The decision of this committee is final.

Amendments

The Honor Committee, by majority vote, may approve proposed amendments to the Honor Code. The proposed amendments will be submitted to the student population at the next spring election, and they must be approved for implementation by a two-thirds majority of those voting.

Human Subjects Research

All research activities involving human subjects or data regarding human subjects that are directed by faculty, staff, or students that involve faculty, staff, or students as participants must be submitted to the Office of Research Subject Protections for review and approval. The form for submission can be found at www.gmu.edu/research/ORSP/HumanSubjects.html. All research activities will be reviewed by the Human Subjects Review Board prior to implementation of the activity. Separate approval by the vice provost for academic affairs is required if contact information for Mason students is needed to conduct the research. All student research must be supervised by a faculty member. The faculty member will serve as the principal investigator for the research and will assume responsibility for the legal and ethical conduct of the work.

Animal Use in Research

All work with live animals, whether for research, teaching, or testing, must be approved by the Institutional Animal Care and Use Committee (IACUC) prior to initiation of the work. All care and use of animals at Mason must be carried out under the supervision of a faculty member who is qualified and experienced in the work being conducted and assumes responsibility for legal and ethical conduct. Further information and submission forms can be found at the Office of Research Subject Protections web site at www.gmu.edu/research/ORSP/AnimalCareAndUse.html.

Student Work, Intellectual Property

Copyrightable works, including dissertations and patentable works developed in connection with course work by students who are not Mason employees, are deemed to belong to the student. Mason may, however, claim copyright ownership of a work or ownership of a patentable invention when extraordinary use of university facilities, personnel, or resources is made in the development of the materials or invention, especially when unrelated to course work. Ownership and disposition of intellectual property developed by students while employed by the university, including undergraduates and graduate research and teaching assistants, is governed by university policies generally applicable to employees.
Registration and Attendance

Registration for the next semester or summer term begins after midsemester of fall or spring semesters, according to priority groups (graduate students, seniors, juniors, and so on). The Registrar’s Office assigns each student a time ticket, which is a specific date and time after which a student may register. The time ticket is based on the number of credits earned. Thus, the time ticket will not be the same for all students within a particular priority group. Students should consult the Schedule of Classes and Patriot Web for information about their registration date and time.

Financial Good Standing; No Holds on Record

Financial good standing and a university record clear of holds are required for students to receive academic services. Services, including, but not limited to, transcript issuance, diploma release, and class registration (add, drop, withdrawal, and such) will not be provided to students with a financial balance due or a hold of any kind on their record. Holds are based on outstanding obligations and may be financial. Examples include fines owed for traffic or parking violations, incomplete immunization records, fines owed to the Mason or consortium libraries, and other administrative holds.

Registration Procedure

The Schedule of Classes, made available by the Registrar’s Office before priority registration each semester, contains written instructions for registration. Courses listed in the Schedule of Classes may be canceled for insufficient enrollment. Mason reserves the right to change the class schedule and adjust the individual section enrollment as necessary.

Registration is usually accomplished using the Patriot Web; however, if a section is closed or registration into a selected section is controlled, permission to enroll must be obtained from the academic program offering the course. Various schools and departments have their own processes for granting this permission. For some courses, the student must submit a completed and signed course permit form in person to the Registrar’s Office.

Students must be present at the first meeting of every laboratory course (lecture and laboratory) to validate their registration. If students cannot attend the first meeting, they must notify the instructor beforehand if they intend to continue in that section. Otherwise, their name may be removed from the class roll in both lecture and lab.

Students are responsible for registering properly and paying by the deadline. Students should confirm the correctness of their enrollments (including drop and add) via the Patriot Web. Incorrect enrollments may result in academic and financial penalties.

Students are responsible for full tuition payment and grades received for all courses in which they are registered unless registration is canceled administratively because of suspension, dismissal, or termination; the section is canceled; or the course is dropped before the tuition liability begins. See the Schedule of Classes for deadlines.

Changing Registration

Registration changes must be completed within the schedule adjustment period defined below and indicated in the Schedule of Classes. Changes to registration are usually made using the Patriot Web.

The last day for adding a 14-week course is two calendar weeks after the first day of classes. The last day for dropping a 14-week course is five calendar weeks after the first day of classes (including the first day). Courses meeting for fewer than 14 weeks have add, drop, and tuition-liability dates proportional to their length. These dates are published on the registrar’s web site each semester. Students who drop all courses during the drop period will have no entry on their transcript for that semester and will not be considered full time or an enrolled student for that semester. If it is the student’s first semester, the student will not have a Mason transcript and must contact Admissions regarding enrollment in a future semester.

All students are expected to complete their initial enrollment before the first day of classes for the semester. Any additions to that enrollment must be processed by the end of the add period through official registration procedures. Students will not receive credit for courses unless their names are on the official class rosters and final grade sheets. Retroactive credits will not be awarded to students who report that they attended classes but were not on the official rosters. After the date listed in the Schedule of Classes for adding courses, add actions are limited to unusual circumstances beyond the student’s control and require approval by the chair of the academic department offering the course.

All students are expected to drop by the end of the drop period those courses that they do not intend to continue. Registration is not canceled for failure to drop courses properly. Furthermore, registration is not canceled for failure to attend classes unless stated otherwise in the Schedule of Classes.

All classes in which a student is enrolled past the drop deadline will remain part of the official academic record. For more information, see the Additional Grade Notations—Administrative Failure section of this chapter. After the date listed in the Schedule of Classes for dropping courses, withdrawal approval is granted only for nonacademic reasons by the student’s academic dean. This approval usually is given for all courses at once, constituting withdrawal from a semester. For more information, see the Withdrawal from a Semester section of this chapter.

No change of registration transaction is complete until it is processed by the Office of Student Accounts and the Office of the Registrar.

Students will not receive written confirmation of schedule changes and are responsible for checking their schedules via the Patriot Web before the end of the add or drop period to verify that their schedules are correct and they are properly enrolled. Students will not be allowed to remain in classes unless they are properly enrolled. Students will be responsible, both financially and academically, for all courses in which they remain officially enrolled.

Canceling Registration

Students who cannot attend classes during the semester for which they have registered should cancel registration using the Patriot Web prior to the first day of classes for the semester. Refunds of tuition and after the first day of classes are made according to the tuition-liability dates published in this catalog and the Schedule of Classes.
Selective Withdrawal for Undergraduates
Undergraduates enrolled in degree programs are eligible to withdraw from a limited number of classes without the dean’s approval and at the student’s own discretion. Students may process a maximum of three such selective withdrawals during their entire undergraduate career at Mason. The three classes may have any number of credits. The academic calendar for each semester will include an open withdrawal period beginning the day following the last day to drop the class and extending through the ninth week. For classes shorter than a semester (14 weeks), the period will be set in proportion to the length of the class. Procedures are published in the Schedule of Classes.

Course Withdrawal with Dean Approval
For graduate and nondegree students, withdrawal after the last day for dropping a course requires approval by the student’s academic dean, and is permitted only for nonacademic reasons that prevent course completion. For undergraduate students, withdrawal after the open withdrawal period, for cause within the period, or after a student has used all three elective withdrawals, requires approval by the student’s academic dean and is permitted only for nonacademic reasons that prevent course completion. Different college level standards for approval may apply.

Semester Withdrawal with Dean Approval
Undergraduates taking three or fewer classes may use the selective withdrawal for all courses for a semester; see the Selective Withdrawal for Undergraduates section of this chapter. Otherwise, students may withdraw from a semester after the end of the drop period without academic penalty only for nonacademic reasons approved by the academic dean as sufficient to merit a policy exception. Students who stop attending classes without the dean’s approval and without processing a selective withdrawal, if eligible, will receive F’s in all courses. Withdrawal forms are available at the appropriate academic dean’s office.

Effects of Course or Semester Withdrawal
Approved or selective withdrawal results in a grade of W on the student’s transcript for the course(s) affected. While a grade of W does not affect the GPA, undergraduate students should note that withdrawn courses are part of “attempted credit hours,” which serve as the basis for the student’s credit level. In the university’s undergraduate retention system, GPA standards increase according to credit level. See the section on Requirements for Retention.

Academic Load
The minimum full-time load for undergraduate students is 12 credits per semester. For graduate full-time load, see the Graduate Policies section below. For planning purposes, applicants for admission are asked to indicate their preference for full- or part-time status, and day or evening classes; however, they may freely choose between evening and day sections of courses and may change their full- or part-time status.

Although many students must work to meet living expenses, employment must not take priority over academic responsibilities. Students employed more than 20 hours a week are strongly urged not to attempt a full-time academic load. Students employed more than 40 hours a week should attempt no more than 6 credits per semester. Students who fail to observe these guidelines may expect no special consideration for academic problems arising from the pressures of employment. Although 12 credits per semester represent a minimum full-time undergraduate load, students planning to graduate in four years need to carry an average of at least 15 credits per semester. Written approval must be submitted to the Registrar’s Office before students can register for more than the maximum allowable credits. The Overload Permission Chart declares maximum credits and approval authority for all categories of students; it is published in the Schedule of Classes each semester.

Course Prerequisites, Corequisites
Course prerequisites or corequisites state requirements for student entry into courses and reflect necessary preparation for attempting the course. It is the student’s responsibility to be aware of these as stated in the catalog and have prerequisites recently enough to be of value. The administrator of the academic unit in which the course is taught or the instructor of the course may summarily drop students who have enrolled in a course for which they have not met the prerequisites. Graduate course prerequisites are normally met with a grade of B- or better; undergraduate course prerequisites are normally met with a grade of C or better. Questions should be addressed to the academic department or course instructor.

Repeating a Course
Some courses are annotated in the catalog as “repeatable for credit.” These are courses in which students receive additional credit for more than one taking of the same course, up to a maximum number of credits specified in the catalog. Special topics and independent study courses are examples. For all other courses, the following conditions apply:

• Graduate students who have passed a course with a grade of B- or better are not permitted to repeat the course for credit. Also, they must obtain permission from the offering department to repeat a course in which a grade of C or below has been earned. Duplicate credit is not earned. Each department establishes procedures for granting such permission. When a course is repeated, all credits attempted are used to determine warnings, suspensions, or dismissal; the transcript shows grades for all courses attempted; and only one grade per course may be presented on the degree application.

• Some undergraduate courses, such as special topics courses, are repeatable for a limited number of additional credits. As long as students do not exceed the maximum allowable credits for repeatable courses, all takings of the course count for credit and in the student’s GPA. In cases where the student has exceeded allowable credits in a repeatable class, repeat rules will exclude the grade and credits of the earliest taking of the class. For undergraduate classes not repeatable for credit, undergraduate degree students may repeat courses for which they seek a higher grade. A grade received in a repeated course will replace a grade in prior takings of the same course in the calculation of the cumulative GPA, even if the more recent grade is lower. Repeat rules apply to the same course and courses designated in the catalog as equivalent. Repeat rules apply throughout a student’s academic history. All instances of courses and their grades remain part of the student’s transcript. Duplicate credit is not given. No adjustment to the cumulative GPA will be made when the grade in the repeated course is W. A grade in a Mason course will not be
excluded from the cumulative GPA based on a subsequent taking of an equivalent course at a transfer institution. The exclusion of earlier grades of repeated courses will not change the academic standing or dean’s list notations for the earlier semester. Note that individual programs may disallow students from retaking certain high-demand courses simply for the purpose of improving their grade.

**Advisor’s Permission to Register**

All newly admitted students and undeclared undergraduates on academic warning or academic probation are required to obtain an advisor’s approval for registration. All students are encouraged to consult with their advisors concerning course registration each semester.

**Credit to Be Earned at Other Institutions**

Students who apply for admission to Mason usually do not seek simultaneous enrollment at another collegiate institution. In those unique situations when a student does seek concurrent enrollment, the student must obtain advance written approval from the appropriate Mason dean. This process permits a student to enroll elsewhere in a suitable course unavailable at Mason. Catalog numbers and descriptions of courses to be taken elsewhere must be submitted with the request for approval. Students must submit an official transcript for all such course work to the Registrar’s Office. Note that while credit may be approved for transfer and a minimum grade must be achieved, grades themselves do not compute into any Mason GPA. Students who enroll elsewhere without advance written permission while enrolled at Mason may not receive transfer credit for course work taken at other institutions.

**Permission to Register as Graduate Student**

Registration for courses in a graduate program is permitted only after the student has been notified of admission. Admitted students are given preference over nondegree students through the registration process. Dual registration (for example, as a graduate student and nondegree enrollee) is not permitted. The graduate student is responsible for being properly registered and aware of all regulations and procedures required by a program of study. Regulations and degree requirements are not waived nor are exceptions granted because of ignorance of any regulations. Registration in graduate-level courses is restricted to admitted graduate degree students and nondegree graduate students (unless excluded by program). Undergraduate degree students may register for graduate courses only with special approval (see section below). Nondegree undergraduate students may not enroll in courses numbered 500 or above. Courses numbered 800 and above are available only to admitted graduate degree students.

**Graduate Course Enrollment by Undergraduates**

Courses numbered 700 and above are closed to undergraduates. Undergraduates may enroll in graduate-level courses 500 to 699 only with written permission, which must be obtained before registration. Forms are available at the Office of the Registrar. Written permission is waived for undergraduate students admitted to combined bachelor’s and accelerated master’s programs.

To enroll in graduate courses for credit applicable to an undergraduate degree, undergraduates must have completed all course prerequisites, have exhausted all upper-level undergraduate courses relevant to their educational objectives, and be able to demonstrate the level of maturity required for graduate courses.

Approval to register for reserve graduate credit (earned credit held in reserve to apply later toward a graduate degree) is given only to Mason seniors within 15 credits of completing undergraduate study who have successfully completed all course prerequisites. In addition, this privilege is normally extended only to seniors who have completed at least 12 credits at the university, have a cumulative GPA of 3.00 or better, and have a major in the department offering the course. Approval for reserve graduate credit is limited to 6 credits and does not imply approval for admission into a Mason graduate program or that credit so earned will be accepted at another graduate school.

Undergraduates enrolled in graduate courses are eligible to receive only those letter grades applicable to graduate grading. For more information, see the Grading System section below. Credit for the same course is not given toward both graduate and undergraduate degrees.

**Combined Bachelor’s and Accelerated Master’s Degrees**

The university offers a number of combined bachelor’s and accelerated master’s degree programs for academically strong undergraduates with a commitment to research or graduate or professional studies. Students admitted into these programs may take a number of graduate courses in their field of study (with permission from their undergraduate and graduate advisors) after fulfilling 90 undergraduate credits and fulfilling all prerequisites. A maximum of 6 graduate credits completed with a 3.00 GPA or better in each course will apply to the undergraduate degree and give the student advanced placement in the related Mason master’s program. A maximum of 6 graduate credits may also be taken as reserve graduate credit and only applied to the master’s. See Graduate Course Enrollment by Undergraduates section above.

Students in an accelerated degree program must fulfill all university requirements for the master’s degree, including a minimum of 18 applicable graduate credits taken after the bachelor’s degree has been completed and posted to the student’s academic record. More information is available in the various schools and institutes. Admission is competitive; undergraduates are advised to inquire early in their undergraduate careers. Applications must be approved by the undergraduate coordinator in the student’s major program, the graduate coordinator in the graduate school or department, and the relevant graduate associate dean. The university waives the graduate application fee for Mason undergraduates.

**Special Registration for Nonenrolled Students**

Degree-seeking students not enrolled in a credit-bearing course but whose academic department certifies that they are pursuing an activity related to their Mason enrolled program can retain active status by registering for Special Registration (ZREG 200) for a $45 fee. Written approval from the student’s advisor and the academic department chair is required. Special registration allows students to retain library and computer privileges, receive a student ID, and buy a parking decal. Students must have active status to apply for or receive a degree, take an exam, or participate in cooperative education.
Enrolling for Credit Without Grade Points

Entire courses normally graded as satisfactory/no credit (S/NC) are annotated in the catalog, but students may elect to take credit without grade points. Undergraduates may take up to 6 credits to be graded S/NC; this option applies only to electives outside the field of the major, concentration, minor, general education requirement, or certificate program. Graduate students may elect the S/NC grade option only for courses that do not apply to the degree or certificate requirements. S/NC grading will also be used for courses numbered 998 and 999. For more information, see the Additional Grade Notations section below.

Auditing a Course

Auditing a course requires the course instructor’s permission. Audit forms are available at the Registrar’s Office. A previously audited course may be taken again for credit in a later term. Students may also audit a course previously taken and passed; however, students may not change from credit to audit status nor from audit to credit status after the end of the drop period, as defined above. The usual tuition and fees apply to audit status.

Academic Common Market

The Academic Common Market (ACM) is a cooperative tuition-reduction program agreement among 16 states, including Virginia, which compose the Southern Regional Education Board. Students who are not legal residents of Virginia but wish to pursue a degree in a selected Mason program that is not available in their home state may be able to participate in the ACM and thereby attend Mason without incurring out-of-state tuition charges. Likewise, legal residents of Virginia may take advantage of programs in other states. More information about this program is available at the Office of the Registrar or at registrar.gmu.edu/students/domicile/nonresidents.html.

University Consortium

Mason is a member of the Consortium of Universities of the Washington Metropolitan Area, which includes American University, Catholic University of America, Corcoran College of Art and Design, Gallaudet University, George Washington University, Georgetown University, Howard University, Marymount University, Southeastern University, Trinity College, the University of the District of Columbia, and the University of Maryland-College Park. Eligible Mason students may enroll in courses at any of the consortium institutions. The consortium’s cross-registration arrangement permits students enrolled in eligible degree programs at one member institution to take a course at another member institution.

Participation in consortium cross registration is available to degree-seeking juniors, seniors, and graduate students in good standing and currently enrolled at Mason. Participation is limited to courses that are approved by the student’s department chair and dean, apply to the student’s program of study, are not offered during that semester at Mason, and have space available at the visited institution. Additional restrictions apply. Students may take just one course per semester, with a career maximum of 6 credits for undergraduates (9–12 if foreign language study is approved) and 6 credits for graduate students. Credit earned through the consortium is considered resident credit, so grades count in the Mason GPA.

Information and regulations, including restricted and excluded courses, for both outgoing and incoming Mason consortium students are available in the Schedule of Classes and on the web at registrar.gmu.edu/students/consortium/index.html. Information pertaining to all member institutions is available at www.consortium.org/main.aspx. For more information, call the consortium coordinator in the Office of the Registrar at 703-993-2436.

Attendance Policies

Students are expected to attend the class periods of the courses for which they register. In-class participation is important not only to the individual student, but also to the class as a whole. Because class participation may be a factor in grading, instructors may use absence, tardiness, or early departure as de facto evidence of nonparticipation. Students who miss an exam with an acceptable excuse may be penalized according to the individual instructor’s grading policy, as stated in the course syllabus.

Absence for Religious Observances or Participation in University Activities

It is Mason’s policy to encourage its faculty to make a reasonable effort to allow students to observe their religious holidays or to participate in university-sponsored activities (e.g., intercollegiate athletics, forensics team, dance company, etc.) without academic penalty. Absence from classes or exams for these reasons does not relieve students from responsibility for any part of the course work required during the absence. Students who miss classes, exams, or other assignments as a consequence of their religious observance or for participation in a university activity will be provided a reasonable alternative opportunity, consistent with class attendance policies stated in the syllabus, to make up the missed work. It is the obligation of students to provide faculty, within the first two weeks of the semester, with the dates of major religious holidays on which they will be absent, and the dates for which they are requesting an excused absence for participation in any university-sponsored activity scheduled prior to the start of the semester, and as soon as possible otherwise. Students requesting an excused absence for participation in a university-sponsored activity must provide their instructor with a letter from a university official stating the dates and times that participation in the activity would result in the student missing class. Faculty members are encouraged to take religious observances into consideration when constructing class schedules and syllabi.

Final Exams

Final exams are usually given at the end of all undergraduate courses. Except in predominantly laboratory courses, exams may not be given during the last week of classes. Exams may not exceed the scheduled length of two hours, 45 minutes. Changes in location or time of in-class final exams must be approved by the appropriate department chair and dean. A professor who is considering assigning a take-home exam or significant end-of-semester paper or project should inform the students at the beginning of the semester. Such assignments should be distributed by the beginning of the last week of classes so that students can coordinate them with preparation for other exams. Students must not be required to submit exams before the date of the regularly scheduled exam for a course. Retaking final exams is not permitted.
Absences
Absences from final exams will not be excused except for sickness on the day of the exam or other cause approved by the student’s academic dean or director. The effect of an unexcused absence from an undergraduate final exam shall be determined by the weighted value of the exam as stated in the course syllabus provided by the instructor. If absence from a graduate final exam is unexcused, the grade for the course is entered as F. See the Additional Grade Notations section below for information on being absent with permission.

Grading System
University course work is measured in terms of quantity and quality. A credit normally represents one hour per week of lecture or recitation or not fewer than two hours per week of laboratory work throughout a semester. The number of credits is a measure of quantity. The grade is a measure of quality. For grades applicable to graduate courses, see the Graduate Academic Standards, Grades section of this chapter.

The university-wide system for undergraduate grading is as follows:

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No credit toward graduation accrues from a failing grade or a grade that is replaced by a retaken course. For more information, see the Registration and Attendance section of this chapter.

Additional Grade Notations
Satisfactory/No Credit (S/NC): An S grade reflects satisfactory work (C or better for undergraduate students, B- or better for graduate students); otherwise, the student receives no credit (NC). S and NC have no effect on the student’s GPA. Entire courses normally graded S/NC are annotated in the catalog. Students may also elect to take credit without grade. For more information, see the Registration and Attendance section of this chapter.

A/B/C/NC: Students who successfully complete English Composition and Introduction to Literature (ENGL 101) or Composition for Non-Native Speakers of English (ENGL 100) are graded A, A-, B+, B, B-, or C. Students who do not attain at least a C in these courses receive no credit (NC). NC has no effect on the GPA.

Incomplete (IN): This grade may be given to students who are passing a course but who may be unable to complete scheduled course work for a cause beyond reasonable control. The student must then complete all the requirements by the end of the ninth week of the next semester, not including summer term, and the instructor must turn in the final grade by the end of the 10th week. Unless an explicit written extension is filed with the Registrar’s Office by the faculty deadline, the grade of IN is changed by the registrar to an F. The maximum IN extension is to the end of the same semester in which it was originally due. Students who have filed their intent to graduate have only six weeks from the date of degree conferral to resolve any incomplete grades and have the final grades recorded by the Registrar’s Office.

While a grade of IN remains on the transcript, it is treated as an unsatisfactory grade in determining probation, suspension, termination, or dismissal. Removal of INs from the transcript may result in retroactive elimination of probation, suspension, termination, or dismissal.

Incomplete, extended (IX): IX is given by the Registrar’s Office after receiving an Incomplete Extension form signed by the instructor and the course dean. The extension gives students additional time to complete work; the amount of time is specified by the instructor. The final grade must be submitted to the Registrar’s Office before final exams for the semester in which the IN grade was originally due. A grade of IX affects the academic record in the same way a grade of IN does.

In Progress (IP): This grade may be given in selected courses, including graduate theses, dissertations, practica, and internships. IP may also be used when the work of BIS 490 or a course that is graded S/NC or A/B/C/NC is not completed within one semester. IP has no effect on the GPA. With the exception of BIS 490, IP remains on the record until the work is completed and a final grade is assigned. An IP in BIS 490 not changed to a final grade by the last day of classes of the next semester, not including summer term, is changed by the registrar to an F. IP grades will also be awarded in courses numbered 998 and 999 until successful completion, and then they will be changed to S/NC. Upon successful completion of 998 or 999 and submission of the final grade, grades for all prior sections will be changed to S/NC.

Absent with permission (AB): A student who has received permission from the academic dean or director to be absent from a final exam for cause beyond reasonable control may receive a temporary grade of AB. A rescheduled exam must be administered within 10 business days of the original exam date, or the AB will automatically become an F. Final determination of academic status is not complete while the AB remains on the transcript.

Special Provision (SP): The grade of SP may be given by a dean to students who are unable to complete the course requirements because of extraordinary long-term circumstances, such as major illness or military deployment. SP has no effect on the GPA and remains on the transcript until the work is completed and a final grade is assigned.

Midterm Reports
Midterm progress is reported for all full-semester 100- and 200-level classes, and for 300- and 400-level classes at the discretion of the professor. The reporting period extends from the fifth through the eighth week of the semester, allowing flexibility as to when individual faculty provide reports for their classes. Students should check with their instructors as to when reports will be complete and available for viewing through Patriot Web. These progress reports, which appear in Patriot Web as “Midterm Grades,” do not become part of the student’s official record. They are not calculated in any GPA, and they do not appear on any official or unofficial transcript.
Final Grades
Semester grade reports are available through Patriot Web. Students may print a grade report for their own records or to issue to a third party. Official semester grade reports for tuition reimbursement may be obtained through the Office of the Registrar. Students may also order an official transcript through the Registrar’s Office.

Transcripts
Official transcripts include all credit course work attempted at the university. Official transcripts will not be issued when unsatisfied financial obligations to the university exist. Unofficial transcripts may be printed by the student from Patriot Web. See registrar.gmu.edu for information and instructions on requesting official transcripts.

GPA
Quality point values are assigned to letter grades as indicated in the grading system table. A quality point score is computed by multiplying the value of a letter grade by the number of credits for the course. For example, a student receiving an A in a 3-credit course earns 12 quality points. The GPA is computed by dividing the quality points earned by the number of credits graded A+ through F (GPA hours).

For undergraduates, the GPA computed for the current term gives the current GPA, which is the measure of academic performance in one semester and affects eligibility for the dean’s list. The GPA computed for all institutional credit gives the cumulative GPA, which is the basis for the university’s retention policies, including good standing, warning, probation, suspension, and dismissal. Cumulative GPA also determines students’ eligibility to graduate and have university honors posted to their record at graduation.

Current GPA and cumulative GPA do not apply to graduate students. A notation of academic warning is entered on the transcript of a graduate student who receives a grade of C, or a grade of F in a graduate course or while a grade of IN or IX is in effect. A degree GPA is computed for graduate students based on graded courses completed at the university and applied toward the degree. For more information, see the Graduate Policies section of this chapter.

Change of Grade
The conditions and time limits for changes from the temporary grades IN, IP, AB, and SP to final grades appear in the Additional Grade Notations section.

Once a final grade has been recorded by the Office of the Registrar, it can be changed only in cases of computational or recording error, or pursuant to a successful appeal of the grade as described below. Additional work of any type submitted to improve a grade after the final grade has been assigned and sent to the Office of the Registrar is never accepted.

All changes of final grades must be initiated, approved, and recorded by the last day of classes of the next regular semester (spring for fall grades, and fall for spring and summer term grades).

Grade Appeals
Although faculty members are generally the best judges of student performance, there may be times when a student believes a grade is unfair. In such cases, the student should ask the faculty member to reconsider the grade. If the student is not satisfied, an appeal may be made to the head of the unit offering the course (the department chair, institute director, or designee). The recipient of the appeal should ask the student to return to the faculty member who assigned the grade for further consultation.

If the instructor is no longer associated with the university, the local administrator of the unit offering the course will appoint a faculty surrogate, who will assume magisterial authority of the instructor record at this level of appeal.

If a mutually satisfactory agreement is not reached, the student may request that the chair form a committee of three faculty peers of the faculty member who assigned the grade. If the chair believes the student’s complaint is not legitimate, this reservation is reported to the chair’s supervisor, usually the dean. No review is conducted unless the dean believes the complaint has merit.

The faculty member or the student may challenged and have replaced one of the members of the committee without giving a reason for the challenge. The committee meets separately with the faculty member and the student to explore the full particulars of the case. A nonparticipating observer of the student’s choice may attend the meeting. Every effort is made to avoid an adversarial relationship.

After the committee has reviewed the case thoroughly, it issues to the chair (with a copy to the faculty member) a written recommendation that includes the reasons for its findings. At this time, the faculty member has an opportunity to take the recommended action, if any. If the matter is not resolved at this point, the chair considers the committee recommendation and makes a recommendation to the dean. The decision of the dean is not subject to further appeal. If the dean decides that a change of grade is appropriate and the faculty member refuses to make the change, then the dean may direct the registrar to do so.

Grade appeals are not accepted after the last day of classes of the following semester (spring for fall grades, fall for spring and summer grades).

Pending Grade Appeal
In select cases, a student may request a delay from the dean in imposing academic suspension because of a pending grade appeal that could change the student’s status. An approved delay allows the student to register.

If the grade appeal is successful, the official transcript is corrected and the student continues in classes as a student in good academic standing. If the grade appeal is not successful, the student is required to stop attending all classes immediately. No record of registration for the academic period appears on a transcript and the student receives the appropriate refund as of the decision date.

Degree Conferral
Mason awards degrees and certificates in programs and at levels authorized by the State Council of Higher Education for Virginia (SCHEV). The university confers degrees at the bachelor’s, master’s, and doctoral levels. An academic program may include a degree program and additional majors, minors, or certificates. The university offers no certificate program below the bachelor level; some postbaccalaureate certificates, however, may be awarded concurrently with the bachelor’s degree. For more information, see the Programs of Study chapter.
Definitions of Degree Components

- **Degree program, major, or field**: A program of study that normally requires at least 30 credits of course work in the specified field. The primary program name (degree and major or field) appears on the diploma for bachelor’s and master’s degrees. Only the degree name appears for doctoral degrees. An undergraduate who desires to graduate with a BA or BS degree in two or more subjects must meet departmental requirements for the major in each field. For each major, at least 18 credits used to fulfill its requirements cannot be used to fulfill the requirements of another major, a concentration, a minor, or an undergraduate certificate.

- **Concentration**: A second-order component of a degree program or a component of a track. A concentration consists of at least 12 hours that are not applied to any other concentration. Undergraduate concentrations are approved by the unit at the undergraduate level or by the Graduate Council at the graduate level.

- **Certificate**: A nondegree program complementary to a degree that requires at least 24 undergraduate or 15 graduate credits. Certificates are approved by the school or college at the undergraduate level and by the university Graduate Council at the graduate level. The name of a completed certificate program appears on the transcript after the conferral of an undergraduate degree. For each undergraduate certificate, at least 15 credits used to fulfill its requirements cannot be used to fulfill the requirements of a major, a concentration, a minor, or another undergraduate certificate.

- **Minor**: A complement to a bachelor’s degree program or major normally requiring at least 15 credits in a field other than the student’s major. Of the courses presented for a minor, at least 8 credits must be applied only to that minor and may not be used to fulfill requirements of the student’s major, concentration, an undergraduate certificate, or another minor.

- **Option**: The choice of a thesis or nonthesis path in graduate programs.

Catalog Requirements for Degrees

Catalog year refers to the setting of course and noncourse requirements within academic programs as stated in the school and college section of a specific catalog. Catalog year does not set academic policies in place, however. For more information, see the Knowledge of University Policies section of this chapter. Not all programs and degree components are available in all catalogs. For any one degree, all requirements must be met as stated in a single catalog.

Bachelor’s degree candidates who have been continuously enrolled (allowing absences from summer terms or single semesters) may choose to graduate under the terms of any catalog in effect at or after their admission. Students who have been inactive for five or more years or who have attended another institution without prior approval from their academic dean or director must graduate under a catalog in effect at or after their re-enrollment.

Master’s and doctoral degree candidates who have been continuously enrolled may choose to graduate under the terms of any catalog in effect at or after their admission. Students who have been inactive more than one year, however, must graduate under a catalog in effect after they have been granted permission to re-enroll, or they must petition their unit dean or director to graduate under an earlier catalog. The final decision rests with the unit dean or director.

Application for Degree

In the semester prior to the expected completion of degree requirements, students must confirm their intent to graduate through Patriot Web. The deadline to file the intent to graduate is generally six to seven months prior to the conferral date. Specific deadlines are published on the registrar’s web site registrar.gmu.edu. Some graduate programs require a paper application. Applications are available on the registrar’s web site as well as complete instructions and deadlines regarding graduation. Separate applications for each graduate degree or certificate are required.

For a degree to be conferred, all course work must be completed, even if the course work is not being applied to the degree. Master’s degree students must complete non-course degree requirements including credit-by-exam, oral exams, theses, scholarly papers, and comprehensive exams prior to the conferral (graduation) date. Master’s theses and doctoral dissertations are due in the library well before the conferral date. For more information, go to www.gmu.edu/library/specialcollections/dwebguide.

Students must have active registration status the semester or summer term of graduation. Students not registered for course work in the term of graduation must obtain a special registration. (For more information, see the Registration and Attendance section of this chapter.) Degree applications will not be automatically extended if graduation is postponed; students must reapply for each conferral date.

Commencement

Commencement provides an opportunity for students and their families to share in the conferral of academic degrees. Students who wish to participate should check the web site at events.gmu.edu for current information about all Commencement details including tickets, regalia, and schedules. Bachelor’s and master’s degree candidates who declare their intent to graduate in August but who have not yet completed all degree requirements may participate in the commencement ceremony in anticipation of degree completion. Their names are marked with an asterisk identifying them as candidates pending completion of all requirements. Doctoral students may participate only if they have successfully completed all degree requirements, including defending and submitting a signed, final copy of their dissertation by the deadline.

Undergraduate Policies

Student Classification

Admitted undergraduates are classified as follows: freshman, 0–29 credits completed; sophomore, 30–59 credits completed; junior, 60–89 credits completed; and senior, 90 or more credits completed. Full-time undergraduates are classified as those students enrolled in 12 or more credits per semester. Please note that different criteria for full-time status may apply for tuition, verification, and financial aid purposes. For more information, contact the offices of Student Accounts, Registrar, and Student Financial Aid, respectively.
Academic Advising

The mission of academic advising at Mason parallels the university’s mission by providing resources and programs to mentor, teach, and guide students in their decision making as they develop their educational and career goals toward the successful completion of a degree program. Admitted undergraduate students should meet regularly with an academic advisor to discuss academic programs, educational goals, and career plans. With their advisors, students plan academic programs to meet the general university degree requirements and specific requirements within their major fields. It is the student’s responsibility to read the catalog and know and fulfill the requirements of a specific baccalaureate degree. To assist in the advising process, Mason provides a computerized degree evaluation. Students may access their individualized reports through Patriot Web.

Individual departments establish their own advising processes; students should check with their departments for the appropriate procedures. During their freshman and sophomore years, students in the Honors Program in General Education plan their schedules with honors advisors. Every department coordinates advising of its honors students through the Honors Office, Enterprise Hall, Room 305.

Some departments require that students be advised prior to registration each semester. For the categories of students who may not register until they have seen an advisor, see the Registration and Attendance section of this chapter.

Academic Advising Center
Student Union Building I, Room 304, MS 2E6
Phone: 703-993-2470
Fax: 703-993-2478
Web: www.gmu.edu/departments/advising
E-mail: advisor@gmu.edu

Admitted students who have not yet declared a major or are considering a change of major are assisted in the Academic Advising Center. Students are encouraged to make an appointment for information about general education requirements, programs, policies, procedures, and other academic concerns. The center also provides information and guidance for students who are interested in preprofessional programs in the health fields. Advising is available by appointment Monday through Friday, 9 a.m. until 5 p.m., and Tuesday until 8 p.m. when classes are in session.

Student Academic Affairs and Advising
Johnson Center, Room 245, MS 2C4
Phone: 703-993-9082
Fax: 703-993-9008
Web: www.gmu.edu/departments/saa

Student Academic Affairs and Advising consists of six centers: the Freshman Center, Transfer Center, University Scholars, Postgraduate Fellowships and Scholarships, Undergraduate Research Apprenticeships, and the University Transitions Office. Student Academic Affairs and Advising also rules on all academic actions submitted by students not in a declared major.

Advising upon Entrance into Upper Division (Junior Standing)

Upon entrance into the upper division, every student should meet with an advisor to adopt a program of study. This meeting should cover the following:

- Review of requirements for the degree and major the student has chosen
- Review of the student’s record including any deficiencies, which must be made up
- Discussion of career or graduate study options open to the student enrolled in such a program
- Opportunities for departmental faculty to evaluate the student’s suitability to major in the chosen discipline.

This advising session occurs in the semester in which the student will have completed 60 or more acceptable credits. The results are a matter of record, with any approved modifications being entered into the student’s computerized degree plan.

Although an upper-division student who has filed an approved program of study is usually not required to consult again with an academic advisor, it remains the student’s responsibility to seek approval for any program change so that the computerized degree plan may be kept current. In particular, once a student has completed 60 credits, a change of major requires an extended session with an advisor in the new major and approval of a new program of study before the change is complete.

A student in lower-division status may change majors by filing a Change/Declaration of Academic Program Form with the registrar. These are minimal advising procedures to be followed in all undergraduate segments of the university; individual units may require additional advising sessions.

Health Professions Advising and the Medical Sciences Advisory Committee
Phone: 703-993-9305
Web: prehealth.gmu.edu

Students are responsible for educating themselves about a career in the health professions (e.g., dentistry, medicine, pharmacy, optometry, podiatry, or veterinary medicine) and should become familiar with the admissions process. The health professions advisor coordinates academic and career advising for Mason students and alumni as the chair of the Health Professions Advising and the Medical Sciences Advisory Committee. The committee reviews all qualified candidates for admission to health professions programs in dentistry, podiatry, veterinary, allopathic, and osteopathic medicine to create a composite letter of evaluation for the applicant. The committee comprises university faculty and professional advising staff. For more information, consult the advising web site or contact the health professions advisor, Student Academic Affairs and Advising, 4400 University Drive, MS 2C4, Fairfax, Virginia 22030.

Requirements for Retention

The following system of academic progress became effective in fall 2004 and applies to all undergraduate degree and nondegree students at Mason, including those formerly categorized as extended studies students.

Academic retention is based solely on the cumulative GPA. The significance of the cumulative GPA varies according to the credit level or attempted credit hours, which is a combination of all credits attempted at the university plus credits transferred from other institutions or obtained by testing.

Dean’s List

Students in degree status who take at least 6 credits in a semester and earn a semester GPA of 3.50 or higher merit placement on the Dean’s List. Courses subsequently repeated and ex-
Academic Policies

Students in good academic standing unless they are academically dismissed, suspended, or on probation. Students on academic warning are still considered to be in good academic standing.

Student Retention Categories
The university’s minimum standard for academic achievement is 2.00 on a 4.00 scale. Students with at least 7 attempted credits and a cumulative GPA of less than 2.00 fall into one of three categories: warning, probation, and suspension. All notations of academic standing are included in a student’s permanent record. The cumulative GPA range that defines each of the categories varies according to the credit level, as noted below:

<table>
<thead>
<tr>
<th>GPA Retention Levels</th>
<th>Credit Level</th>
<th>Warning GPA Range</th>
<th>Probation GPA Range</th>
<th>Suspension GPA Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempted Credit Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7–16</td>
<td></td>
<td>0.00–1.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17–29</td>
<td></td>
<td>1.75–1.99</td>
<td>1.00–1.74</td>
<td>0.00–0.99</td>
</tr>
<tr>
<td>30–59</td>
<td></td>
<td>1.85–1.99</td>
<td>1.25–1.84</td>
<td>0.00–1.24</td>
</tr>
<tr>
<td>60–89</td>
<td></td>
<td>1.95–1.99</td>
<td>1.55–1.94</td>
<td>0.00–1.54</td>
</tr>
<tr>
<td>90+</td>
<td></td>
<td>–</td>
<td>1.85–1.99</td>
<td>0.00–1.84</td>
</tr>
</tbody>
</table>

Periods of Academic Suspension
Students in degree status who incur a first suspension following a spring semester or summer term serve a period of suspension through the next fall semester. Students who incur a first suspension following a fall semester serve a period of suspension through the next summer term. A second suspension is for one calendar year: two semesters and a summer term. Students returning from suspension are on probation for one academic period. Course credits earned at other colleges during the period of suspension from Mason (for academic or nonacademic reasons) are not accepted for the degree program.

Nondegree undergraduate students placed on suspension have no specified rights of return to the university. Nondegree students who have been suspended and wish to resume their studies after a period of absence must qualify for readmission through the Office of Admissions.

Academic Dismissal
A third suspension results in academic dismissal, a status that is usually permanent. In exceptional cases, students who have been dismissed may apply for readmission after a minimum absence of three calendar years from the university, but only if they meet one or more of the following conditions after having been dismissed:

- Demonstrate academic success (2.50 GPA or better) in at least 18 credits of classes taken during the period of dismissal at an accredited two- or four-year college or university. Such credits may be considered for transfer back to Mason, but there is no guarantee of acceptance of the credit.
- Provide other evidence of a renewed ability to achieve academic success.
- Provide evidence that all degree requirements will be met once an additional 12 or fewer credits are complete.

Meeting the above requirements does not guarantee a return. The Office of Admissions and the appropriate school or college dean will make individual decisions in the best academic interests of the student and the university. For students seeking readmission to a new school or college, the new dean will make the decision in consultation with the former dean and the Office of Admissions. For more information, see the Academic Clemency section of this chapter.

Academic Period
Academic period refers to fall semester, spring semester, or summer term. For determining the duration of academic warning, probation, and suspension, an academic period is defined as follows:

Each academic period begins on the 15th day following the last scheduled day of final exams for the previous period. Each academic period ends on the 14th day after the last scheduled day of final exams. For example, assume that the last scheduled day of final exams for a semester is Monday, December 23. That period then ends on Monday, January 6. The next period begins on Tuesday, January 7.

Academic Performance and Credit Limit
Undergraduate students on warning, probation, or returning from suspension are limited to a maximum of 13 credits for following semesters until they achieve good standing. Students registered for 14 or more credits are responsible for seeking academic advisement and adjusting their enrollment to a maximum of 13 credits.

Academic Standing and Student Activities
Only students in good academic standing are eligible to hold or run for elective or appointive office in any organization or activity associated with Mason, compete in any athletic or other activity representing Mason on either an intercollegiate or a club level, or serve as a working staff member of any student organization. Note that students on warning are considered to be in good standing.

A student whose eligibility for an activity requires the completion of a semester will have fulfilled that requirement when the student’s publicly scheduled exams are over, unless continued eligibility depends on the grades received. In the latter case, the student will not become eligible until the end of the semester as defined in the Academic Period section of this chapter.

Academic Clemency
Undergraduate students returning to Mason after a separation of a minimum of three calendar years may petition their academic dean to have a number of previously earned grades and credits removed from the calculation of their cumulative GPA. Up to 16 credits and corresponding grades from courses previously completed at Mason may be removed from calculation of the GPA and will not be counted toward graduation requirements. Note that the courses, with their original grades and the notation “Academic Clemency,” will remain listed on the student’s transcript permanently. The
petition for clemency must be filed in the first semester of returning to Mason; approval may depend on successful completion of that semester. Approval of the request is neither automatic nor guaranteed.

**Undergraduate Academic Program**

To plan a sound academic program, undergraduates should select a degree and major as soon as it is practical but no later than four weeks before the end of the sophomore year. To declare a major, students should confer with the appropriate advisor or designate of either the new major program or, if undeclared, the Academic Advising Center (in Student Union Building I, Room 304). Students should obtain signatures from both departments in the Change of Major section of the Change/Declaration of Academic Program Form, which is available in the Registrar’s Office and the Academic Advising Center.

**Change of Academic Program**

Students considering a change in their academic program (major or degree) are encouraged to see an advisor in the Academic Advising Center or a faculty advisor in their prospective discipline. Departmental chapters of this catalog describe requirements for acceptance. Students not meeting the requirements may appeal to the department chair for an exception.

Once a student has completed 60 credits, a change of major requires a meeting with an advisor in the new major before the change is complete. To file a change of major, signatures of advisors or designates in both the new and former major programs must be obtained on the Change/Declaration of Academic Program Form.

**Credit for More than One Undergraduate Major**

Students seeking to graduate with a BA or BS degree in two or more subjects must meet departmental requirements for the major in each field. For each major, at least 18 credits used to fulfill its requirements cannot be used to fulfill the requirements of another major, a concentration, a minor, or an undergraduate certificate.

Students given permission to pursue two or more concurrent majors must complete the Declaration of Second Major section of the Change/Declaration of Academic Program form, available in the Registrar’s Office or at registrar.gmu.edu/forms. The applicant must present a detailed program of study for both majors and obtain the authorizing signature from the chair or director of the second major program and from the dean or director, if required by the college, school, or institute. When required, department chairs and deans or directors must also approve all changes to the programs of study. Students may begin a program at any time that permits completion before the anticipated graduation date.

**Minors**

Students may elect minor programs of study in addition to major fields by completing the Declaration or Change of Minor section of the Change/Declaration of Academic Program Form. Minors usually require between 15 and 21 credits of study, at least 8 of which must be applied only to that minor and may not be used to fulfill requirements of the student’s major, concentration, an undergraduate certificate, or another minor. Students must complete at least 6 credits in their minor at Mason and achieve a minimum 2.00 GPA in courses applied to the minor. Students interested in a minor should consult the appropriate chapters in this catalog.

**Undergraduate Certificates**

Students may elect undergraduate certificate programs of study in addition to major fields by completing the Change/Declaration of Academic Program Form. Students pursuing undergraduate certificates must be admitted to Mason in degree-seeking status. Undergraduate certificate programs require at least 24 credits, 15 of which may not also be used to fulfill the requirements of a major, a concentration, a minor, or another undergraduate certificate. More than half of the credit hours for an undergraduate certificate must be taken at Mason, and more than half must be taken in degree-seeking status. Students must achieve at least a 2.00 GPA in courses applied to the certificate. Students with a previous bachelor’s degree, who are admitted to an undergraduate certificate program alone, have four years to complete certificate requirements. A completed undergraduate certificate may be posted to the transcript only after completion of a bachelor’s degree. Note that these are university minimum requirements; individual programs may have higher standards and/or more restrictive requirements.

**Baccalaureate Degree Requirements**

To qualify for a bachelor’s degree, students must have been admitted, completed at least 120 credits that count toward graduation, fulfilled all degree requirements, and achieved a cumulative GPA of 2.00 or higher. Students seeking a bachelor’s degree must apply at least 45 credits of upper-level courses (numbered 300 or above) toward graduation requirements. Some programs may have higher standards for grades allowable in majors, minors, or certificates. Please refer to the appropriate section of this catalog for more information.

**General Education Requirements**

All undergraduates seeking a baccalaureate degree at Mason must complete the General Education requirements. For more details, go to the University General Education chapter of this catalog. Additional requirements for specific degree programs can be found in the description of each college or school in this catalog.

**English Composition Requirement**

Mason requires students to complete at least two semesters of English composition. Students enrolled in the honors program in General Education or New Century College learning communities complete the English composition requirement as specified in those programs. All other students, unless they have received equivalent credit through transfer or proficiency exam, must enroll in ENGL 101 (or 100) upon admission and, after meeting its prerequisites, ENGL 302. Students must attain a minimum grade of C in composition courses to fulfill degree requirements.

**Writing-Intensive Course Requirement**

In addition to English composition and as part of the university’s commitment to literacy in all programs, at least one course in each major has been designated “writing intensive.” While other courses in the major may require written projects, writing-intensive courses emphasize the process of drafting and revision. Faculty members give constructive comments on drafts of at least one course project. Students then revise and resubmit, or use for future submissions. Writing-
intensive courses are numbered 300 and above. See the description of each major for the specific courses that fulfill the requirement.

Residence Requirements
At least one-fourth of the total credits applied to the degree must be completed at Mason and include at least 12 upper-level credits (courses numbered 300 or above) in the major program. For more information, see the Credit to Be Earned at Other Institutions section.

Second Bachelor’s Degree
A second bachelor’s degree may be earned, either concurrently or sequentially. To graduate with two degrees, students must present at least 30 Mason credits beyond those required by either degree alone. For sequential awarding of degrees, students must be readmitted for the second degree through the Office of Admissions and complete a minimum of 30 credit hours after that point to have fulfilled the residency requirement for that degree.

Students who are concurrently pursuing two bachelor’s degrees at Mason must present a detailed program of study for both degrees and obtain authorizing signatures from the chair or director of each degree program and the dean or director, if required by the college, school, or institute. Students may declare the second concurrent degree by completing the Declaration of Second Bachelor’s Degree section of the Change/Declaration of Academic Program Form. Students pursuing concurrent degrees should apply to graduate when both degrees are complete, or be prepared to meet the requirements noted above for sequential awarding of degrees.

University Honors
A student graduates with distinction from the university when at least 60 credits applied toward graduation are earned at Mason, and the student’s cumulative GPA is at least equal to one of three values: 3.90, summa cum laude; 3.70, magna cum laude; or 3.50, cum laude.

A student graduates with recognition from the university when between 45 and 59 (inclusive) credits applied toward graduation are earned at Mason, and the student’s cumulative GPA is at least 3.80.

Graduate Policies

Graduate Council
The Graduate Council is the governing body for all graduate academic policies and procedures. The council approves all new graduate programs; authorizes all graduate course work, policies, and degrees conferred by the university; and sets minimum standards for admission to and graduation from any graduate program. These are minimum standards that all programs must meet; individual programs may set and enforce higher standards. The Office of the Provost administers university graduate policies for the Graduate Council.

Graduate Faculty
The graduate faculty consists of all tenured and tenure-track faculty members and other faculty members appointed to the graduate faculty by the provost.

Academic Programs
At the graduate level, Mason offers certificates and master’s and doctoral degrees. There are also a number of combined bachelor’s and accelerated master’s degree programs for academically strong undergraduates with a commitment to research. For more information, see the Registration and Attendance section of this chapter.

Student Status
Students may access graduate classes and programs according to their status as nondegree or enrolled degree students. For more information, see the Admission chapter of this catalog.

Full-Time Classification
Graduate students are considered full time if they are enrolled in at least 9 graduate credits per semester or hold a full-time assistantship (20 hours a week) and are enrolled in at least 6 graduate credits per semester. Graduate students who are enrolled in dissertation credits (either 998 or 999) are considered full time if they are enrolled in at least 6 credits per semester, regardless of whether they hold an assistantship. Graduate students who have completed the minimum number of credits required by their degree program, including the minimum number of credits of 998 and 999 required by the university and their degree program, are considered full time if they are registered for at least 1 credit of 999 and their advisors and department chairs certify each semester that they are working full time on the dissertation. Note that different criteria for full-time status may apply for tuition, verification, loan deferral, and financial aid. Contact Student Accounts, the Registrar’s Office, and Student Financial Aid, respectively, for more information.

Change from Nondegree Status
A student admitted for graduate study in nondegree status may request a change to degree status within the same program. All admission requirements (as usually defined by the student’s program for degree status) must be met, including official transcripts and letters of recommendation. If the student intends to use credits earned in nondegree status toward a degree, the credits must be approved on the Graduate Transfer of Credit Request form. The credit must have been earned within six years prior to first enrollment as an admitted student in the specific certificate or degree program, and a minimum grade of B (3.00) must have been earned. There is a limit on the number of credits that can be transferred when changing from nondegree to degree status; please see the applicable degree program for specific information.

Removing Provisional Qualifier
For policies concerning students admitted provisionally, see the Graduate Admission Policies section in the Admission chapter of this catalog.

Permission to Re-Enroll
Permission to re-enroll in a program must be obtained by all master’s and doctoral degree students who have failed to enroll in at least 1 credit of course work for two or more consecutive semesters at Mason. A program may allow a student to petition to graduate under any catalog in effect while the student was enrolled. The final decision rests with the unit dean or director. Forms are available from the Office of the Registrar at registrar.gmu.edu/forms.
Voluntary Resignation from Graduate Academic Program

Degree-seeking students may officially resign from their academic program with the approval of their department or program chair and their dean. The Voluntary Resignation form must be approved by the student’s program and Student Accounts, then submitted to the Registrar’s Office for notation on the transcript. Resignations after the drop period will result in grades of W on the student’s transcript for that semester, and removal from any future registered courses. Program resignation is final. Students who have been granted a resignation will not be able to register for any courses unless admitted to another degree program or nondegree status in a different program.

Academic Advising

At the time the student was admitted to graduate study, the student is assigned a faculty advisor by the academic program responsible for the student’s program of study. Registration for newly admitted graduate students, as well as continuing students, begins with a visit to the student’s academic advisor. There, the student can obtain information about specific courses and degree requirements and develop an individual program of study. Progress in an approved program of study is the shared responsibility of the student and the advisor. The graduate student is responsible for compliance with the policies and procedures of the college, school, or institute, and all applicable departmental requirements that govern the individual program of study. Students should consult with their advisors before registration each semester.

Transfer of Credit

Graduate credit earned prior to admission to a certificate, master’s, or doctoral program may be eligible to be transferred into the program and applied to the certificate or degree. Transfer of credit requires the approval of the program director and dean or director of the school, college, or institute. They will determine whether the credit is eligible for transfer and applicable to the specific certificate or degree program. Note that credits accepted for transfer do not compute into any Mason GPA. Limits on the number of credits that can be transferred derive from the degree requirements given below.

Credit is usually considered for transfer at the student’s request at the time of initial registration as a degree-seeking student. Students must supply official transcripts plus an official transcript evaluation for transcripts from outside the United States, and an official translation for transcripts not in English if these documents were not supplied in the admissions process. Credit transfer requests from students who are admitted provisionally are not considered until the students have fulfilled the conditions of their admission and had the provisional qualifier removed from their records.

Students requesting a reduction of credit must supply official transcripts plus an official transcript evaluation for transcripts from outside the United States, and an official translation for transcripts not in English if these documents were not supplied in the admissions process. Reduction-of-credit requests from students who are admitted provisionally are not considered until the students have fulfilled the conditions of their admission and had the provisional qualifier removed from their records.

Credits used in reduction of credit are not subject to time limits, and the credits must have been applied to a previous degree. All the other conditions given above for eligibility of transfer of credit apply also to reduction of credits.

Credit by External Exam

Degree credit for satisfactory completion of an external exam is limited to those exams and achievement levels specifically approved by the Graduate Council.

Credit from Other Institutions

Students enrolled in a degree program may take graduate courses at another accredited institution and apply these credits to a master’s or doctoral degree with prior approval. Approval must be secured in writing from the director of the graduate program and the dean or director of the school, college, or institute, and submitted to Mason’s Office of the Registrar before registering at the other institution. Upon completion of the course, students must arrange for an official transcript to be submitted to Mason so that the credits may be transferred into their Mason degree program. These credits are subject to all the other conditions given above for transfer credit, including limits on numbers of credits that can be taken elsewhere. Note that credits accepted for transfer do not compute into any Mason GPA. Permission to take a course elsewhere does not exempt a graduate student from satisfying the degree requirements given below.

Enrolled, degree-seeking graduate students may be eligible to take courses through the Consortium of Universities of the Washington Metropolitan Area. See the University Consortium section. Credits earned through the consortium are considered resident, not transfer, credits, and are therefore not subject to transfer of credit conditions or limitations.
Graduate Academic Standards, Grades

University course work is measured in terms of quantity and quality. A credit normally represents one hour per week of lecture or recitation, or not fewer than two hours per week of laboratory work, throughout a semester. The number of credits is a measure of quantity. The grade is a measure of quality. The university-wide system for grading graduate courses is as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Quality Points</th>
<th>Graduate Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.00</td>
<td>Satisfactory/Passing</td>
</tr>
<tr>
<td>A</td>
<td>4.00</td>
<td>Satisfactory/Passing</td>
</tr>
<tr>
<td>A-</td>
<td>3.67</td>
<td>Satisfactory/Passing</td>
</tr>
<tr>
<td>B+</td>
<td>3.33</td>
<td>Satisfactory/Passing</td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
<td>Satisfactory/Passing</td>
</tr>
<tr>
<td>B-</td>
<td>2.67</td>
<td>Satisfactory*/Passing</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
<td>Unsatisfactory/Passing</td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
<td>Unsatisfactory/Failing</td>
</tr>
</tbody>
</table>

* Although a B- is a satisfactory grade for a course, students must maintain a 3.00 average in their degree program and present a 3.00 GPA on the courses listed on the graduation application.

Academic Warning

A notation of academic warning is entered on the transcript of a graduate student who receives a grade of C or F in a graduate course or while a grade of IN is in effect.

Academic Termination

Graduate students who are admitted provisionally may be terminated from their academic programs if they fail to meet the conditions of their admission in the time limits set at admission. Students admitted provisionally and nondegree graduate students may be terminated upon accumulating grades of F in two courses or 9 credits of unsatisfactory grades in graduate courses. Provisionally admitted students who accumulate 12 credits of unsatisfactory grades in undergraduate courses will also be terminated. (For students admitted provisionally, graduate and undergraduate grades are not combined in the calculation of unsatisfactory credits leading toward termination.) Although the university will make every effort to notify students when their performance reaches the threshold for termination, each student is responsible for knowing the termination criteria for non-degree students at Mason, for knowing when their grades have met the standard, and for initiating any appeal to their dean. Students may be terminated if they fail to achieve satisfactory progress toward their degree. A letter of termination is sent by the dean or director of the school, college, or institute, and notification of academic termination is affixed to the graduate student’s official record. A student who is dismissed may not take additional course work at Mason.

Requirements for Graduate Certificates

Candidates must satisfy all university requirements and all requirements established by the graduate certificate program faculty. Individual departmental graduate certificate requirements are listed under their academic departments in this catalog. Note that the following are university minimum requirements; individual programs may have higher standards and/or more restrictive requirements.

- Graduate certificate programs require a minimum of 15 graduate credits.
- Only graduate courses may apply toward the graduate certificate.
- A maximum of 3 graduate credits taken at another institution can be transferred into a graduate certificate program. See Transfer of Credit section.
- Candidates must have a minimum GPA of 3.00 in course work presented on the certificate application, which may include no more than 3 credits of C. (Grades of C+, C-, and D do not apply to graduate courses.) The GPA calculation excludes transfer credits.
- Certificate students are subject to graduate termination and dismissal policies.

Students in Master’s or Doctoral Programs also Pursuing Graduate Certificates

Admission

Students must be admitted to the master’s or doctoral program in degree status. They must also be admitted to degree status for the graduate certificate program at least one semester before completion of certificate requirements.

Course Work in Degree Status

More than half of the credits required for the certificate program must be taken in degree status for the master’s or doctoral degree.

Time Limits

The time limits coincide with the six-year time limit for master’s degrees or the six-year time limit for advancement to candidacy in a doctoral degree. Master’s and doctoral time limit rules apply.

Multiple Programs

Students may be enrolled in one or two graduate certificate programs while they pursue a master’s and/or doctoral degree. Students who have completed a graduate certificate may subsequently be approved to apply many of those credit hours to a master’s degree. Courses applying to the master’s or doctoral program may also apply to up to two graduate certificate programs. When such sharing of credits between graduate certificates and graduate degrees has occurred, a maximum of two graduate certificates may be conferred.
Students in Graduate Certificate Programs Only

**Admission**

Students must be admitted to the graduate certificate program in degree status.

**Course Work in Degree Status**

More than half of the credits required for the graduate certificate program must be taken in degree status for that program.

**Time Limits**

The time limit for completion is six years from the date of enrollment into degree status for the graduate certificate program. The time limit is not extended because of an absence and subsequent re-enrollment into the graduate certificate program. Failure to meet the time limit or to secure an extension request may result in termination from the program.

**Multiple Programs**

Students may be admitted to two graduate certificate programs at the same time. The graduation application for each graduate certificate must include a minimum of 12 credits that apply only to that certificate and not to another.

**Requirements for Master’s Degrees**

Candidates must satisfy all university degree requirements and all requirements established by the master’s program faculty. Individual departmental degree requirements are listed under the respective master’s programs in this catalog.

- Candidates must earn a minimum of 30 graduate credits.
- Only graduate courses may apply toward the degree.
- The majority of the credits applied to the degree must be earned at Mason or, in the case of programs offered through joint, cooperative, or consortial arrangements, at the participating institutions.
- A minimum of 18 credits must be taken in degree status, after admission to the degree program.
- A maximum of 6 credits of master’s thesis research (799) or master’s project may be applied to the degree.
- Candidates must have a minimum GPA of 3.00 in course work presented on the degree application, which may include no more than 6 credits of C. Grades of C+, C-, or D do not apply to graduate courses. The GPA calculation excludes all transfer courses and Mason nondegree studies credits not formally approved for the degree.

**Thesis Options**

Requirements regarding a thesis vary with the degree program. A number of master’s programs offer both thesis and non-thesis options. The same quality of work is expected of students regardless of their chosen option. For more information, consult the section on degree requirements under each degree program.

**Time Limit**

Master’s degree students have six years from the time of first enrollment as a degree-seeking student to complete their degrees. Individual master’s programs may have stricter time limits, which are published in this catalog. Students who are given permission to re-enroll following an absence from Mason may not count the six-year time limit as beginning on the date of re-enrollment. Students who will not meet published time limits because of circumstances beyond their control may petition for an extension. Failure to meet the time limits or to secure approval of an extension request may result in termination from the program.

**Master’s Thesis**

When a thesis proposal has been approved by the appropriate department, the department chair sends the collegiate dean or director a copy of the thesis proposal, including the approval signatures of the master’s thesis committee members. Students may enroll in thesis research (799) at the beginning of the next semester. Students must register for 3 credits per semester until they reach the last 3 required credits. Once they have only 3 credits remaining, students may enroll for 1 credit per semester until graduation. To be considered a full-time student, the advisor and department chair must certify each semester that the student is working full time on the thesis. Please note: Graduate students must maintain continuous enrollment in 799 while writing and submitting a thesis. Graduation candidates who miss the library deadline for thesis submission, but do submit officially before the next semester begins, do not have to register for 799 in that next semester, but must stay active to graduate.

The master’s thesis committee is named by the candidate’s department chair, who designates a member of the graduate faculty from that department as the thesis committee chair. The committee is appointed after consulting with the candidate and advisor and consists of at least three people. Two must be members of the graduate faculty from the candidate’s department, while one may come from outside the department.

The thesis committee chair is primarily responsible for directing and guiding the candidate’s research and writing activities. The student is responsible for keeping all committee members informed of the scope, plan, and progress of the research as well as the thesis.

Students selecting the thesis option should obtain a copy of Mason’s Thesis, Dissertation, or Project Guide, which is available at thesis.gmu.edu. Students may register in 799 Thesis only after their thesis proposal has been submitted and approved as prescribed in the guide. Any student not in attendance at Mason who is preparing a thesis under the active supervision of a member of the faculty or wishes to take an exam must maintain continuous registration in 799 for at least 1 credit per semester.

**Thesis Submission**

The university has a policy on the dissemination of scholarly works created by graduate students. The Electronic Thesis and Dissertation (ETDs) program encourages masters-level graduate students to submit an electronic copy of their thesis for broad scholarly dissemination through the Mason Archival Repository Service (MARS). Student participation in the ETDs program is strongly encouraged, but not mandatory. All students choosing to participate in this program will be required to sign the MARS Author/Contributor Permission Agreement.

On or before the thesis deadline for any semester, the student will submit a complete (signed Signature Sheet through Curriculum Vitae) 100% cotton copy of his or her thesis to the University Libraries along with a transmittal sheet. The student may also opt to submit an electronic copy of his/her thesis. These submissions can be in Word, WordPerfect, or in portable document format (PDF). Media formats (tiff, jpeg, png, wav, avi, mpeg, mov, rm, wmv, wma, etc.) for supporting materials will also be accepted. Datasets may be accepted at the discretion of the libraries. The files may be submitted on
CD, DVD, or USB memory device. Please note that those students opting out of the ETDs program are required to submit two 100% cotton copies of their thesis.

For degree conferral in a particular semester, the above materials must be submitted to the library by 5 p.m. on the last Friday of classes in that semester. For specific deadlines and other information, go to registrar.gmu.edu.

**Requirements for Doctoral Degrees**

Candidates must satisfy all university degree requirements and all requirements established by the doctoral program faculty. Departmental degree requirements are listed under the respective doctoral programs in this catalog. Programs may impose more stringent requirements.

- Candidates must earn a minimum of 72 graduate credits, which may be reduced by a maximum of 30 credits from a completed master’s degree or other suitable, approved transfer work.
- The remaining 42 credits for students with a master’s degree may apply only to the doctoral degree and not to a second master’s degree.
- Only graduate courses may apply toward the degree.
- The majority of credits applied to the doctoral degree (minimum 72) must be earned at Mason or in the case of programs offered through joint, cooperative, or consortial arrangements, at the participating institutions.
- More than half of all credits (minimum 72) must be taken in doctoral degree status, after admission to the degree program.
- Candidates must pass a written or oral doctoral candidacy (qualifying) exam, or both.
- Candidates must complete a minimum of 12 credits of doctoral proposal (998) and doctoral dissertation research (999). A maximum of 24 credits of 998 and 999 may be applied to the degree.
- Candidates must pass a final public defense of the doctoral dissertation.
- Candidates must have a minimum GPA of 3.00 in course work presented on the degree application, which may include no more than 6 credits of C. (Grades of C+, C-, or D do not apply to graduate courses. The GPA calculation excludes all transfer courses and Mason extended studies or nondegree credits not formally approved for the degree.)

**Time Limit**

Doctoral students have six years from the time of first enrollment as a degree-seeking student to become advanced to candidacy. Students have five years from the time of advancement to candidacy to graduation. Individual doctoral programs may have stricter time limits, which are published in this catalog. Students who are given permission to re-enroll following an absence from Mason may not count the time limits as beginning on the date of re-enrollment. Students who will not meet published time limits because of circumstances beyond their control may petition for an extension. Failure to meet the time limits or to secure approval of an extension request may result in termination from the program.

**Doctoral Research Skill Requirements**

Some doctoral degree programs require demonstration of proficiency in a research skill, including knowledge of the research literature in a foreign language, computer language, statistical methods, or a research tool specific to the discipline. Research skill requirements are included with the degree requirements for the specific doctoral degree. Where demonstration of research skills is required, certification that this requirement has been met must be completed for advancement to candidacy.

**Program of Study**

Usually before the end of the second year of graduate study but no later than consideration for advancement to candidacy, doctoral students must submit a program of study for approval by the dean or director of the college, school, or institute. The program of study must include major courses and supporting courses to be completed, research skills required, subject areas to be covered by the candidacy exam, and a proposed date for the candidacy exam. Program of Study Forms are available from each program’s doctoral coordinator. Any changes in the programs of study must be documented with an amended Program of Study Form.

**Advancement to Candidacy**

Advancement to candidacy implies that a doctoral student has demonstrated both a breadth and a depth of knowledge in the field of study and is capable of exploring problems on the boundaries of knowledge. The candidacy exam includes a written part and may include an oral part, depending on the particular doctoral program. Doctoral students should consult the degree requirements for each doctoral program to determine whether an oral portion is required, whether it is judged separately or with the written portion, the number of times a failed candidacy exam may be repeated and any time limits for repeating, and any time limits for attempting the candidacy exam.

Before doctoral students may be advanced to candidacy by the unit dean or director, they should have completed all course work required by the program faculty, been certified in all doctoral research skills required, passed the candidacy exam, and been recommended by the doctoral supervisory committee or program coordinator. Students advanced to candidacy after the add period for a given semester must wait until the following semester to register for 999 Dissertation Research.

**Dissertation Committee**

By the time a doctoral student is advanced to candidacy, the dean or director of the school, college, or institute appoints a dissertation committee upon recommendation of the program director. The committee consists of a graduate faculty member (see the Graduate Faculty section in this chapter) from the department of the student’s field of study and at least two other members of the graduate faculty, one of whom must be from outside the student’s local academic unit (school, college, institute, or department). Additional members may be appointed who are not members of the graduate faculty but are from outside the university.

Student-initiated changes in the composition of the dissertation committee may occur only with the approval of the dean or director in consultation with the committee. Such changes may be made for extenuating circumstances only. Faculty may resign from a dissertation committee with appropriate notice by submitting a written resignation.
Dissertation Registration (998, 999)

Students working on dissertation research (999) must register for a minimum of 3 credits of 999 per semester (excluding summers) until they have completed the minimum number of credits of 995 and 999 required by the university and their degree program. Then, they must register for 1 credit of 999 until the dissertation is complete and has been officially submitted to the library. See the Full-Time Classification section for more information.

All registration for doctoral dissertation research (999) must be planned with the dissertation director and approved by the dean or director of the school, college, or institute. Dissertation research (999) is open only to doctoral students who have advanced to candidacy. Once enrolled in 999, students must maintain continuous registration in 999 each semester until graduation, excluding summers. Students who defend in the summer must be registered for at least 1 credit of 999 in the summer. Individual doctoral programs may require continuous registration beginning with 998. Graduation candidates who miss the library deadline for dissertation submission, but do submit officially before the next semester begins, do not have to register for 999 in that next semester, but must stay active to graduate.

It is the student’s responsibility to complete registration for dissertation proposal (998) or research (999) prior to the first day of classes for the semester. If this date is missed, students must still enroll in these courses via Add or Late Schedule Adjustment procedures and are subject to Late Registration fees. Failing to register on time in a particular semester does not alter the requirement for continuous registration in 999.

Doctoral Dissertation

A dissertation is required for the doctor of philosophy degree and most professional doctoral degrees. The dissertation is a written piece of original thinking that demonstrates doctoral candidates’ mastery of subject matter, methodologies, and conceptual foundations in their chosen field of study. This is generally achieved through consideration of a problem on the boundaries of knowledge in the discipline.

The director of the dissertation committee is primarily responsible for directing the doctoral candidate’s research and guiding the preparation of the written dissertation. After the dissertation committee is appointed, the student should begin discussions with the director to define a suitable problem for the dissertation. Before the student may enroll in doctoral dissertation research (999), the dissertation proposal must be approved by the dissertation committee and evidence of approval sent to the unit dean or director for approval. Before that time, the student may enroll in proposal research (998).

Guidelines for the content and general format of doctoral dissertations are in the Thesis, Dissertation, or Project Guide, which is available at thesis.gmu.edu. Consult a doctoral coordinator to determine which additional reference manuals are suitable.

Doctoral Defense

As soon as all degree requirements have been satisfied, including completion of the doctoral dissertation, the doctoral candidate may request a doctoral defense. Approval for the defense is given by the doctoral dissertation committee, department or program chair, and relevant dean or director of the school, college, or institute. Notice of a defense must be circulated to the university community two weeks before the defense date. The public defense should demonstrate the candidate’s maturity of judgment and intellectual command of the chosen branches of the field of study.

At the close of the final defense, the dissertation committee makes final judgments for approving the dissertation. The doctoral candidate is responsible for making all required changes promptly, submitting the original and required copies, and obtaining signatures. Final approval for the dissertation is given by the doctoral dissertation committee, department or program chair, and the relevant dean or director of the school, college, or institute, all of whom must sign the final copy.

For a dissertation to be approved, all members of the committee must sign. If a committee member refuses to do so, the student or any member of the committee may petition the unit dean or director for a review and ruling. The dean or director may seek the advice of outside reviewers to provide an assessment of the work. The final decision is that of the dean or director, and is not subject to appeal.

Dissertation Submission and Fee

The university has a policy on the dissemination of scholarly works created by graduate students. The Electronic Thesis and Dissertation (ETDs) program encourages doctoral-level graduate students to submit an electronic copy of their dissertation for broad scholarly dissemination through the Mason Archival Repository Service (MARS). Student participation in the ETDs program is strongly encouraged, but not mandatory. All students choosing to participate in this program will be required to sign the MARS Author/Contributor Permission Agreement.

On or before the dissertation deadline for any semester, the student will submit a complete (signed Signature Sheet through Curriculum Vitae) 100% cotton copy of his or her dissertation to the University Libraries along with a transmittal sheet. The student will also submit an electronic copy of his or her dissertation. These submissions can be in Word, WordPerfect, or in portable document format (PDF). Media formats (tif, jpg, png, wav, avi, mpeg, mov, rm, wmv, wma, etc.) will be accepted. Datasets may be accepted at the discretion of the libraries. The files may be turned in on CD, DVD, or USB memory device. Please note that those students opting out of the ETDs program are required to submit two 100% cotton copies of their dissertation.

Submission of an additional PDF on CD of the dissertation to University Microfilms International (ProQuest) is required; a fee of either $55 or $150 (depending on publishing option chosen) is paid by the student for this process. Submission of a completed Survey of Earned Doctorates is also required. All copies of the dissertation must be submitted and all fees paid before the doctoral degree is awarded.

For degree conferral in a particular semester, the above materials must be submitted to the library by 5 p.m. on the last Friday of classes in that semester. (For specific deadlines and more information, go to registrar.gmu.edu.) To be included in Mason’s published commencement program, doctoral students must submit materials to the library by the commencement program deadline.
University Dissertation and Thesis Services

University Dissertation and Thesis Services (UDTS) facilitates completion and submission of dissertations, theses, and graduate-level projects. The program assists Mason students in all stages of production. The UDTS web site, thesis.gmu.edu, provides students with useful tools, including download-able templates of necessary elements, forms required for the submission process, and links to related web sites. Students completing a thesis or dissertation are required to complete a format review. UDTS is located in Fenwick Library, Special Collections and Archives, Wing 2C. For more information, contact the university dissertation and thesis coordinator at 703-993-2222.
Equal Opportunity and Nondiscrimination Policy

George Mason University is committed to providing equal opportunity and an educational and work environment free from any discrimination on the basis of race, color, religion, national origin, sex, disability, veteran status, sexual orientation, or age. Mason shall adhere to all applicable state and federal equal opportunity/affirmative action statutes and regulations.

The university is dedicated to ensuring access, fairness, and equity for minorities, women, individuals with disabilities, and veterans (as covered by law) in its educational programs, related activities, and employment. Mason shall thus maintain a continuing affirmative action program to identify and eliminate discriminatory practices in every phase of university operations.

Retaliation against an individual who has raised claims of illegal discrimination or cooperated with an investigation of such claims is prohibited.

Students and employees should bring questions or concerns to the attention of the Office of Equity and Diversity Services, Mason Hall, Suite D105, 703-993-8730. The Equal Opportunity/Affirmative Action Grievance Procedures list the various ways to file a complaint. Grievance procedures can be found at www.gmu.edu/equity/policies_grievances.htm.

Sexual Harassment Policy

It is the policy of the university to provide an academic and work environment free from sexual harassment. Sexual harassment is contrary to the standards and mission of the university. Sexual harassment is illegal and will not be tolerated. Each member of the university community has a responsibility to maintain an academic and work environment free from sexual harassment. The university will take whatever action is necessary to prevent, stop, correct, or discipline harassing behavior. Same-sex sexual harassment violates this policy and is subject to discipline under the same procedures.*

Sexual harassment is defined by law as unwelcome sexual advances, requests for sexual favors, and other verbal, physical, or other form of expressive communication of a sexual nature when submission to or rejection of such conduct is used as a basis for employment or academic decisions, or such conduct has the purpose or effect of unreasonably interfering with an individual’s work or academic performance, or creating an intimidating, hostile, or sexually offensive work or academic environment. Examples of behavior that may be considered sexual harassment include, but are not limited to, the following:

- Sexual assault
- Explicitly or implicitly requiring submission to sexual advances as a condition or term of education or employment, i.e., grades, employment, promotion, letters of recommendation, or other privileges
- Repetitive sexual comments, questions, jokes, gestures, or other forms of sexually explicit expression

Any student, faculty member, or staff employee who believes he or she is the victim of sexual harassment should report the incident promptly in the manner most comfortable to him or her. The Equal Opportunity/Affirmative Action Grievance Procedures list the various ways to file a complaint. Grievance Procedures can be found at www.gmu.edu/equity/policies_grievances.htm.

Retaliation against an individual who has raised claims of illegal discrimination or cooperated with an investigation of such claims is prohibited.

Any employee who becomes aware of sexual harassment or other potentially discriminatory behavior must contact the Office of Equity and Diversity Services. The Office for Equity and Diversity Services is responsible for administering and monitoring Mason’s equal opportunity/affirmative action policies and procedures. Inquiries about or complaints alleging violation of the university’s equal opportunity/affirmative action policies should be directed to the Office of Equity and Diversity Services, Mason Hall D105, 4400 University Drive, MS 2C2, Fairfax, Virginia 22030. Phone: 703-993-8730; TTY: 703-993-8787.

* Note: Sexual harassment does not include verbal expression or written material that is relevant to course subject matter or curriculum, and this policy shall not abridge academic freedom or the university’s educational mission.

Nondiscrimination and Reasonable Accommodations on the Basis of Disability

The university is committed to providing equal access to employment and educational opportunities for people with disabilities. Mason recognizes that individuals with disabilities may need reasonable accommodations to have equally
effective opportunities to participate in or benefit from the university educational programs, services, and activities, and have equal employment opportunities. The university will adhere to all applicable federal and state laws, regulations, and guidelines with respect to providing reasonable accommodations as necessary to afford equal employment opportunity and equal access to programs for qualified people with disabilities. Applicants for admission and students requesting reasonable accommodations for a disability should call the Office of Disability Services at 703-993-2474. Employees and applicants for employment should call the Office of Equity and Diversity Services at 703-993-8730 or 703-993-8787 (TTY). Questions regarding reasonable accommodations and discrimination on the basis of disability should be directed to the ADA coordinator in the Office of Equity and Diversity Services.

**Conduct within the University Community**

The Mason community respects and protects the individual dignity, integrity, and reputation of all its members. All students, faculty, and staff must comply with the conventions and regulations of university life that are necessary to maintain order, protect individuals and property, and fulfill the purposes and responsibilities of a university. This includes ensuring our commitment to high standards of civility and decency toward all.

Students enrolling in the university assume an obligation to conduct themselves in a manner compatible with the university’s function as an educational institution. The Code of Virginia (Section 23-9.2:3) confers upon the university the responsibility for maintaining order within the university and the right to exclude those who are disruptive.

The Office of Judicial Affairs is administratively responsible for supervising student conduct on campus. Questions regarding student conduct should be directed to the Judicial Affairs Office, SUB I, Room 302, 703-993-2884, judicialaffairs.gmu.edu.

**Student Health Services**

Student Health Services provides high-quality health care to all currently enrolled students. There is no evaluation fee, but there are minimal charges for most tests and procedures. The staff includes physicians, nurse practitioners, registered nurses, a medical technologist, and various levels of support personnel. Appointments are required for nonemergency services.

Offices are located on the Fairfax, Prince William, and Arlington Campuses. Contact information is as follows:

**Fairfax Campus**: SUB I, Room 214, 703-993-2831

**Prince William Campus**: Occoquan Building, Room 229, 703-993-8374

**Arlington Campus**: 3330 Washington Boulevard, Room 150 F and I, 703-993-4863

**Immunization Requirements**

Immunization policies are determined by legislation enacted by the Virginia General Assembly and recommendations from the Advisory Committee on Immunization Practice, the Centers for Disease Control and Prevention (CDC), and the American College Health Association. All students born after December 31, 1956, are required to provide documented evidence that they have been immunized against certain communicable diseases.

The **required immunizations** are as follows:

- Two doses of measles, mumps, rubella (MMR), with first dose given after first birthday and after 1967 or a laboratory report of a titer documenting immunity is acceptable.
- Primary tetanus, diphtheria, and pertussis series, with last tetanus and diphtheria booster within past 10 years. Students requiring a decennial booster should receive Tdap.
- Students must be immunized against meningococcal disease, or they must sign a waiver stating that they have received and reviewed information on meningococcal disease and the availability and effectiveness of the vaccine but have chosen not to be vaccinated. If that student is younger than 18 years old, the waiver must also be signed by a parent or other legal representative.
- Students must be immunized against hepatitis B disease, or they must sign a waiver stating that they have received and reviewed information on hepatitis B disease and the availability and effectiveness of the vaccine but have chosen not to be vaccinated. If the student is younger than 18 years old, the waiver must also be signed by a parent or other legal representative.
- Tuberculosis (TB) screening is required for all students at high risk for contracting TB as defined by the Centers for Disease Control and Prevention (CDC) and the Virginia Department of Health. TB screening, completed in the United States, is also required for all students from countries where TB is endemic as defined by the CDC.

The Immunization Record must be submitted by October 1 for fall entrance and March 1 for spring entrance. Records can be sent to the Immunization Office, Room 215, in care of Student Health Services, SUB I, 4400 University Drive, MS 2D3, Fairfax, Virginia 22030. Immunization records can also be faxed to 703-993-4053. The immunization record is included as a tear-out form in the orientation booklets that are mailed to all new undergraduate and transfer students when their application for admission to the university has been approved. For more information, call 703-993-2836, e-mail immunize@gmu.edu, or go to www.gmu.edu/student/hcs/imm.html.

**Drug and Alcohol Policy**

The abuse of drugs and alcohol by members of the campus community is not compatible with the goals of the university. Mason attempts to prepare individuals to act responsibly by defining standards of behavior and providing educational programs to create an awareness of drug- and alcohol-related problems. Those in need of assistance in dealing with drug- and alcohol-related problems are encouraged to seek the confidential help of the university’s Office of Alcohol, Drug, and Health Education, adhe.gmu.edu.
Drugs

- Use or possession of illegal drugs and drug paraphernalia is prohibited on all Mason campuses. Violation of this community standard will be considered a serious offense. Implementation of this policy will be in accord with established university procedures as contained in the University Judicial Code.
- The University Police will enforce all applicable local, state, and federal laws in accord with established standing orders, procedures, and guidelines.
- There will be a university judicial review of all reports of drug offenses occurring on campus. Action under the University Judicial Code will neither prejudice nor be prejudiced by action taken in the criminal justice system or by the management of the Office of Housing and Residence Life.
- Any student found responsible for a violation of law or regulation involving illegal drugs may, at the discretion of the hearing officer, be required to undergo an evaluation administered by personnel of the university’s Office of Alcohol, Drug, and Health Education prior to readmittance to the university.
- The housing status of a resident student found in violation of a campus drug regulation will be determined by the appropriate housing official. Guests and visitors found responsible of violating a campus drug regulation while in a residence hall will be issued a trespass order prohibiting their presence in any and all residential buildings on the university’s campuses. This trespass order will be in effect for a minimum of one calendar year.
- In addition to any action taken by the Office of Housing and Residence Life, the standard sanction for a student’s first on-campus violation involving possession or use of marijuana or possession of drug paraphernalia will be suspension from the university for a minimum of one academic semester.
- Any student found responsible for a violation involving the sale or the possession of an illegal substance with intent to distribute will be permanently separated from the university.
- Any student found responsible for use or possession of an illegal drug other than marijuana will be suspended from the university for a minimum of one year. The suspended student must provide evidence of successful participation in a drug treatment program prior to reinstatement.
- All first-time offenses of this policy by residential students, except those involving severe intoxication and/or emergency medical response, will be adjudicated through the housing judicial system. All offenses by nonresident students will be referred to the university judicial administrator.
- Housing discipline sanctions will be primarily educational, but may include a housing assignment change, referral to the university judicial administrator, and/or removal from housing.
- All cases involving severely intoxicated students and/or police or emergency medical response will be referred to the university judicial administrator for disciplinary action. The university judicial administrator may mandate an evaluation by the Office of Alcohol, Drug, and Health Education or an outside agency.
- Sanctions imposed by the university judicial administrator or the university Judicial Board will be designed to offer assistance in overcoming an identified problem. While the purpose of the judicial action will be educational and remedial, it may be appropriate to remove the student from campus housing or the university.
- The university will encourage parental involvement whenever there is a repeat offense or the first offense indicates a serious problem. This involvement will be in accord with the provisions of the Family Education Rights and Privacy Act.

Notice to All State Employees

The federal Drug-Free Workplace Act requires the university to inform all employees of the state that the unlawful manufacture, distribution, possession, or use of a controlled substance is prohibited in the workplace. The workplace consists of any state-owned, controlled, or leased property, or the site where state work is performed. Any employee who violates this prohibition will be subject to disciplinary action up to and including discharge and, at the discretion of management, will be required to satisfactorily participate in a drug abuse assistance or rehabilitation program. Employees must abide by the terms of this prohibition as a condition of employment and must notify their supervisor no later than five days after conviction of any criminal drug statute conviction occurring in the workplace.

Commonwealth Policies on Alcohol, Drug Use

Those who purchase, possess, and consume alcoholic beverages on campus must do so responsibly and must have reached the legal age of 21. All members of the university community (students, faculty, staff, and alumni, and their guests) are expected to comply with university-related regulations, as well as federal and state laws regarding the use of alcohol. Compliance also extends to university-sponsored activities held off campus. Students and employees are expected to take personal responsibility for their own conduct when making decisions regarding alcohol use.

Virginia law prohibits the purchase, possession, or consumption of beer, 3.2 beverages, wine, or distilled spirits by those under the age of 21. The law also prohibits purchasing for or serving such beverages to a person under age 21. Underage people who use or attempt to use a driver’s license that has been altered, forged, borrowed, or in any way deceptive in an attempt to obtain prohibited beverages shall have their...
driver’s license revoked for a minimum of 30 days but for not more than one year. Consuming alcohol in unlicensed, public places or offering a drink to another in a unlicensed, public place is also a violation of Virginia law. The sale of alcoholic beverages to an intoxicated person is prohibited. In addition, it is unlawful for an intoxicated person to purchase or possess alcoholic beverages. While purchase or possession by an intoxicated person is a misdemeanor, violators are subject to having their driver’s license revoked for one year.

It is illegal to operate a motor vehicle, including mopeds, when a person has a blood alcohol concentration (BAC) of 0.08 percent or higher. Individuals under age 21 who drive with a BAC of more than 0.02 percent but less than 0.08 percent risk having their driver’s license suspended for six months and being fined up to $500. If a person is arrested for driving with a license revoked or suspended under a prior driving-under-the-influence (DUI) conviction, the offender’s car is immediately impounded for 30 days. Following conviction, the court can impound the vehicle for an additional 90 days. If the car does not belong to the offender, the owner of the car may petition the court for release of the vehicle.

Sobriety spot checks to detect drunken drivers are legal. Refusing a breath test or having a BAC of 0.08 percent or higher may result in an individual’s driver license being revoked for seven days. The option to request a blood test instead of a breath test for an alcohol-related offense is no longer available.

It is illegal to serve alcohol from an unregistered keg, which is defined as a common container holding four gallons or more. Only University Dining Services or other authorized entity may serve alcohol from kegs.

Possession, use, sale, or distribution of controlled substances, including marijuana, is a violation of federal and state laws, as well as university regulations. The 1988 federal Drug-Free Workplace Act also prohibits the unlawful manufacture, distribution, possession, or use of a controlled substance in the workplace.

Students, faculty, staff, and sponsoring organizations found in violation of state or university regulations may be subject to disciplinary action, civil action, or loss of the privilege to reserve or use university facilities. Disciplinary action for students or student organizations will be conducted in accordance with the Mason Judicial System for Student Conduct, and civil proceedings may occur in certain situations. University sanctions are intended not to punish individuals but to provide education and rehabilitation services.

Sanctions depend on the severity of the violation. They range from written warnings to expulsion from the university. Most sanctions require the student to be evaluated by Substance Abuse Programs and Services personnel, who will assess the severity of alcohol and other drug problems and offer referrals to arrange community service hours. Employees found in violation of the university’s drug and alcohol policy may be subject to action by the appropriate administrative office.

**Health Risks**

Alcohol is a depressant that slows brain activity. Alcohol use can impair decision-making abilities and lead to negative consequences, including risky sexual behavior. Drinking alcohol should be avoided by pregnant women and anyone taking prescription medications or operating a motor vehicle. Long-term or heavy use of alcohol is linked to cancer, heart and liver damage, and other serious illnesses, and can lead to tolerance and physical and psychological dependence. Excessive alcohol intake can cause death because of alcohol poisoning. All students and employees are expected to respect those who choose not to drink.

Illicit drugs have more than legal consequences; they have specific health and ethical risks that can cause dangerous consequences and unhealthy, dependent behavior. Use of alcohol (or any other drug) in a manner that leads to impairment or intoxication is unhealthy and risky, and should be avoided and discouraged. The potential for health problems can also develop from the use of nicotine or caffeine products.

Those who need assistance in dealing with alcohol and other drug problems are encouraged to seek the confidential services of the resources listed in the Campus and Community Resources section listed below.

**General Rules for Serving Alcoholic Beverages**

University regulations prohibit the possession or consumption of any alcoholic beverage on university grounds unless the university has sanctioned the location and conditions for possession or consumption, such as the Bistro. For more information, please review the comprehensive guidelines for alcohol service available in the Office of Substance Abuse Programs and Services.

**Campus and Community Resources**

- **Fairfax Campus—Health and Wellness Education Resource Room:** SUB I, Room 220, 703-993-3686, and SUB I, Room 219, 703-993-2830

- **State Employee Assistance Service:** 804-786-6741

- **Alcoholics Anonymous:** 703-993-3686 for campus meetings; for other locations, 703-876-6166

- **Narcotics Anonymous:** 703-532-1255

The drug and alcohol policy outlines university regulations on substance use and abuse. This policy is distributed annually to all employees and students to inform the campus community of alcohol and drug laws, health risks, and campus and community resources. University regulations regarding the drug and alcohol policy have been developed by a committee of faculty, staff, and students. This policy statement is available in the Office of Substance Abuse Programs and Services, Health and Wellness Center, SUB I, Room 219K. This policy is also distributed through the student and faculty and staff handbooks and the university newspaper, **Broadside**.

**Responsible Use of Computing Policy**

The Responsible Use of Computing (RUC) policy applies to all academic and operational departments and offices at all George Mason University (Mason) locations owned and leased. The policies and procedures provided herein apply to all Mason faculty, staff, students, visitors, and contractors.

The university provides and maintains general computing services including web and Internet resources, as well as telecommunication technology, to support the education, research, and work of its faculty, staff, and students. At the same time, Mason wishes to protect all users’ rights to an open exchange of ideas and information. This policy sets
forth the responsibilities of each member of the Mason community in preserving the security, confidentiality, availability, and integrity of Mason computing resources. To accomplish these ends, this policy supports investigations of complaints involving Mason computing abuse, including sexual harassment, honor code, federal, state, applicable industry, and local law violations.

University faculty and staff members, as state employees, are subject to the Freedom of Information Act, §2.2-3700, et seq., of the Code of Virginia, and all applicable state and federal rules and regulations. While this policy endeavors to maintain user confidentiality it cannot create, nor should faculty or staff members presume, any expectation of privacy.

Violations of this policy may result in revocation of access, suspension of accounts, disciplinary action, or prosecution. Evidence of illegal activity will be turned over to the appropriate authorities. It is the responsibility of all users of Mason computing resources to read and follow this policy and all applicable laws and procedures (user sign-on agreement).

To report violations of this policy, or any related university policy, e-mail the Security Review Panel (SRP) at StopIt@ gmu.edu or abuse@gmu.edu.

Definitions
Mason Computing Resources. All computers, systems, workstations, networks, networking equipment, peripheral devices, servers, and any other university property attached to Mason’s web site or Internet network. These resources include all software, files, documents, and databases stored in Mason computing systems. The Mason web site includes all web pages that reside on servers owned by Mason. The Mason web site does not include servers or other resources owned by Internet Service Providers or personal resources owned by members of the Mason community who may use the resources to access Mason computing resources.

System Administrator (SA). Anyone who has the responsibility to maintain, configure, operate, or repair Mason’s computing resources. System administrators have special privileges and special responsibilities under this policy.

Information Technology Unit (ITU). The organizational entity that is responsible for IT equipment and services within the Mason campus system. The ITU is headed by the vice president for Information Technology (VPIT), who is administratively responsible for this policy.

Technology Council. A group of Mason faculty and staff members that provide advice and recommendations to the VPIT regarding the selection and architecture of technologies used to provide IT services.

Responsibilities of the Various Groups
System Administrator. The SAs have extraordinary powers to override or alter access controls, configurations, and passwords. This power should be exercised with great care and integrity. SAs’ actions are constrained by this policy and by the policies of local administrative units.

Data stewards of Mason units who employ SAs are responsible for ensuring that the SAs comply with and enforce the requirements of this policy in the systems for which they are responsible. SAs who violate this policy or who misuse their powers are subject to disciplinary action.

If an SA observes someone engaging in activities that would seriously compromise the confidentiality, availability, or integrity of a Mason system, network, or electronic Mason data, the SA may take immediate action to stop the threat or minimize the damage or contact the ITU Support Center to activate the Computer Security Incident Response Team (CSIRT). SAs who observe suspected violations of law should immediately alert the Mason Police.

Security Review Panel (SRP). This policy establishes an SRP that is responsible for reviewing SAs’ decisions, responding to complaints, providing security advice, and periodically reviewing this policy. The SRP consists of the Director, IT Security, three faculty members, two members of Mason’s Technology Council, one representative from the Faculty Senate, one graduate student, one undergraduate student, one ITU staff member, and one non-ITU system administrator. The VPIT appoints the SRP members. The SRP chair will be one of the faculty members and will be appointed by the VPIT.

The SRP is responsible for periodically reviewing the RUC Policy and recommending improvements and clarifications as needed. All modifications to the policy will be made after full public disclosure and a reasonable period for public comment.

The SRP will establish a dispatching procedure for routing StopIt complaints to the appropriate official or staff member for action.

Rules of Use
Access to Mason’s computing resources is a privilege granted on a presumption that every member of the Mason community will exercise that privilege responsibly. Because it is impossible to anticipate all the ways in which individuals can damage, interrupt, or misuse Mason’s computing resources, this policy focuses on a few simple rules. These rules describe actions that users should avoid and the principles behind them. Each rule is followed by a non-exhaustive list of examples of actions that would violate the rule.

Rule 1: Use Mason computing resources consistently with the following intended purposes:
- Educational, research, and administrative purposes of Mason
- Uses indirectly related to Mason purposes that have an educational or research benefit, such as news reading, web browsing, chat sessions, and personal communications
- Employees and contractors of the Commonwealth of Virginia may not use Mason’s computing resources for recreation or entertainment.

Rule 2: Do not use computer accounts for illegitimate purposes.
Account usernames identify individuals to the entire international Internet user community. Users may be held responsible for actions in the account. If that person violates any policies, his or her actions will be traced back to the username and the account holder may be held responsible.

Forbidden:
- Selling access to Mason’s computing resources
- Engaging in commercial activity not sanctioned by Mason
- Intentionally denying or interfering with any network resources
• Using or accessing any Mason computing resource, or reading or modifying files without proper authorization
• Using the technology to in any way misrepresent or impersonate someone else
• Sending chain letters
• Violating copyright laws and licenses
• Violating federal or state law, or university policy

Rule 3: Honor the privacy of other users.

Mason respects the desire for privacy and voluntarily chooses to refrain from inspecting users’ files, except as described below in Section V. System administrators who carry out standard administrative practices, such as backing up files, cleaning up trash or temporary files, or searching for rogue programs, do not violate privacy. Some examples of privacy violations are:
• Accessing the contents of files of another user without explicit authorization from that user.
• Intercepting or monitoring any network communications meant for another person.
• Transmitting or distributing personal or private information about individuals without explicit authorization from the individuals affected.
• Creating or using programs (e.g., keyloggers) that secretly collect information about users. Note that most systems keep audit trails and usage logs; these are not secret and are considered normal parts of system administration.

Rule 4: Do not use any account except the one you have been authorized to use.

If a user has a legitimate reason to give someone else access, it should be strictly temporary. The account holder should change the password after another user finishes using the account.

Rule 5: Do not use Mason’s computing resources to violate other policies or laws.

The list below is not comprehensive. In case of doubt, ask the Security Review Panel (SRP), or e-mail stopit@gmu.edu.
• Using Mason’s computing resources to violate harassment laws or policies. Various types of harassment, including sexual or racial, are proscribed by Mason policies.
• Using Mason’s computing resources to violate the Honor Code
• Extending the Mason network without explicit permission from ITU Network Engineering. The unauthorized use of routers, switches, modems, and other devices can impact the security and stability of the network.
• Running vulnerability scans on systems are considered hostile. If required for academic reasons, written permission from the system owner is required.
• Using Mason’s computing resources to transmit, store, display, download, print or intentionally receive obscene material, or to distribute pornographic material. All users of Mason computing resources are subject to all federal and state obscenity laws. State employees should also be aware of state laws prohibiting the use of state equipment to access, store, print, or download sexually explicit material.

Electronic Information Environment

Personal e-mail, electronic files maintained on Mason equipment, and personal web sites are part of a unique electronic information environment. This environment creates unique privacy issues that involve federal and state laws as well as Mason policies.

Mason reserves the right to inspect user files and communications for all lawful purposes, to include investigating allegations of illegal activity, violations of Mason policies, or to protect the integrity and security of network systems.

Web pages. Mason will investigate all complaints involving personal web sites and will remove or block material or links to material that violate federal or state law or university policy.

Compliance

The StopIt Process. The process described here, called “StopIt,” uses a graduated approach to handle violations of this policy. This policy distinguishes between incidents that pose no immediate dangers to persons or to system integrity, and incidents that do. The three-step StopIt process described below is for cases in which there are no immediate dangers.

Incidents posing immediate dangers to persons or systems require immediate action. These include active system break-ins or intrusions, denials of service, and incidents or criminal activity conducted using Mason computing resources. In these cases, the responsible SA may take reasonable actions to deal with the threat, such as temporarily disconnecting the system from the network, temporarily suspending accounts, and calling law enforcement officers. The SA taking such actions will notify his or her supervisor and the ITU Support Center as soon as practicable.

The StopIt process rests on two foundations:

Wide distribution of policy information: Notices describing the essence of the RUC policy will be displayed in academic computing labs on Mason premises; the same information will be provided to the community at least annually. By logging on to the Mason network, users are agreeing to the conditions of the RUC policy (user sign-on agreement).

Standard reporting mechanism: The StopIt e-mail address is monitored regularly by individual(s) appointed by the SRP. Harmful or disruptive behavior should be reported to the StopIt e-mail or to the Mason Police. The individual who responds to a complaint will normally forward it to the SA of the system on which the infraction apparently occurred. That SA will investigate the complaint, determine its validity, and take appropriate actions (see below).

The steps of the process are:

StopIt 1: First Warning

The SRP member handling a case (or SA, if the case is delegated) will send a warning letter or email to the alleged perpetrators of improper use of Mason computing resources, harassment, or other uncivil behavior. The letter will have this form:

“Someone using your account did [description of offense].” This is followed by an explanation of why this behavior violates which policy. “Account holders are responsible for the use of their accounts. If you were unaware that your account was being used in this way, it may have been compromised.”
Your system administrator can help you change your password and secure your account. If you are aware, then please make sure that this does not happen again.”

This warning ensures that the alleged perpetrators are aware that a policy violation may have occurred and that there was a complaint. It offers them an opportunity to desist without having to admit guilt and secure their account against unauthorized use.

StopIt 2: Second Warning
If there is a second offense from an account that received a first-warning letter, the SRP member will issue a second warning and may require that the account holder come to a mandatory interview. The SRP chair can authorize the temporary suspension of access to the user’s account if the individual fails to arrange for a mandatory interview. The user can request a hearing before the full SRP.

StopIt 3: Disciplinary Procedures
If the previous StopIt stages do not convince the perpetrators to desist, the matter will be turned over to the appropriate Mason authority designated for that type of offense. The SRP will make available all information and evidence it has on the case to that authority.

If it appears from the evidence that any federal or state laws may have been violated, the SRP may recommend suspension of the account pending the outcome of the Mason or law enforcement authorities’ investigation.

Amendments
All amendments to the Responsible Use of Computing Policy Number 1301 are to be reviewed and approved by the Office of the Provost and the Office of the Senior Vice President.

Effective Date
The policies herein are effective October 20, 1997 and were revised December 17, 2007. This policy shall be reviewed and revised, if necessary, annually to become effective at the beginning of Mason’s fiscal year, unless otherwise noted.

Parking Policy
Sandy Creek Parking Office
Phone: 703-993-2710
Web: parking.gmu.edu

All faculty, staff, and students who park on property owned or operated by the university must display a valid permit or park in a parking deck and pay an hourly or daily rate. On the Fairfax Campus, the decks are located on Mason Pond Drive and Sandy Creek Way off Patriot Circle. Visitors and guests must park in the deck or at a meter unless special arrangements have been made through Parking Services. Permit enforcement runs 24 hours a day, seven days a week. Metered parking is designated for short-term use and is monitored from 7 a.m. to 10 p.m. Monday through Friday, and 8 a.m. to 8 p.m. Saturday and Sunday. Broken meters are considered closed parking spaces; any vehicles parked in such spaces, and fire and emergency lanes are monitored 24 hours a day, seven days a week.

To avoid receiving a substantial fine, students, faculty, and staff should purchase a permit as soon as they arrive on campus. Parking permits are available on an annual or semester basis. Permits may be purchased online at parking.gmu.edu or at the Parking Services sales office, located in the Sandy Creek Parking Office. Hours are 8:30 a.m. to 5 p.m. Monday, Wednesday, Thursday, and Friday, and 8:30 a.m. to 7 p.m. on Tuesday. Current parking fee amounts and citation fine amounts, as well as information pertaining to the Arlington and Prince William Campuses, are listed on the Parking Services web site.

Disabled parking is available at a number of convenient locations at Mason facilities. A Department of Motor Vehicles (DMV) disabled placard or license plate must be displayed along with a university permit; a DMV placard or license plate alone is not sufficient for parking in disabled spaces in university lots. A visitor with a DMV placard or license plate may park in a parking deck at prevailing rates. Parking in or blocking access to a disabled space carries a fine at the prevailing rate.

Some parking lots have designated spaces reserved for faculty and staff, resident students, special permit holders, or service and repair vehicles. Please read all signs posted at entrances to the parking lots. All vehicles must be parked in a marked space. Complete parking regulations can be found at the Parking Services web site. For more information, call the Parking Services Office at 703-993-2710 or e-mail parking@gmu.edu. Please check the Parking Services web site for special announcements and changes to the policy.

Motorist Assistance Program
Phone: 703-993-2715

The Motorist Assistance Program (MAP) is designed to assist drivers who have minor car problems. Trained MAP personnel are available to help with dead batteries, and can contact lockout or towing services at the driver’s request and expense. MAP is available at the Fairfax Campus from 8 a.m. to 11 p.m. Monday through Sunday. To access this service, call 703-993-2715.

Mason Shuttles/CUE Bus/Transportation
Mason Shuttles: 703-993-2828
Transportation: 703-993-4156
Web: shuttle.gmu.edu
transportation.gmu.edu

The following shuttles are operated by the Mason Shuttle program free of charge to the user:

• Prince-William Fairfax shuttle providing service between the Prince William and Fairfax Campuses, Monday through Friday
• Mason to Metro shuttle providing service Monday through Friday and Saturday evenings between the Fairfax Campus and the Vienna Metro Station
• West Campus Shuttle providing service between Presidents Park and the West Campus Parking Lot on the Fairfax Campus

For more information and current shuttle schedules, go to shuttle.gmu.edu, call 703-993-2828, or e-mail shuttle@gmu.edu.

Mason faculty, staff, and students may also ride the City of Fairfax CUE bus for free by showing their
Mason ID card. For schedule information, go to www.fairfaxva.gov/CUEBus/CUEBus.asp. For other transportation information, go to transportation.gmu.edu or e-mail transportation@gmu.edu.

Other Policies

Sexual Assault Policy
The following policy applies equally to all members of the Mason community: students, faculty, administrators, staff, contract employees, and visitors.

The university is committed to providing an institutional environment where all people may pursue their studies, careers, duties, and activities in an atmosphere free of threat of unwelcome and unwanted sexual actions. It strongly condemns sexual offenses, will not tolerate sexual offenders, and supports those who have been victimized.

Sexual assault includes the attempt or act of rape (sexual intercourse without consent or with a child under the age of 13, by a stranger, an acquaintance, or an intimate), forced sodomy (forced oral or anal sex), or the forced penetration by a foreign object either animate, such as a finger, or inanimate. Nonpenetration sexual assault includes the act of touching an unwilling person’s intimate parts such as genitalia, anus, groin, breast, or buttocks, or the clothing covering these parts, or forcing an unwilling person to touch another’s intimate parts.

The above acts constitute sexual assault when they are committed against a person’s will as evidenced by refusal of consent; through the use of force, threat, manipulation, or intimidation; or against a person who, by virtue of mental incapacity or physical helplessness, is unable to give or withhold consent. This includes, but is not limited to, incapacity or helplessness caused by alcohol or other drugs. Intoxication of the assailant shall not diminish the assailant’s responsibility for the sexual assault.

The university will respond promptly, fairly, and decisively to all reports of sexual assault. Members of the university community accused of sexual assault will be subject to university disciplinary procedures when the alleged incident has occurred on campus or the incident has occurred off campus and materially affects the learning environment or operations of the university.

Sexual assaults are serious violations of the university’s student judicial code, faculty standards, and university employee policies. They are crimes under state law and punishable by fines or imprisonment. In addition, these actions are subject to civil suit for damages.

Mason is compliant with the Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (the Clery Act) as amended in 1998, which requires all postsecondary institutions to publish and distribute certain information regarding campus crimes, including reports of campus sexual assault, sexual assault policies, and security programming to all current students, employees, and any applicant who so requests.

Through the Office of Sexual Assault Services, 24-hour assistance is available to those who have been affected by sexual assault.

For more information, contact Sexual Assault Services at 703-993-4364.

Stalking Policy
Stalking is a crime under Virginia state law (18.2-60.3). Incidents of stalking outside the Commonwealth of Virginia may be admissible in court if they are relevant to the case and may be punishable as a misdemeanor or a felony. Stalking behavior is prohibited and will not be tolerated by Mason.

The university defines stalking as a series of behaviors that in context intend to place or have knowledge that the behaviors might place another person in reasonable fear of his or her safety or mental or physical well-being. Such behaviors include nonconsensual (unwanted) communication or contact, including face-to-face, telephone calls, voice messages, electronic mail, instant messaging, written letters, and unwanted gifts; harassment, either by the individual or through a third party; use of threatening gestures; pursuing or following; surveillance or other types of observation; use of electronic devices or software to track or obtain private information; trespassing; vandalization; and nonconsensual (unwanted) touching.

Some behaviors may result in separate criminal charges. While certain acts can be classified as crimes, others that do not rise to criminal behavior may still be subject to the campus judicial process. The university can take action and has the right to impose sanctions on an offender. Incidents occurring on or off campus are subject to university discipline when such actions materially affect the learning environment or operations of the university.

Legal options available to victims of stalking include reporting to the campus or local police, seeking a remedy through civil proceedings, and using the campus judicial process. Additional support is available from Sexual Assault Services.

This policy applies equally to all members of the Mason community: students, faculty, administrators, staff, contract employees, and visitors.

The university is committed to protecting the right of all individuals to pursue their intellectual, vocational, and personal interests without harassment or interference. The university is also committed to providing an environment in which visitors to and members of the campus community are treated with dignity, respect, and regard for their welfare and learning needs.

For more information on stalking issues or this policy, call Sexual Assault Services at 703-993-4364.

Other Regulations

Annual Security Report
Mason’s 2007 Annual Security Report is available on the University Police Department web page. This report contains the previous three years of crime statistics and includes policies concerning campus security such as sexual assault, stalking, and other matters that pertain to safety on campus. To view a copy of the report, go to www.gmu.edu/police/annualsecurity.htm. Paper copies of this report are available at any police facility.

Weapons
The unauthorized possession, storage, display, or use of any kind of ammunition, firearm, firework, explosive, air rifle, air pistol, or other lethal instrument is prohibited on university property. For more information, call University Police at 703-993-3840.
**Smoking**
Smoking is not permitted in any building on campus.

**Bicycles and Skateboards**
Bike racks are provided at various on-campus locations for the convenience of students who bike to and from campus. For resident students, bike racks are located in the residential complexes. Bikes and skateboards are not permitted on sidewalks, stairs, ramps, footpaths, or grassy areas of the campus. They also are not allowed inside university buildings.

**Pets**
No pets, except those assisting people with disabilities, are permitted in university buildings at any time. Pets on campus grounds must be on a leash and under supervision at all times.

**Solicitors and Salespeople**
Except on official business with the university, solicitors and salespeople are not permitted on the campus without prior approval of the University Services Office.
University Academic Programs and Resources

University Libraries
Phone: 703-993-2250
Web: library.gmu.edu

Administration
John G. Zenelis, University Librarian and Associate Vice President, Information Technology Fenwick Library, Room A227
Craig Gibson, Associate University Librarian for Research, Instructional, and Outreach Services
Clyde W. Grotophorst, Associate University Librarian for Digital Programs and Systems
John C. Walsh, Associate University Librarian for Resources and Collection Management Services

Professional Faculty

Administrative Faculty
Fletcher, Matthews, Perry, Stockwell, Vay

Resources and Services
Resources and services of the George Mason University Libraries are housed on the Fairfax Campus at the Charles Rogers Fenwick Library and the George W. Johnson Center Library; on the Arlington Campus at the Arlington Campus Library; and on the Prince William Campus at the Mercer Library. The School of Law Library, on the Arlington Campus, is administered separately. Combined holdings, including the law library, total more than 1.2 million books and bound journal volumes; 11,000 current print serial subscriptions; 3.0 million microform units; 341,000 print government documents; 214,000 maps; 36,000 multimedia materials; 550 electronic databases; 31,000 electronic journals and proceedings; 100,000 electronic books; and significant holdings of manuscripts, special collections, and archives.

Mason’s integrated library information system provides an online, public-access catalog; circulation; electronic reserves; and library-processing services. The information system can be used in any of the libraries from campus locations on the network or via the web. The web site library.gmu.edu offers access to a variety of networked digital resources and electronically mediated services, including a virtual reference service.

The library liaison program supports a variety of cooperative and collaborative activities. Liaison librarians work with academic departments and programs to develop print collections and electronic resources. They also offer introductory and advanced information literacy instruction sessions, as well as advanced reference and research consultation services to students and faculty. Each of the four libraries has its own dedicated instruction room for information literacy classes.

Through membership and active participation in local, regional, and national library consortia, the University Libraries are able to better respond and meet the needs of the university’s growing and diverse academic and research programs. Current affiliations include the following:

• The Virtual Library of Virginia (VIVA) Program, a Virginia-funded electronic and resource-sharing program for public higher-education institutions
• Washington Research Library Consortium (WRLC), whose membership also includes American, Catholic, Georgetown, and George Washington universities
• Association of Southeastern Research Libraries, which includes the 36 largest university libraries in a 10-state region
• Center for Research Libraries, a Chicago-based research library for research libraries whose multimillion volume holdings comprise specialized and uniquely held materials in North America
• The international Online Computer Library Center, whose extensive computerized system and network facilitate national and international library resource-sharing activities

An intercampus delivery service is available for students and faculty requesting materials held at any Mason campus library. Materials not held by Mason can be obtained by direct borrowing from WRLC institution libraries via the Consortium Loan Service, interlibrary loan, or commercial delivery services when required.

Expanded academic support services also include the following:

Educational Services Unit
The Educational Services Unit leads planning and program development for information literacy initiatives throughout all
the libraries and, through collaboration with other university units, creates institution-wide projects and initiatives focused on students’ research abilities. The Educational Services Unit staff designs classes, tutorials, instructional materials, and program-level plans to teach students how to identify, assess, and manage information for their academic courses and other endeavors, and conduct research in an ethical way. This unit is also responsible for leading assessments related to information literacy and fluency projects.

**iMasonLibraries Service**  
Web: library.gmu.edu/research  
This service enables users to ask reference questions via an instant messenger.

**Mason Archival Repository Service**  
Phone: 703-993-3742  
Web: mars.gmu.edu  
The Mason Archival Repository Service (MARS) provides a stable digital archive for scholarly and research materials of lasting value held notably by Special Collections and Archives or produced by Mason faculty, students, and staff. MARS is managed by Digital Programs and Systems. The MARS librarian offers expert advice on archiving these materials, file formats, copyright issues, long-term management of archived materials, and issues pertaining to scholarly communication.

**University Copyright Assistance Office**  
Johnson Center, Rooms 227 EB  
Phone: 703-993-2544 or 2427  
Fax: 703-993-4116  
Web: library.gmu.edu/copyright  
This office provides guidance and assistance on copyright and fair use issues, including copyright use in classroom teaching and technology, online courses, distance education, university publications, university web sites, networked library collections and related services, electronic course reserves, and course readers. Workshops are offered on a regular basis.

**University Dissertation and Thesis Services**  
Phone: 703-993-2222  
Web: thesis.gmu.edu  
The University Dissertation and Thesis Service (UDTS) assists students and academic units in the dissertation, thesis, and graduate-level project process by helping students meet all university requirements and deadlines for submission of work. The UDTS web site provides useful tools such as the university’s Thesis, Dissertation, or Project Guide, which contains downloadable templates of necessary elements, forms required for the submission process, and links to related web sites. UDTS also assists graduate students through individual consultation and informational workshops.

**Records Management**  
Phone: 703-993-2220  
Web: specialcollections.gmu.edu/rm_net.html  
A part of the Special Collections and Archives, this service assists university academic and administrative departments with the retention and disposition of temporary records by providing a number of online resources to members of those departments. The records manager works with members of university departments to ensure that records are retained, retrieved, managed, and disposed of appropriately, in accordance with Virginia state laws, policies, and guidelines.

**Statistical Research Services**  
Phone: 703-993-3417  
Web: library.gmu.edu/srs  
This office provides expert consultation services for students and faculty who need assistance with statistics-based research projects, including quantitative and qualitative research design analysis, and help with the myriad statistical-analysis software.

**Fenwick Library**  
Phone: 703-993-2240  
Fenwick is the main library in the university’s library system. It holds most of the book collections across disciplines, as well as current and bound journals, microforms, special collections and archives materials, federal and Virginia government documents, and maps. Instruction and reference classes are available in search strategies, information sources, and information technology. In addition, publicly accessible computer workstations and data ports for laptop use enable access to the entire system’s electronic resources and associated services.

**Johnson Center Library**  
Phone: 703-993-9060  
This library is part of the George W. Johnson Center integrated learning environment. Electronic access to scholarly information is complemented by a print-reference collection, multimedia collections, and a growing circulating book collection comprising core texts and readings supporting the university’s undergraduate curriculum. This library, in particular, supports interdisciplinary programs such as the Honors Program and New Century College through its collections and outreach services. The library also holds designated discipline-based circulating book collections. It is the center for multimedia collections and services for the university library system. This library also provides course support through reserve materials (electronic, print, and media) for students and faculty on the Fairfax Campus and manages the entire electronic reserves service. A collection of international newspapers rounds out the collections and services. The Johnson Center has a wireless network that students may use anywhere in the building. Assistive technologies include screen-reading software, text-enlargement software, and special hardware for individuals with disabilities.

**Arlington Campus Library**  
Phone: 703-993-8818  
This library is a full-service research facility supporting the teaching and research needs of Mason faculty, students, and staff on the Arlington Campus. Consistent with this campus’ distinct areas of academic specialization at the graduate level, the library’s collection emphasizes public policy, international commerce, economics, education, management of nonprofit organizations, and conflict resolution. The library holds a core of reference materials and is a depository of European Union documents. Interlibrary delivery of circulating materials from other library sites is also available. Library
staff can provide reference assistance and instruction for students, faculty, and staff in identifying and using resources. Physical library holdings continue to grow, and a critical component of the library emphasizes providing many of its resources and services online. This library supports a wireless network, and assistive technologies are available for people with disabilities.

**Mercer Library (Prince William Campus)**

Phone: 703-993-8340

This library supports faculty and students in the programs and courses offered at the Prince William Campus, including education; biotechnology, bioinformatics, and biodefense; computer science; health, fitness, and recreation resources; and administration of justice. The library provides access to university-wide electronic resources, with an emphasis on instruction and assistance with information resources and research. Notable holdings include scientific journals in bioscience and biomedicine. The library is fostering partnerships to provide information services to the rapidly expanding corporate and technology presence in Prince William County. This library has a wireless network, as well as assistive technologies for people with disabilities.

**School of Law Library (Arlington Campus)**

Phone: 703-993-8106

**Administration**
Dolores Gomez-Moran, Associate Dean, Library and Technology

This library supports the School of Law and has holdings in law and economics, including specialized academic tracks in intellectual property, litigation, corporate and securities law, international business, regulatory law, and technology and law. The library also provides access to electronic law resources including Lexis, Westlaw, and LegalTrac. This library is open to all members of the university community, and its collections are available for checkout by all faculty, students, and staff.

**University Ombudsman**

Johnson Center, Room 245
Phone: 703-993-3006
Web: www.gmu.edu/departments/ombudsman

**Administration**
Erek Perry, MEd

The ombudsman serves all undergraduate and graduate students at the university.

**University Scholars Community**

Student Academic Affairs
Johnson Center, Room 245
Phone: 703-993-9082

**Administration**

Erica Hernandez

The university awards four-year scholarships annually to top high school graduates who have demonstrated superior academic achievement, outstanding leadership, and exemplary school and community service. Applications must be submitted by December 1 to receive priority consideration for the scholarship.

The University Scholars reside in a common residence hall their first year and share the Dr. Noreen McGuire Prettyman University Scholars Lounge. Students enrolled in the University Scholars Program participate in a dynamic learning community that provides opportunities for intellectual, cultural, and social engagements.

The program draws to Mason a special caliber of student, one who is actively involved in all facets of academic and student life. In addition to excelling in their respective academic areas, the scholars have historically emerged in a variety of student leadership positions and service-related activities.

Intellectual dialogue is fostered among scholars, professors, and administrators through stimulating seminars, discussion groups, cultural activities, service projects, internships, campus events, and participation in organizations that complement the scholars’ academic experiences. The peer interaction, faculty guidance, and academic focus of the University Scholars community reflect the university’s commitment to providing a stimulating and supportive environment that encourages academic excellence and personal growth.

**University Courses**

University (UNIV) courses are special undergraduate academic seminars that appeal to a wide range of majors. They are designated as transitional, interdisciplinary honors, and special topics courses. Enrollment in these courses is limited in size to encourage interaction between students and faculty. Because of their interdisciplinary nature, the courses sometimes can satisfy general education requirements.

**University Transitions Courses**

This series of courses focuses on transition through the various stages of college. UNIV 100 helps freshmen adjust academically, develop decision-making skills, and learn about the services and opportunities for involvement on campus. UNIV 200 topics focus on choosing a major or career. UNIV 300 has three tracks: the first is for new transfer students making the transition to a new university, the second focuses on career readiness for internships and research as-
sistantships, and the third is designed for specific groups of student leaders. UNIV 400 emphasizes preparation for the workplace, graduate school, and life responsibilities.

**University Interdisciplinary Honors Seminars**
These seminars are offered exclusively to students who have demonstrated strong academic performance. They are developed to give high-ability freshmen and advanced-standing students the opportunity to study with a senior professor in a small classroom setting. The Freshman Seminars (UNIV 190) are open to eligible first-year students and are taught exclusively by the Robinson professors. Qualified students with 30 or more credits are invited to participate in the UNIV 390 seminars, which are taught by Robinson professors and other distinguished faculty scholars.

**University Special Topics Courses**
Upper-level university courses are open to all students unless specific prerequisites are indicated. They are usually repeated offerings. Two regularly offered university courses, each worth 3 credits, are UNIV 301 Great Ideas in Science and UNIV 441 AIDS: Its Impact in Our Society.

**UNIV 101: Freshman Academic Transition (1:2:0)**
This seminar focuses on academic transition and development issues for second semester freshmen. A special emphasis is placed on resources and techniques to assist students with assessing and improving their academic performance. Students will work closely with their instructor to track their academic progress over the course of the semester.

**International Programs and Resources**

Global Connections (International Degrees)
Web: www.gmu.edu/global

Academic programs focused specifically on international and global issues include the following:

- BA and MA in anthropology (Department of Sociology and Anthropology)
- BA in communication, with a concentration in international and intercultural communication (Department of Communication)
- BA, BS, MA, PhD in conflict analysis and resolution (Institute for Conflict Analysis and Resolution)
- BA, BS in geography (Department of Geography)
- BA in global affairs
- BA in government and international politics, with a concentration in international and comparative politics (Department of Public and International Affairs)
- BA in Latin American studies (Department of History and Art History)
- BA in Russian studies (Modern and Classical Languages)
- BA in foreign languages, with concentrations in French and Spanish (Department of Modern and Classical Languages)
- MEd in curriculum and instruction, with concentrations in multilingual and multicultural education, foreign language education, and teaching of English as a second language
- MA in foreign languages, with concentrations in French or Spanish, or in Spanish and bilingual-multicultural education (Department of Modern and Classical Languages)
- MS in global health (College of Health and Human Services)
- MS in health science, concentration in international health (College of Health and Human Services)
- MA in history, with concentrations in comparative world history and modern European history (Department of History and Art History)
- MA in international commerce and policy (School of Public Policy)
- MA in political science, with specialization in international politics and comparative government
- MS in professional studies: peace operations
- MPA with a concentration in international management
- MA in telecommunications with a concentration in international telecommunications
- Interdisciplinary minors in ancient Mediterranean art and archaeology, Asia-Pacific studies, global systems, Islamic studies, Judaic studies, Latin American studies, linguistics, the New Europe
- Minors in Chinese, conflict analysis and resolution, French, German, global affairs, international and comparative studies, Latin, Russian, and Spanish
- Undergraduate certificate in Islamic studies and teaching of English as a second language
- Graduate certificates in global trade management; international business planning; international e-commerce and telecommunications policy; international governance and institutions; international health; international health care; international market analysis; managing international commerce; science, technology, and the global economy; teaching of English as a second language; world religions, diplomacy, and conflict resolution

For new developments, go to the Global Connections web site: www.gmu.edu/global.

**Center for Global Education: Study-Abroad Office**
Johnson Center, Room 235
Phone: 703-993-2154
Fax: 703-993-2153
Web: globaled.gmu.edu
E-mail: cge@gmu.edu

**Administration**
Dr. Yehuda Lukacs, Director

The Center for Global Education (CGE) offers students the opportunity to challenge their assumptions about themselves and other cultures in an educational environment by offering study-abroad programs of varying lengths, academic emphasis, and locations. Students can discover new cultures, sharpen language skills, and travel while earning credit. Study options include faculty-led, short-term study tours and intensive language programs; semester and year-long Mason-sponsored...
programs; direct exchange programs and international internship programs. Most programs are open to Mason undergraduate and graduate students and short-term programs are also open to faculty, staff, and the general public.

CGE offers a wealth of resources to help create a personalized international experience, including information sessions about study-abroad and internship options; one-on-one student advising; transfer of approved international program credits; a resource library of travel books; international and diplomatic community programming; advising to international students from partner schools; and International Student Identity Cards.

**English Language Institute**

Krug Hall, Room 202  
Phone: 703-993-3660  
Fax: 703-993-3664  
E-mail: ELI@gmu.edu  
Web: eli.gmu.edu

**Administration**  
John Pope, MA, Director  
Baotran Nguyen, MA, Assistant Director

The English Language Institute (ELI) provides quality instruction in English as a second language to develop students’ language and academic skills, as well as cultural awareness necessary for academic, personal, and professional success. ELI offers two programs: the Intensive English Program, which serves international students who have come to the United States to study English in preparation for academic study at an American college or university, and the Support Services Program, which provides programs for nonnative English-speaking students newly admitted to Mason and other international members of the campus community. ELI also provides contract services to private corporations, embassies, and government agencies.

**Office of International Programs and Services**

Phone: 703-993-2970  
Web: oips.gmu.edu

The Office of International Programs and Services (OIPS) advises and consults on matters affecting non-immigrant students, scholars, faculty, staff, and families at Mason. Staff members provide regulatory information related to non-immigrant status and have been designated by the university to issue and sign immigration documents and paperwork on behalf of the institution. OIPS advisors are available by appointment to discuss any concern and to provide practical assistance to students and scholars as they adjust to U.S. culture. OIPS conducts a comprehensive orientation program for new international students and offers social and cultural programming throughout the fall and spring semesters. Most notably, the staff works with student groups and the Student Activities Office to coordinate Mason’s International Week held annually in April.

**International Student Umbrella**

Phone: 703-993-2898  
E-mail: isu@gmu.edu

The International Student Umbrella consists of a variety of international student organizations that coordinate educational and social activities to promote cross-cultural understanding and international awareness.

**International Student Association**

Phone: 703-993-2970  
E-mail: oips@gmu.edu

The International Student Association is a group of students from around the world who work together to assist newly arriving students and meet for fellowship and fun. Their goal is to make all students feel welcome and comfortable at George Mason University and to participate in activities with classmates of various cultures and backgrounds.

**Office of Continuing Professional Education**

Fairfax Campus  
Krug Hall, Room 211  
Phone: 703-993-2109  
Web: ocpe.gmu.edu

**Prince William Campus Professional Development Office**  
Phone: 703-993-8335

**Herndon Office and Training Center**  
Center for Innovative Technology  
2214 Rock Hill Road  
Herndon, VA 22070  
Phone: 703-993-4800

**Administration**  
Janet Niblock, Executive Director

The Office of Continuing Professional Education (OCPE) serves as Mason’s initial point of contact and referral for the business and professional community, and responds to all professional development and continuing education inquiries, requests, and needs. Supported program activities include contracted academic credit programs, noncredit public programs and seminars, online courses, professional certificate programs, continuing education units (CEUs), onsite contract training programs, special professional development events and programs, special workforce development programs, and training center facilities.

The OCPE is strategically located at the Fairfax Campus in Krug Hall, the Prince William Campus, and the Center for Innovative Technology (CIT) in Herndon. Current continuing education program information, offerings, and capabilities can be reviewed at ocpe.gmu.edu.

The Krug Hall office serves as the primary point of inquiry and referral. It facilitates, promotes, and administers the delivery of contract credit courses, online courses, and other specialized professional programs. This office also administers the award of CEUs, which are nationally recognized standard units of measurement earned for satisfactory completion of qualified programs of continuing education. OCPE provides this service to all Mason academic groups that deliver noncredit professional development programs.

The Prince William Campus office facilitates a variety of open enrollment and contract programs (both noncredit and credit) that support the strengths of the programs on that campus. Programs are targeted to meet the professional de-
development needs of the business community of the Prince William area, as well as Northern Virginia local and state government communities.

The CIT in Northern Virginia’s high-technology corridor facilitates a variety of professional development programs targeted to the area’s business and federal government organizations. This office reaches out to the business community by designing, marketing, and delivering noncredit training courses and in-depth certificate programs. Public seminars and customized, contract training programs are targeted to respond to the needs and interests of managerial, technical, and professional employees in private, nonprofit, and public organizations located in Northern Virginia and Washington, D.C.

New Professional Studies, MA/MS

The Master of New Professional Studies Program was established in 1996 to provide graduate education for working professionals. The highlights of this innovative, interdisciplinary degree are as follows:

- Course activities are designed to adapt to the demands of working professionals with a variety of obligations. Through innovative use of information technologies and flexible course scheduling, participants are able to balance the demands of work with an intensive learning experience.
- The degree incorporates action-oriented group learning as a way to integrate theory and practice. Grouped into teams, candidates are immersed in the practical problems of organizations and, at the same time, engage each other through collaborative technologies. By dealing with practical organizational issues, participants gain deeper insight into how complex organizations work.
- The program produces a tightly integrated learning experience and focuses on building a learning community. Participants work on projects as teams and gain an understanding of how to develop team-based organizations.
- Collaborative technology skills developed early on are used throughout the degree program. They enable a high degree of collaboration and interaction between students.

New Professional Studies is an umbrella degree program with four tracks: knowledge management, organization development and knowledge management, peace operations, and teaching. Four core courses (12 credits) are common to all tracks: MNPS 700 The New Professionalism: Theory and Practice; MNPS 702 The New Professional as Reflective Practitioner; MNPS 703 Technology and Learning in the New Professions; and MNPS 704 Research Methodologies in the New Professions. The remaining elective courses (21 credits) are selected from participating disciplines. For information about the tracks on knowledge management, organization development and knowledge management, and peace operations, see the School of Public Policy chapter of this catalog. For information about the teaching track, see the Graduate School of Education section in the College of Education and Human Development chapter.

Reserve Officer Training Corps

Phone: 703-993-2706
Fax: 703-993-2708

Administration

James S. Overbye
Director, Military Science Department
Northeast II Module, Room 104

The U.S. Army Reserve Officers’ Training Corps (ROTC) is an elective program that offers qualified students the opportunity to earn a commission as an officer in the active U.S. Army, Army National Guard, or U.S. Army Reserve while pursuing a baccalaureate or graduate degree as a full-time student. The program emphasizes student learning and participation in applied leadership, leadership theory and assessment, decision making, management skills, time management, ethics and military law, logistics, military roles and national objectives, strategic and tactical planning and principles, and basic military knowledge and skills.

Enrollment

Enrollment in military science (MLSC) courses is open to all students. Freshmen (MLSC 100 and 101), sophomore (MLSC 200 and 201), and junior (MLSC 300 and 301) classes are awarded 1 credit each. Senior classes (MLSC 400 and 401) are 3 credits each. Credit earned in military science courses may count toward degree completion as elective credit. No service obligation is incurred by enrolling in Army ROTC. Courses can be dropped or added, just as with any elective course at Mason.

The four-year program is organized into two successive phases: the basic course and the advanced course. For students seeking the opportunity to earn a commission as an officer, several entry methods and participation strategies can be used. A minimum of four semesters must remain in the student’s academic curriculum to complete commissioning requirements; these semesters may be part of either an undergraduate or graduate degree. Course descriptions appear under Military Science (MLSC) in the Course Descriptions chapter of this catalog.

Basic Course Curriculum

The basic course curriculum is a four-course series (MLSC 100, 101, 200, 201), usually taken in the freshman and sophomore years. Each class awards 1 academic credit. The basic course trains students in the topics listed above, as well as in applied topics, including map reading, land navigation, first aid, physical fitness, leadership, ethics and communication skills. Each lecture class meets once a week for 75 minutes. Textbooks are provided free of charge to all enrolled students. Uniforms and equipment are also issued to students at no cost, but students must return them at the end of each semester. While only one section is listed for most MLSC classes, small sections or individual tutorials are offered when scheduling conflicts exist.

Mason’s Army ROTC program has numerous experiential aspects. MLSC LAB 201 Leadership Laboratory encompasses several different activities. Students enrolling in any
ROTC lecture class must enroll in the required, nongraded lab section. Only the ROTC director can dismiss LAB 201 enrollment in certain circumstances, such as scheduling conflicts.

All LAB 201 sections meet as a combined unit on Thursdays from 1:30 to 4 p.m. During this time, the unit trains in a variety of hands-on, practical leadership skills and military tasks, ranging from drills and ceremonies to squad and platoon tactics. Other experiential aspects of LAB 201 include field training exercises and physical training (PT). PT classes are conducted every Monday, Wednesday, and Friday from 7 to 8 a.m. at the Field House, but they are voluntary for noncontracted students. During the four-year program, there are progressive requirements for meeting physical fitness standards, weight limits, and leadership positions. Much emphasis is placed on cadets to meet established academic standards. A student must maintain an overall GPA of at least 2.00 to earn commissioning credit for ROTC.

Army ROTC also organizes numerous optional events, including rappelling, orienteering, and helicopter orientations. A battlefield visit is offered every year, and a formal military ball is held during the spring semester. The unit has an organized color guard and a Ranger Challenge Club. Airborne and air assault training, among other Army formal schools, is available to enrolled cadets. Enrolled students typically become progressively more involved to enhance their training, develop esprit de corps, and take part in social aspects of the program.

Advanced Course Curriculum
The advanced course consists of a four-course series (MLSC 300, 301, 400, 401) taken during the junior and senior years. MLSC 300 and 301 are each 1 credit, while MLSC 400 and 401 are 3 credits each. Normally, advanced-course cadets contract to become commissioned officers and thus incur a service obligation on graduation and commissioning. An active duty tour is not guaranteed, although many cadets request and receive active duty tours upon graduation. ROTC also offers guarantees of entering either the Army Reserve or Army National Guard to students so inclined.

The 300-level courses emphasize squad and platoon leadership, tactics, and preparation for the Leadership Development Assessment Course (LDAC). LDAC is a five-week training and evaluation activity required of contracted students. Cadets typically attend LDAC in the summer between their junior and senior years; however, they may attend after their senior year if necessary. Salary, travel expenses, and room and board are all provided during the course. LDAC is a critical part of the ROTC program that students must pass to receive a commission.

There is also a professional military education requirement. Contracted cadets must take and pass a military history course: American Military History (HIST 389) or an alternative course approved by the program director. This course may simultaneously fulfill the student’s general education or academic major requirements.

Because all students may enroll in ROTC classes, students who want to take an upper-level course must declare their intentions when seeking enrollment approval from the ROTC director or instructor. Prerequisites exist for upper-level courses. For more information, see the Course Descriptions chapter of this catalog.

Noncontract students who want to take MLSC 300- and 400-level courses must have junior or senior standing in their majors and meet the appropriate prerequisites. Course requirements will be established between the ROTC director and students to tailor the class to the students’ interests and needs.

The 400-level courses are considered to be the transition to officer phase. These courses focus on leadership, staff operations, logistics, military law, and ethics. Seniors are expected to organize and attend an additional one-hour staff and training meeting per week as part of their leadership experience and duties. Planning and implementation of training becomes the primary focus for seniors in LAB 201.

Earning a Commission
There are several methods by which students may enter Army ROTC to earn a commission as a second lieutenant on graduation:

- Students may complete the four-year program.
- Freshman and sophomore classes may be compressed into the sophomore year.
- Veterans may enter directly into the junior year (when academically aligned as a junior).
- Sophomores may attend a five-week Leaders Training Camp (LTC) between the sophomore and junior years to gain experience equivalent to the basic course.
- A special four-semester program is available to nursing majors in which LTC is not required.

Students who complete the ROTC program may take up to two years to complete their baccalaureate studies; education delays for graduate study also may be approved for graduating cadets before commissioning. Graduate students and resident aliens who become U.S. citizens by a certain time may become commissioned officers.

Scholarship Programs
Two- and three-year ROTC scholarships are available to freshmen and sophomores in all majors on a competitive basis. Students are required to have a minimum 2.50 GPA to apply and be under age 31 when commissioned. Scholarships pay 100 percent of tuition, an annual book allowance of $1,200, and a stipend of at least $300 per month during the school year, all tax free. Students do not have to be enrolled to apply, and there is no service obligation incurred when applying.

A two-year Reserve Forces Duty scholarship is available that guarantees reserve duty upon graduation and commissioning (no active duty tour). Students should contact the ROTC director to determine eligibility.

Four-year scholarships are available, but students should apply by December 15 of their senior year in high school for a scholarship that would start in the fall semester of their freshman year at Mason. Contact the ROTC director for details.

Many students participate in ROTC as nonscholarship cadets. A nonscholarship cadet cannot contract to receive a commission until the sophomore year. For the sophomore, junior, and senior years, nonscholarship contracted students receive the monthly stipend for the school year.
The George Mason Army ROTC Patriot Battalion began in 1981, achieved independent status in 2000, and frequently conducts training with Georgetown University and the University of Maryland Army ROTC.

Air Force ROTC
Two programs are available for college men and women to earn a commission as a second lieutenant in the U.S. Air Force while completing their university degree requirements. To enter, students should call 301-314-3242 or go to www.afrotc.umd.edu. Mason students can register for the appropriate courses through the Consortium Office, but mandatory courses are held at the University of Maryland. Car pools among Mason students are usually available.

Oak Ridge Associated Universities (ORAU)

Phone: 865-576-3306
Web: www.orau.org

Administration
Matthew J. Kluger, Vice President for Research and Economic Development; ORAU Councilor for George Mason University
Monnie E. Champion, ORAU Corporate Secretary

Since 1993, the students and faculty of George Mason University have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of 98 colleges and universities and a contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with member institutions to help their students and faculty gain access to federal research facilities throughout the country; keep its members informed about opportunities for fellowship, scholarship, and research appointments; and organize research alliances among its members.

Through the Oak Ridge Institute for Science and Education (ORISE), the DOE facility operated by ORAU, undergraduates, graduates, postgraduates, and faculty members enjoy access to a multitude of opportunities for study and research. Students can participate in programs covering a wide variety of disciplines, including business, earth sciences, epidemiology, engineering, physics, geological sciences, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry, and mathematics. Appointment and program length range from one month to four years. Many of these programs are especially designed to increase the number of underrepresented minority students pursuing degrees in science- and engineering-related disciplines. A comprehensive listing of these programs and other opportunities, their disciplines, and details on locations and benefits can be found at sec.orau.org or by calling either of the contacts below.

ORAU’s Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU’s members, private industry, and major federal facilities. Activities include faculty development programs, such as the Ralph E. Powe Junior Faculty Enhancement Awards, the Visiting Industrial Scholars Program, consortium research funding initiatives, faculty research, and support programs, as well as services to chief research officers.

Center for Global Studies

Phone: 703-993-9430
Web: cgs.gmu.edu

Administration
Peter Mandaville, Codirector and Associate Professor, Government and Politics
Terrence Lyons, Codirector and Associate Professor, Conflict Analysis and Resolution
Andrea Zizack, Coordinator

Dedicated to the promotion of multidisciplinary research on globalization, the Center for Global Studies coordinates outreach efforts in global affairs, facilitating access for external communities to the university’s full range of global expertise. Ongoing activities include hosting guest speakers and visiting scholars, an annual conference, electronic and paper publications, and an annual cycle of small grants to support faculty research. The center also manages multidisciplinary unit research projects and a number of regional and thematic working groups.

The Center for Real Estate Entrepreneurship

Phone: 703-993-9843
Web: realestate.gmu.edu

Administration
Greg Hero, Executive Director and Professor

Pulling resources and expertise from the Volgenau School of Information Technology and Engineering, the School of Public Policy, and the School of Management, the Center for Real Estate Entrepreneurship is designing undergraduate, graduate, and certificate programs in real estate development that encompass the entire real estate development continuum from land use and environmental considerations to acquisition dynamics and construction management. Areas of emphasis currently being developed include land use and zoning, sustainable development, real estate finance, management of the development process, development company management, marketing and asset management, and entrepreneurship and leadership.
The Krasnow Institute for Advanced Study seeks to expand the understanding of mind, brain, and intelligence by conducting research at the intersection of the separate fields of cognitive psychology, neurobiology, and the computer-driven study of artificial intelligence and complex adaptive systems, including social systems. These separate disciplines increasingly overlap and promise progressively deeper insight into human thought processes. The institute also examines how new insights from cognitive science research can be applied for human benefit in the areas of mental health, neurological disease, education, computer design, and social system analysis.

The Krasnow Institute for Advanced Study was chartered in 1990 as a private nonprofit Virginia corporation and merged with Mason in 2002, becoming a chartered institute under the Office of the Provost. The Center for Social Complexity joined the Krasnow Institute in 2005. In 2007, the institute became an academic unit housing the Department of Molecular Neuroscience and the Department of Computational Social Science (pending SCHEV approval). With an annual budget of $3.1 million, the institute is home to a scientific staff of 60. Cognitive research at the institute spans from molecules to the mind to social systems. Krasnow scientists have published extensively in the most prestigious scholarly journals and collectively have brought in more than $22 million in sponsored research from federal agencies such as the National Institutes of Health and private sources such as the Sir John Templeton Foundation.

GRADUATE PROGRAMS

■ Neuroscience, PhD SC-PHD-NEUR
Phone: 703-993-4381
Web: neuroscience.gmu.edu

The Krasnow Institute, together with the College of Science (COS) and the College of Humanities and Social Sciences (CHSS), oversees the campuswide Neuroscience Council in developing the Neuroscience PhD curriculum.

Neuroscience PhD courses are listed under NEUR in the Course Descriptions section of this catalog. Neuroscience PhD admissions and program requirements are listed under Neuroscience in the College of Science section of this catalog.

■ Computational Social Science, PhD SC-PHD-CSS
Phone: 703-993-1402
Web: socialcomplexity.gmu.edu
E-mail: cssgrad@gmu.edu

The core objective of the PhD in Computational Social Science (CSS) Program is to train graduate students to be professional computational social scientists in academia, government, or business. The program offers a unique and innovative interdisciplinary academic environment for systematically exploring, discovering, and developing skills to successfully follow careers in one of the areas of computational social science.

Admission Requirements
Applicants should have a bachelor’s degree in one of the social sciences; computer science, engineering, or a relevant discipline, and have taken undergraduate courses in these and related areas. Bachelor’s degrees in the physical or biological sciences are also eligible, but applicants may be advised to take additional courses in social science or computer science as prerequisites to admission. Minimal requirements also include one undergraduate course in calculus and knowledge of a computer programming language, preferably an object-based language. Applicants should have an undergraduate degree from an accredited institution, with a GPA of at least 3.25. To apply, prospective students should send to the COS Fairfax Campus Graduate Admissions Processing Center a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, an expanded goals statement not to exceed 2,000 words, and the names of two Mason faculty members who may be suitable advisors. Applicants should also include three letters of recommendation from faculty members or individuals with direct knowledge of the student’s academic or professional capabilities. The letters must arrive directly from the senders. Applicants should also submit an official report of scores obtained on the GRE. TOEFL scores are required of all international applicants.
Degree Requirements

Students must maintain a minimum GPA of 3.00 in the program. The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work and 24 credits of dissertation research. For those holding a master’s degree, the 72 required credits may be reduced by up to 30 credits, depending on graduate courses. A maximum of 24 credits of prior graduate course work may be transferred, provided such credits have not been used for another degree. The 48 credits of courses have the functional distribution and learning objectives indicated below:

- 12 credits of required core CSS courses:
  - CSS 600 Introduction to Computational Social Science
  - CSS 605 Object-Oriented Modeling for Social Science
  - CSS 610 Computational Analysis of Social Complexity
  - CSS 620 Origins of Social Complexity
- 6 credits of extended core CSS courses taken from the following:
  - CSS 625 Complexity Theory in the Social Sciences
  - CSS 645 Spatial Agent-Based Models
  - CSS 692 Social Network Analysis
- 15 credits of discipline-based social science courses in a specific area such as anthropology, economics, geography, history, linguistics, political science, or sociology, as approved by the student’s advisor, to provide domain-specific knowledge
- 15 credits of elective courses or independent research, as approved by the student’s advisor, to provide further substantive or methodological specialization as needed. (Students possessing a strong background in computing, such as an MS in computer science, but weaker social science training will be required to use all or most of these electives in a substantive social science. Conversely, students with a strong background in social science, such as a BS in economics, will be required to use most or all of these electives in computing courses.)
- 24 credits of dissertation research to demonstrate doctoral-level originality and research excellence

Areas for dissertation research include, but are not limited to, the following:
- Agent-based computational economics: trade, finance, decision making under risk
- Computational political economy: voting, institutions, norms, inequality
- Computational linguistics: generative grammars, parsing, classifiers, inference
- Social network analysis: connectivity, structure, evolution of the Internet, cyberwarfare
- Computational anthropology: emergence of hierarchy, settlement patterns
- Computational political science: systems of government, conflict and war, cooperation
- Computational sociology: segregation, collective action, leadership, trust
- Complexity theory: power laws, potential theory, criticality, bifurcation
- Computational methodology: multiagent systems, evolutionary computation

During the first year, each student will form a graduate studies committee, called the First-Year Committee, consisting of the student’s advisor plus two or three appropriately qualified individuals. The committee assists the student in designing a specific plan of study and evaluating the student’s progress by the end of the first year. During the second year, the student forms a doctoral committee, with membership approved by the CSS program director. The committee will advise the student in preparing for the doctoral candidacy exams and preparing, developing, and defending the doctoral dissertation.

The candidacy exam is taken after students have completed all core requirements and a majority of additional course work (18 plus 15 credits), which typically corresponds to the fifth semester in the program. The purpose of the candidacy exam is to assess the student’s substantive and methodological knowledge in CSS as a whole and in the chosen area of concentration; ability to integrate materials from different courses; and potential for a successful dissertation.

The exam will consist of written and oral parts. On passing the candidacy exam and submitting an acceptable dissertation proposal, students are advanced to doctoral candidacy. The degree is awarded on the successful defense of a PhD dissertation that represents a detailed written report of an original and significant research contribution to the CSS field.

Graduate Certificate in SC-CERG-CSS Computational Social Science

This 15-credit program is designed for students who seek training in computer simulation and related computational methods for analyzing social systems and processes. The program is open to all students with graduate standing at Mason and all students who hold a bachelor’s degree from an accredited university. The CSS certificate allows students with social science or computational backgrounds to acquire new knowledge and modeling skills to improve their qualifications and attractiveness to employers in government, academia, or industry. The core courses provide a common foundation; additional elective courses allow for a variety of student interests across diverse social domains.

Students in the CSS certificate program must take both CSS 600 Introduction to Computational Social Science and CSS 610 Computational Analysis of Social Complexity. Students are also required to take a minimum of 9 credits in elective courses (for example, CSS 605, 620, 692). Students may include a maximum of 3 credits of programming courses to meet the requirements. Such programming courses as procedural, object-oriented languages, or other approved programming approaches (such as CSI 603 or 604 Introduction to Scientific Programming I or II may be used with approval of the director. Some courses on computational techniques, modeling, or statistics, such as visualization, graphics, and statistical and database packages (such as CSI 606 and 607), may also be used to meet the requirements with prior approval of the director. Students intending to obtain the CSS certificate must apply to the CSS certificate program before beginning any CSS course work intended to satisfy requirements. They must also have their course work plan approved by the director.

Admission Requirements

Applicants should have an undergraduate degree from an accredited institution with a GPA of at least 3.00. To apply, prospective students should send to the COS Fairfax Campus Graduate Admissions Processing Center a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé. TOEFL scores are required of all international applicants.
Life, Liberty, and the Pursuit of Happiness: A Rationale for General Education at George Mason University

“Life, liberty, and the pursuit of happiness”—this ringing phrase from the Declaration of Independence makes a fine statement about the ideals of general education (or, as it is more classically called, liberal education) as we strive to articulate it at Mason. Let’s take the three parts of Thomas Jefferson’s affirmation of humanity’s “unalienable rights” and see how they apply to the goals of a general, or liberal, education.

Life. A liberal education prepares us for life’s unpredictable, fascinating journey. One sobering truth about formal learning is that no matter how many courses we take or degrees we earn, we can’t master every skill and possess every piece of knowledge that we need to succeed in a dynamic world. A liberal education proposes that the highest value of the college experience is the development of our ability to continue learning, adapting, creating, and responding to an ever-changing society and career environment. A liberal education is the most practical of all, because it never goes out of date; the habits of mind it fosters help us to stay current with our careers and the life of our times.

Liberty. A liberal education takes its name from this part of Jefferson’s phrase; the root word for both the concept we so cherish and the education we practice is the Latin liber, meaning “free.” So this kind of education is meant to increase our freedom—of thought and action, from prejudice and ignorance. It is the foundation stone of citizenship as Jefferson and his contemporaries envisioned that notion, a liberty built on rights, responsibilities, and respect for differences. A liberally educated person feels free to seek knowledge and wisdom from across the whole spectrum of human experience—free to challenge the assumptions of the past (and also, after critical consideration, to accept them).

The pursuit of happiness. The liberal arts tradition provides tools for the pursuit of a happier, more fulfilled life. The definition of happiness is personal; for some, an appreciation of “the best that has been thought and said”—or composed, constructed, painted, danced, or acted—is a necessary condition for happiness. For others, it might be an understanding of the wonder of the natural universe, the ability of humans to create marvelous new inventions, or the complexities of the social fabric in an increasingly borderless world. For still others, it is a call to serve the community and the world in large and small ways, acting for the betterment of humanity. For most, it is some combination of the above. No matter the specifics; a liberal education offers the joy of discovery and the satisfaction of engagement with the largest questions of our time—and all time.

At George Mason University, we have created several ways to experience the excitement and gain the value of liberal education. The University General Education Program is detailed in the following pages; the New Century College First-Year Experience, pp. 205; the Mason Topics Program, pp. 178; and, for a small group of outstanding students, the Honors Program in General Education, pp. 166. Though their approaches are very different, as befits the creative spirit and diverse nature of our university, they are united in their commitment to the ideals of life, liberty, and the pursuit of happiness.

Category Goals and Requirements

Foundation Requirements

Foundation requirements help ensure that students are equipped with the tools and techniques necessary to succeed in college and throughout their lives and careers. These courses emphasize skills—in writing, speaking, and working with numbers and technology—that can be applied to any major field of study.

Written communication goal: Students develop the ability to use written communication as a means of discovering and expressing ideas and meanings: in short, writing as a way of thinking. Students begin this process at the fundamental level in English 101 (100 for ESL students) and build higher-level skills in English 302. Writing will be emphasized in many courses throughout a student’s career, and at least one course in every student’s major is designated “writing intensive.”

Required: English 101 (or 100), 302, and an approved writing-intensive course in the major.
Oral communication goal: Students develop the ability to use oral communication as a way of thinking and learning, as well as sharing ideas. Courses provide opportunities for students to learn to express themselves in public or group settings, apply critical thinking skills to public messages, and gain understanding of the cultural, psychological, political, and practical significance of communication, with a special emphasis on the role of communication in a free society.

Required: One approved course. Students will be expected to continue developing oral communication skills in additional general education courses as appropriate.

Quantitative reasoning goal: Students develop the ability to use and critically evaluate numerical information, and create and critique logical arguments using quantitative reasoning. Courses are intended to give students the capability to reason quantitatively through the examination of important problems and ideas. Students must take a placement exam to determine their proficiency before attempting courses that satisfy this requirement. Those who demonstrate a higher proficiency may choose among an approved set of courses that develop quantitative reasoning, while those with basic proficiency must satisfy this requirement with one course, MATH 106.

Required: MATH 106, or if the student has achieved an appropriate placement score on quantitative skills, one of the following: Math 108, 110, 111, 113, 115, or 125; or IT/STAT 250. (Students are assumed to have achieved satisfactory completion of the high school math required for admission.)

Information technology (IT) goal: Students develop a command of basic software and hardware concepts, terminology and functions, and file and data structures. They also use appropriate electronic tools for data organization and search, including databases, web browsers, and search engines; data analysis, including spreadsheets, geographic information systems, and statistical software; and data presentation and communication, including text, electronic slides, web pages, graphs, presentation software, HTML, word processing, and e-mail.

Ethics component: In addition, students are required to have classroom experience in, knowledge of, and appreciation for fundamental ethical issues relating to IT and our changing world. These issues include computer security, privacy laws, public policy issues and professional codes of ethics, intellectual property issues, copyright, security, and financial data.

Required: One approved 3-credit course to meet all IT requirements, or completion of an appropriate combination of courses, proficiency exams, and modules.

Core Requirements

Core requirements help ensure that students are introduced to the broad range of intellectual domains that contribute to a liberal education. By gaining exposure to the subject matter and ways of knowing in a variety of fields, students will be better able to synthesize new knowledge, respond to fresh challenges, and meet the demands of a complex world.

Literature goal: Courses foster understanding and appreciation of the aesthetic, cultural, historical, and intellectual aspects of major literary works through critical analysis. Students will identify, analyze, write about, and discuss aspects of theme, plot, central idea, narrative, audience, perspectivive, figurative language, and the relationship between structure and ideas.

Required: One approved course.

Arts goal: Students will develop an understanding of the aesthetic and intellectual components of the arts through critical analysis of major artistic works or creative work of their own. Courses are intended to give students knowledge and understanding of the arts through critical or historical analysis, theory, and practice. Arts courses provide distinctive modes of thought, ways of working, and avenues for student achievement, and establish a foundation for ongoing intellectual and artistic development. Some courses emphasize the development of artistic technique, problem solving, and the creative and interdisciplinary process, while others focus on developing aesthetic sensibility and understanding historical and cultural contexts.

Required: One approved course.

Natural science goal: Courses provide an understanding of natural science, by addressing the critical approach of the scientific method, relation of theory and experiment, use of quantitative and qualitative information, and development and elaboration of major ideas in science.

Required: Two approved science courses. At least one course will include laboratory experience.

Western civilization/world history goal: Course covers the period of Western civilization from the Greek and Roman civilizations to the contemporary era. Students will develop awareness and understanding of a major civilization that has influenced thought, culture, and politics in the United States and throughout the world.

Required: One approved course.

Global understanding goal: Courses examine some of the principal global issues and concerns that shape our world today. After completing a course from this category, students will be able to identify the causes and consequences of change in significant global issues. While some courses may deal with a specific global problem, institution, or issue, others may focus on a specific area or region outside the contemporary Western world by incorporating specific comparisons of several cultures. These courses stress the interconnectedness, difference, and diversity that are central to understanding and operating in a global society.

Required: One approved course.

Social and behavioral sciences goal: Courses provide students with an understanding of the social and behavioral sciences. Students are engaged in reasoning using the scientific method, the use of quantitative and qualitative information, and the analysis of empirical observations in relation to theory, among other methods. The development of major ideas in social science is also addressed.

Required: One approved course.

Synthesis Requirement

Synthesis goal: All students will take one upper-division synthesis course, typically after all other university general education requirements are met (or concurrently enrolled). Synthesis courses draw on the skills and knowledge base attained through the General Education Program, applying the power of liberal learning to a specific field; often, though not always, in the student’s major. Synthesis courses may link particular issues in a given field to wider intellectual and
community concerns; other courses might be interdisciplinary. Some synthesis courses also serve as capstone courses in a major. All synthesis courses require students to demonstrate advanced skills in oral and written presentations.

Required: One approved course.

Writing-Intensive Course Requirement
In addition to English composition and as part of the university’s commitment to literacy in all programs, at least one course in each major is designated as “writing intensive.” For more information, go to the Academic Policies chapter of this catalog. Please read the description of each major for the specific courses that fulfill this requirement.

Approved Courses
The course list reflects approved courses as of press time. For the most current list, go to www.gmu.edu/departments/provost/gened/GENEDapprovedcourses.htm.

Foundation Requirements
Written communication (6 credits: 3 lower, 3 upper)
ENGL 100 or 101, 302

Oral communication (3 credits)
COMM 100 or 101

Information technology (IT, all)
ADJ 300, ANTH 395, CHEM 350, GOVT 300, IT 103, MUSI 415

Information technology (IT, all except ethics)
AVT 180; CS 112; PHYS 251; PSYC 300, 301, 372 (these must be taken in sequence); SOCI 410

Information technology ethics (IT Ethics)
CS 105 (1 credit), 305 (3 credits); ENGR 107 (2 credits); IT 304; PHIL 112 (1 credit)

Quantitative reasoning (3 credits)
IT 250; MATH 106, 108, 110, 111, 113, 115, 125; STAT 250

Core Requirements
Literature (3 credits)
CHIN 310, 311, 325, 328; CLAS 250, 260, 340, 350, 360, 380; ENGL 201; FREN 325, 329; FRLN 330; GERM 325; PHIL 253; RUSS 325, 326, 327; SPAN 325

Arts (3 credits)

Western civilization/world history (3 credits)
HIST 100 or 125

Social and behavioral science (3 credits)
ADJ 100; AFAM 200; ANTH 114, 120, 125, 396; CONF 101; ECON 100, 103, 104, 110, and 111 (110 and 111 must be taken in sequence); EDUC 372; GEOG 103; GOVT 101; 103; HEAL 230; HIST 120; LING 326; PSYC 100, 211, 231; SOCI 101; SOM 100, TOUR 311; WMST 200

Global understanding (3 credits)
ADJ 405; ANTH 302, 304, 306, 309, 311, 312, 313, 331, 332, 333, 385; ARTH 203, 319, 320, 380, 382, 383, 384, 385; CEIE 100; COMM 305, 456; DANC 118, 318; ECON 360, 361, 362, 380, 390; ENGL 349, 350; GCH 205; GEOG 101; GLOA 101; GOVT 132, 133; HIST 130, 251, 252, 261, 262, 271, 272, 281, 328, 329, 356, 364, 365, 387, 459, 460, 462; MSOM 305; MUSI 103, 431; RELI 100, 211, 212, 313, 315, 341, 374; RUSS 354; SOCI 120, 320, 332; SPAN 322; THR 359; TOUR 210; WMST 100

Natural science (7 credits total)
Nonlab (3 credits): ASTR 103, 302; CDS 101, CHEM 101, 102, 201, 202; CLIM 101, EVPP 201; GEOG 102; UNIV 301
Lab (4 credits): ASTR 111, 112, 113, 114; BIOL 103, 104, 213, 303, 304; CHEM 103, 104, 155, 156, 211, 212, 251; EOS 121, EVPP 110, 111; GEOL 101, 102; PHYS 103, 104, 160, 243 and 244, 245 and 246, 260 and 261, 262 and 263

Synthesis requirement
ADJ 303; ANTH 400; ARTH 394; ASTR 497, 498; BINF 354; BIOL 301; BIS 490; CAS 313; CEIE 490; COMM 326, 362, 454; CONF 490; CS 306, 491; DANC 490; ECE 447, 492, 493; ECON 309; EDCI 490; ENGL 325; EOS 304; EVPP 335; FRLN 385; GEOG 303, 304; GEOL 420; GOVT 490, 491; HIST 300, 499; IT 492; LAS 499; MATH 400; MUSI 490; NCLC 308; NEUR 354; NURS 465; PHIL 309, 493, 377, 378; RELI 490; RUSS 353; SOCI 377, 483; SOCW 323; SOM 498; SYST 495; THR 440, 496; UNIV 342, 442

Total: 40 credits
Institute for Conflict Analysis and Resolution

Phone: 703-993-1300  
Web: icar.gmu.edu  
College Code: CA

Administration  
Sara Cobb, Director  
Kevin Avruch, Associate Director

Faculty  
Professors: Avruch, Cheldelin, Gopin, Jeong, Rothbart, Rouhana, Rubenstein, Sandole  
Associate professors: Bartoli, Cobb, Hirsch, Lyons, Warfield  
Assistant professors: Goodale, Howard, Nan, Paczynska, Schoeny, Simmons  
Research professors: Korostelina, Price, Sluzki  
Affiliate faculty: Dale  
Emeritus faculty: Mitchell

Course Work  
The Institute for Conflict Analysis and Resolution (ICAR) offers all course work designated CONF in the Course Descriptions chapter of this catalog.

Academic Programs  
ICAR provides the following academic offerings:

Undergraduate  
• BA in Conflict Analysis and Resolution  
• BS in Conflict Analysis and Resolution  
• Minor in Conflict Analysis and Resolution

Graduate  
• MS in Conflict Analysis and Resolution  
• PhD in Conflict Analysis and Resolution  
• Dual Degree Program in Social Work and Conflict Analysis and Resolution (MSW and MS)  
• Graduate Certificate in Conflict Analysis and Resolution Advanced Skills  
• Graduate Certificate in Conflict Analysis and Resolution for Collaborative Leadership in Community Planning  
• Graduate Certificate in Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Conflicts  
• Graduate Certificate in World Religions, Diplomacy, and Conflict Resolution

UNDERGRADUATE PROGRAM  
Phone: 703-993-4165  
E-mail: ugradcar@gmu.edu  
Location: Fairfax Campus

Susan F. Hirsch, Undergraduate Program Director  
Conflict Analysis and Resolution (CAR) offers students a BA, a BS, or a minor in a growing interdisciplinary social science field with practical applications. Conflict analysis and resolution is committed to analyzing the sources and dynamics of conflict and the means for resolution toward lasting peace. All CAR students take a series of core courses that provide a background in conflict theory, analysis, and conflict resolution skills. Required bridge courses cover conflict analysis and resolution at three levels: interpersonal conflict, community and organizational conflict, and international conflict. After selecting a level of conflict as a concentration, students choose courses from units throughout the university that relate to the concentration and their areas of interest, such as anthropology, communication, government, philosophy, psychology, management, sociology, and New Century College. The major also requires 3 credits of field experience in the form of an internship, a service-learning opportunity, or study abroad.

Conflict Analysis and Resolution, BA  
In addition to satisfying the university-wide general education requirements and the College of Humanities and Social Sciences (CHSS) college-level requirements for philosophy or religious studies, foreign language proficiency, social sciences, and non-Western culture, CAR majors must complete 39 credits for the BA degree:

Students pursuing a double major/degree with a program outside of the ICAR undergraduate program will be expected to fulfill all of the university general education and college requirements necessary to complete the second major. Please check with the second major department concerning additional requirements.

Required core courses (15 credits): CONF 101, 300, 301, 302, 490

Required bridge courses (9 credits): CONF 320, 330, 340

Field experience (3 credits): Students can choose to fulfill this requirement through an internship, service learning, or study abroad. Students register for internship credits through
New Century College. More information is available at http://ncc.gmu.edu. Students interested in study abroad should register through the Center for Global Education. More information can be found at http://www.gmu.edu/departments/cge. Prior approval by the major advisor is required for all field experience options.

- Internship: NCLC 390/490 or CONF 375
- Service Learning: NCLC 495
- Study Abroad: CONF 385

**Concentration courses (12 credits):** Students choose courses from one of three levels of conflict: interpersonal (micro level), community and organizational (mezzo level), and international (macro level). Students should choose classes that pertain to their concentration and are listed as approved. Students are encouraged to check special topics courses each semester and think creatively about the applicability of courses that support learning in their chosen concentration. Independent study approved by the advisor is also an option. The CAR director will consider student requests for approval of courses not listed below.

**Concentration in Interpersonal Conflict (MICR)**
Students choose four courses from the following areas: ADJ 302, 404, 406; ANTH 315, 365, 371; COMM 305; CONF 202, 393, 399, 495; NCLC 305, 310, 315, 317, 320, 395; PHIL 309, 355; PSYC 231, 321, 324, 467; SOCI 300, 302, 305, 309, 350; SOCW 323

**Concentration in Community and Organizational Conflict (MEZZ)**
Students choose four courses from the following areas: ADJ 302, 402, 407, ANTH 310, 365, 488; COMM 326, 335, 350, 432; CONF 202, 240, 393, 399, 495; ECON 309, 320; GEOG 306, 406; GOVT 301, 309, 337, 365, 414; HIST 340, 350, 418; MGMT/MSOM 301; MGMT 412, 463; NCLC 301, 304, 310, 320, 361, 381, 395; PHIL 254, 309, 326, 355, 395; PSYC 231; SOCI 300, 301, 302, 307, 308, 315, 326, 332, 340, 352, 373, 492; SOCW 351, 425; UNIV 342

**Concentration in International Conflict (MACR)**
Students choose four courses from ADJ 405, 475; ANTH 312, 331, 332, 333, 365, 385, 440; COMM 412/GOVT 412; CONF 240, 393, 399, 495; ECON 360, 361; GEOG 301; GOVT 331, 332, 333, 334, 336, 337, 338, 342, 345, 349, 421, 432, 446, 448; HIST 364, 461, 466; MGMT 461; MSOM 305; NCLC 381, 395, 424; PHIL 327, 355; SOCI 307, 320, 326, 400, 450

**Conflict Analysis and Resolution, BS**

In addition to satisfying the university-wide general education requirements CAR majors must complete 54 credits for the BS degree:

Students pursuing a double major/degree with a program outside of the ICAR undergraduate program will be expected to fulfill all of the university general education and college requirements necessary to complete the second major. Please check with the second major department concerning additional requirements.

**Required core courses (15 credits):** CONF 101, 300, 301, 302, 490

**Required bridge courses (9 credits):** CONF 320, 330, 340

**Non-Western culture (3 credits):** from institute BA requirement list. Cannot be double counted for global understanding requirement.

**Research methods (6 credits):**

- STAT 250
- 3 credits chosen from ADJ 300; ANTH 380, 450; ENGL 327; GOVT 300, 366, 400; HIST 300; PHIL 357/SOCI 599; PSYC 300, 301; SOCI 303, 313, 410; STAT 362/IT 362, STAT 474

**Field experience (3 credits):** Students can choose to fulfill this requirement through an internship, service learning, or study abroad. Students register for internship credits through New Century College. More information is available at http://ncc.gmu.edu. Students interested in study abroad should register through the Center for Global Education. More information can be found at http://www.gmu.edu/departments/cge. Prior approval by the major advisor is required for all field experience options.

- Internship: NCLC 390/490 or CONF 375
- Service Learning: NCLC 495
- Study Abroad: CONF 385

**Concentration courses (12 credits):** Students choose courses from one of three levels of conflict: interpersonal (micro level), community and organizational (mezzo level), and international (macro level). Students should choose classes that pertain to their concentration and are listed as approved. Students are encouraged to check special topics courses each semester and think creatively about the applicability of courses that support learning in their chosen concentration. Independent study approved by the advisor is also an option. The CAR director will consider student requests for approval of courses not listed below.

**Concentration in Interpersonal Conflict (MICR)**
Students choose four courses from the following areas: ADJ 302, 406, 407; ANTH 315, 365, 488; COMM 326, 335, 350, 432; CONF 202, 240, 393, 399, 495; ECON 309, 320; GEOG 306, 406; GOVT 301, 309, 337, 365, 414; HIST 340, 350, 418; MGMT/MSOM 301; MGMT 412, 463; NCLC 301, 304, 310, 320, 361, 381, 395; PHIL 254, 309, 326, 355, 395; PSYC 231; SOCI 300, 301, 302, 307, 308, 315, 326, 332, 340, 352, 373, 492; SOCW 351, 425; UNIV 342

**Concentration in Community and Organizational Conflict (MEZZ)**
Students choose four courses from ADJ 302, 404, 406; ANTH 315, 365, 371; COMM 305; CONF 202, 393, 399, 495; NCLC 305, 310, 315, 317, 320, 395; PHIL 309, 355; PSYC 231, 321, 324, 467; SOCI 300, 302, 305, 309, 350; SOCW 323

**Concentration in International Conflict (MACR)**
Students choose four courses from ADJ 302, 406, 407; ANTH 310, 365, 488; COMM 326, 335, 350, 432; CONF 202, 240, 393, 399, 495; ECON 309, 320; GEOG 306, 406; GOVT 301, 309, 337, 365, 414; HIST 340, 350, 418; MGMT/MSOM 301; MGMT 412, 463; NCLC 301, 304, 310, 320, 361, 381, 395; PHIL 254, 309, 326, 355, 395; PSYC 231; SOCI 300, 301, 302, 307, 308, 315, 326, 332, 340, 352, 373, 492; SOCW 351, 425; UNIV 342

**Concentration in International Conflict (MACR)**
Students choose four courses from ADJ 405, 475; ANTH 312, 331, 332, 333, 365, 385, 440; COMM 412/GOVT 412; CONF 240, 393, 399, 495; ECON 360, 361; GEOG 301; GOVT 331, 332, 333, 334, 336, 337, 338, 342, 345, 349, 421, 432, 446, 448; HIST 364, 461, 466; MGMT 461; MSOM 305; NCLC 381, 395, 424; PHIL 327, 355; SOCI 307, 320, 326, 400, 450

**Major electives (6 credits):** Elective courses can be chosen from the approved concentration course list at any level but
may not count for both concentration and elective credit. Independent study approved by the advisor is also an option.

**Minor in Conflict Analysis and Resolution**

Students are required to achieve a minimum of 2.00 GPA in courses applied to a minor. At least 8 credits of the minor must be applied only to the CAR minor and may not be used to fulfill requirements of the student’s major, major concentration, or another minor.

Students pursuing a minor complete 18 credits distributed as follows:

- **Required core courses (6 credits):** CONF 101 and 300

- **One of three bridge courses (3 credits):** CONF 320, 330, 340

- **Emphasis courses (9 credits):** Students choose courses from one of three levels of conflict: interpersonal (micro level), community and organizational (mezzo level), and international (macro level). With permission of the advisor, students may use other CONF designated courses to fulfill emphasis requirements. The CAR director will consider student requests for approval of courses not listed below.

- **Emphasis in Interpersonal Conflict**
  Students choose three courses from ADJ 302, 404, 406; ANTH 315, 365, 371; COMM 305; CONF 202, 393, 399, 495; NCLC 305, 310, 315, 327, 320, 395; PHIL 309, 355; PSYC 231, 321, 324, 467; SOCI 300, 302, 305, 309, 350, SOCW 323

- **Emphasis in Community and Organizational Conflict**
  Students choose three courses from ADJ 302, 406, 407; ANTH 310, 365, 488; COMM 326, 335, 350, 432; CONF 202, 240, 393, 399, 495; ECON 309, 320; GEOG 306, 406; GOVT 301, 309, 337, 365, 414; HIST 340, 350, 418; MGMT/MSOM 301; MGMT 412, 463; NCLC 301, 304, 310, 320, 361, 381, 395; PHIL 254, 309, 326, 355; PSYC 231; SOCI 300, 301, 302, 307, 308, 315, 326, 332, 340, 352, 373, 492, SOCW 351, 425; UNIV 342

- **Emphasis in International Conflict**
  Students choose three courses from ADJ 405, 475; ANTH 312, 331, 332, 333, 365, 385, 440; COMM 412/GOVT 412; CONF 240, 393, 399, 495; ECON 360, 361; GEOG 301, GOVT 331, 332, 333, 334, 336, 337, 338, 342, 345, 349, 421, 432, 446, 448; HIST 364, 461, 466; MGMT 461; MSOM 305; NCLC 381, 395, 424; PHIL 327, 355; SOCI 307, 320, 326, 340, 450

**Writing-Intensive Requirement**

All Mason students are required to complete at least one course designated as “writing intensive” in their major at the 300-level or above. CONF 302 has been designated “writing intensive.”

**Advising**

CAR advisors help students create interdisciplinary programs that meet their interests and career goals. All majors and minors are strongly encouraged to meet regularly with a CAR academic advisor who will help students develop and follow a coherent plan of study and complete the degree in a timely manner.

**Physical Education Courses**

PHED courses offered by the School of Recreation, Health, and Tourism that are activity courses cannot be counted toward credits required for a degree in CAR. Students may use non-activity PHED courses for elective credit for CAR degrees.

**GRADUATE PROGRAMS**

**Conflict Analysis and Resolution, MS**

This two-year professional program prepares students for practice and further academic work by integrating conflict analysis and resolution theory, research, and practical techniques. Participants study the theory, methods, and ethical perspectives of the field, and apply this knowledge in laboratory simulations and workshops, internships, and field practice. Graduates work in a variety of settings where conflict resolution is useful and interest groups are in conflict with current and emergent public policy. Examples are businesses, unions, government agencies, religious groups, court systems, educational institutions, community centers, international relief and development organizations, and consulting firms.

**Admission Requirements**

In addition to meeting all admission requirements for graduate study, applicants must submit all undergraduate and graduate transcripts; three letters of recommendation, one of which should be from a faculty member in the applicant’s undergraduate or graduate major field; and a 750- to 1,000-word essay on goals and reasons for seeking admission to the program. GRE or other standardized test scores are not required but may be submitted. The TOEFL is required of international students. For more information, see the Admission of International Students section in the Admissions chapter of this catalog.

Background courses in social sciences, as well as prior work experience, are desirable. Prior graduate academic work is evaluated on an individual basis for possible transfer credit and fulfillment of program requirements; however, Mason usually does not reduce the total credits required for the degree. Although students may enroll on a full- or part-time basis, entry into the program is in the fall semester only.

**Degree Requirements**

Forty-one credits are required: 15 in required core courses, 20 in elective courses, and 6 in integrative courses (students can choose from a defined list). Mason requires all students to complete the master’s degree within six years of their official admission date.

Because the choice of electives can vary significantly according to individual goals or needs, each student should develop a plan of study that should be discussed once each semester with the advisor and updated as appropriate.

**Required Courses**

Students take 15 credits of required course work.

CONF 501 Introduction to Conflict Analysis and Resolution

CONF 601 Theories of Conflict and Conflict Resolution

CONF 610 Philosophy and Methods of Conflict Research

CONF 642 Integration of Theory and Practice

CONF 713 Reflective Practice in Interpersonal-Multiparty Conflicts
**Elective Courses**

Students take 20 credits of elective course work. Electives are any 500-, 600-, or 700-level CONF courses, except required courses and courses from the Graduate Certificate Program. With the advisor’s approval, each student is eligible to include a maximum of 6 credits of electives from outside the ICAR Program, including courses in other Mason departments, consortium courses, ICAR graduate certificate courses, and transfer courses from other universities.

**Integrative Courses**

Students must complete 6 credits of integrative work, choosing one of the following options:

- CONF 690 Practicum in Conflict Analysis and Resolution: Applied Practice and Theory (3 credits in fall semester, 3 credits in spring semester)
- CONF 694 Internship (3 credits) and CONF 795 Professional Development Seminars (3 credits) or CONF 694 Internship (6 credits)
- CONF 799 Master’s Thesis (6 credits) or CONF 798 Thesis Proposal (1 credit) and CONF 799 Master’s Thesis (5 credits)

**Directed Readings**

Only two directed readings (CONF 697) may be applied toward requirements for the master’s degree.

**Field Opportunities**

The internship program provides students with opportunities to use and develop conflict resolution skills, integrate theory and practice of conflict analysis and resolution, and network with professionals in the field to enhance employment opportunities. Experience does not necessarily have to be explicitly hands on. CONF 694 requires at least 160 hours of supervised work on a project toward the analysis or resolution of conflict. Such work must be spelled out in a memorandum of agreement to be signed by the student, the site supervisor, and the internship coordinator before the internship begins.

The Applied Practice and Theory (APT) Program is a 6-credit course that runs yearlong. It is designed to take the concepts presented in class and practiced in labs into real situations with conflict and consequences. Students work in teams integrating research and practice with theory development and applied ethics.

**Dual Degree HH-MSW-SOCW, MS-CONF in Social Work and Conflict Analysis and Resolution**

The Department of Social Work and the Institute for Conflict Analysis and Resolution have joined forces to offer a three-year dual-degree program. Students can earn both an MSW and an MS in conflict analysis and resolution while taking advantage of the diversity of the Washington, D.C., metropolitan area and the university’s proximity to the nation’s capital. This is the only dual-degree program of its kind.

**Admissions Requirements**

Students applying for the dual MSW and MS in conflict analysis and resolution must apply separately to both the programs. If accepted into both programs, students request permission to pursue the dual degree. See admissions information for both the College of Health and Human Services and the Institute for Conflict Analysis and Resolution.

**Degree Requirements**

Students must successfully complete the following:

**Social Work Courses**
- SOCW 623 Human Behavior and Social Systems I ..........3
- SOCW 624 Human Behavior and Social Systems II ..........3
- SOCW 651 Social Policies, Programs, and Services ..........3
- SOCW 652 Influencing Social Policy .........................3
- SOCW 657 Directed Social Work Practice I .................3
- SOCW 658 Directed Social Work Practice II ..............3
- SOCW 670 Communication and Technology for Social Work Practice ..........................3
- SOCW 672 Foundation Field Practicum and Seminar I ....3
- SOCW 673 Foundation Field Practicum and Seminar II ...3
- SOCW 684 Social Work and the Law .........................4
- SOCW 685 Organizational Leadership for Social Workers ..................................................4
- SOCW 687 Empowering Communities for Change ..........4
- SOCW 688 Advanced Research in Social Work ..........3
- SOCW 690 Social Change Field Practicum ..................6
- SOCW 691 Social Change Field Seminar ...................3
- SOCW electives (selected with approval from ICAR) ....12

**Conflict Analysis and Resolution Courses**
- CONF 501 Introduction to Conflict Analysis and Resolution ........................................3
- CONF 601 Theories of Sources of Conflict and Conflict Resolution ......................................3
- CONF 610 Philosophy and Methods of Conflict Research ..................................................3
- CONF 642 Integration of Theory and Practice .............3
- CONF 694 Internship ................................................3
- CONF 713 Reflective Practice in Interpersonal-Multiparty Conflicts ..................................3
- CONF 795 Professional Development Seminar ..........5
- CONF electives (selected with approval from ICAR) ....12

Total .................................................................86

**Conflict Analysis and Resolution, PhD**

The doctoral program, the first of its kind in the United States, provides advanced study for students in the fields of conflict and conflict resolution. Students are prepared for careers as researchers, theoreticians, and teachers in higher education, and as policy administrators, analysts, and consultants in the public and the private sectors.

The program stresses a close link between knowledge of theory and process in the resolution of conflict. For this, training in the methods of research and analysis is emphasized. In addition, students are expected to obtain a background in a substantive area of conflict, usually related to the topic of the dissertation.

**Admission Requirements**

In addition to the requirements listed for applicants to the MS program, requirements for the PhD program include a written sample of work that shows the applicant’s potential for completing dissertation research in a doctoral program. Although students may enroll on a full- or part-time basis, entry into the program is in the fall semester only. A master’s degree or equivalent degree is required for admission to the PhD program.
Degree Requirements
Fifty-seven credits are required.

Required Core Doctoral Courses
Students take 27 credits of required course work; each course is 3 credits.

CONF 711 The Conventions of Statistical Methodology
CONF 713 Reflective Practice in Interpersonal-Multiparty Conflicts
CONF 801 Introduction to Conflict Analysis and Resolution
CONF 802 Theories of the Person
CONF 803 Structural Theories
CONF 810 Philosophy and Conflict Research
CONF 811 Advanced Quantitative Research Methods
CONF 812 Advanced Qualitative Research Methods
CONF 900 Integrating Theory, Practice, and Method in Conflict Analysis

Elective Courses
Eighteen elective credits must be completed prior to comprehensive exams. Electives are any 500-, 600-, and 700-level CONF courses, except required courses and courses from the Graduate Certificate Program. With the advisor’s approval, each student may include a maximum of 6 credits of electives from outside the ICAR Program, including courses in other Mason departments, consortium courses, ICAR graduate certificate courses, and transfer courses from other universities. The intent is to allow students to have maximum flexibility in selecting courses to build skills and knowledge needed in dissertation work.

Directed Readings
Only two directed readings (CONF 897) can be applied toward doctoral elective requirements.

Dissertation Units
Twelve combined dissertation proposal and research credits are required:

CONF 998 Doctoral Dissertation Proposal (All CONF 998 courses are graded In Progress until completion of the proposal. At that time, an appropriate grade is issued.)

CONF 999 Doctoral Dissertation Research (All CONF 999 courses are graded In Progress until the dissertation defense is successfully completed. At that time, an appropriate grade is issued.)

Credit for Prior Study
Students who have earned an MS in conflict analysis and resolution from Mason may have the course total required for a doctoral degree reduced by 15 credits. The actual number of credits reduced is determined in consultation with the student’s advisor and the program coordinator after a review of courses taken.

Students entering with other relevant degrees (MA, MS, or JD) may have the required course load reduced by up to 15 credits. The actual number of applied credits is determined in consultation with the student’s advisor and the program coordinator after a review of courses taken.

Foreign Language Requirement
Every doctoral student must show competence in a foreign language (that is, a language other than their native tongue) before advancing to candidacy. Students cannot register for CONF 998 without evidence of meeting this requirement. International students may use English as their foreign language and the TOEFL as a demonstration of competency. The Department of Modern and Classical Languages has ruled that neither American Sign Language nor computer languages can be used to fulfill this requirement. All students, regardless of how recently language courses have been taken, are required to fulfill the same standard before advancing to candidacy.

Competence in a foreign language must be shown by taking a placement test at Mason’s Language Laboratory. The test has oral and written components. If the test is passed at a level greater than 300, which indicates the end of intermediate and beginning of advanced competency, the Department of Modern and Classical Languages will issue a certificate of proficiency.

If the student desires testing in a language that Mason does not offer, the test can be taken at an outside organization, embassy, church, or other entity. The student must submit a letter to Mason certifying that the test was passed at a high, intermediate, or low advanced level. The student may submit for approval the names and qualifications of those capable of administering such a test.

After students pass their comprehensive exam and before they register for CONF 998, they should notify the PhD coordinator about the language they have selected to satisfy the foreign language requirement.

Advancement to PhD Candidacy
After completing course work (except the dissertation) listed on the Program of Studies, passing written comprehensive exams, and completion of the language requirement students are advanced to candidacy. A candidate is permitted five years from the advancement date to complete the dissertation.

Graduate Certificates
Phone: 703-993-1300
E-mail: icarcert@gmu.edu
Location: Arlington Campus
Mara Schoeny, Certificate Program Director
Four graduate certificate programs are administered exclusively by ICAR. Each of these one-year, 15-credit programs is specifically tailored to provide students with practical knowledge of conflict analysis and resolution relevant to their focused areas of work. Designed for midcareer professionals studying in a cohort environment, the certificate programs integrate conflict analysis and resolution theory, research, and practical technique. These programs use intensive course sessions, lecture, seminar, and applied mentored learning in real and simulated situations to prepare students to use conflict analysis and resolution approaches in their work in a variety of fields.

Admission Requirements
In addition to meeting all admission requirements for graduate study, applicants must submit an undergraduate transcript
showing completion of an undergraduate degree or equivalent, and a curriculum vitae or résumé indicating relevant work experience.

In addition, prior work experience in areas related to the chosen graduate certificate is desirable. GRE or other standardized test scores are not required but may be submitted. The TOEFL is required of international students. For more information, see the Admission of International Students section in the Admissions chapter of this catalog. Although students may enter the program in either the fall or spring semester, they are strongly encouraged to participate fully in the cohort learning experience by enrolling for the fall semester, taking two courses in the fall and two in the spring, and completing their certificate with the final course in the summer.

Degree Requirements
Fifteen credits are required for each graduate certificate degree. Each degree consists of three courses (9 credits) required of all certificate programs.

- **Graduate Certificate CERG-CARA in Conflict Analysis and Resolution Advanced Skills**

  **Required Courses**
  Students take 12 credits of required course work. The semester in which the courses are generally offered is indicated in parentheses:
  
  - CONF 502 Intensive Introduction to Conflict Analysis and Resolution (fall and spring)
  - CONF 650 Conflict Analysis and Resolution Advanced Skills (fall)
  - CONF 660 Conflict Assessment and Program Evaluation (spring)
  - CONF 668 Applied Integration for Graduate Certificates (summer)

  **Elective Courses**
  Students take 3 credits of elective course work. They may choose from the following:
  
  - CONF 656 Integrating Complementary Approaches in Conflict Analysis and Resolution (spring)
  - CONF 657 Facilitation Skills (spring)
  - CONF 658 Diversity in Conflict Analysis and Resolution (spring)
  - CONF 659 Leadership in Conflict Analysis and Resolution (spring)

  Application of any other course toward fulfillment of the elective requirement must be approved by the director of certificates.

- **Graduate Certificate CERG-CARC in Conflict Analysis and Resolution for Collaborative Leadership in Community Planning**

  **Required Courses**
  Students take 12 credits of required course work. The semester in which the courses are generally offered is indicated in parentheses:
  
  - CONF 502 Intensive Introduction to Conflict Analysis and Resolution (fall and spring)
  - CONF 651 Conflict Analysis and Resolution for Collaborative Leadership in Community Planning (fall)
  - CONF 660 Conflict Assessment and Program Evaluation (spring)
  - CONF 668 Applied Integration for Graduate Certificates (summer)

  **Elective Courses**
  Students take 3 credits of elective course work. They may choose from the following:
  
  - CONF 656 Integrating Complementary Approaches in Conflict Analysis and Resolution (spring)
  - CONF 657 Facilitation Skills (spring)
  - CONF 658 Diversity in Conflict Analysis and Resolution (spring)
  - CONF 659 Leadership in Conflict Analysis and Resolution (spring)

  Application of any other course toward fulfillment of the elective requirement must be approved by the director of certificates.

- **Graduate Certificate CERG-CARP in Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Conflicts**

  **Required Courses**
  Students take 12 credits of required course work. The semester in which the courses are generally offered is indicated in parentheses:
  
  - CONF 502 Intensive Introduction to Conflict Analysis and Resolution (fall and spring)
  - CONF 652 Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Contexts (fall)
  - CONF 660 Conflict Assessment and Program Evaluation (spring)
  - CONF 668 Applied Integration for Graduate Certificates (summer)

  **Elective Courses**
  Students take 3 credits of elective course work. They may choose from the following:
  
  - CONF 656 Integrating Complementary Approaches in Conflict Analysis and Resolution (spring)
  - CONF 657 Facilitation Skills (spring)
CONF 658 Diversity in Conflict Analysis and Resolution (spring)
CONF 659 Leadership in Conflict Analysis and Resolution (spring)

Application of any other course toward fulfillment of the elective requirement must be approved by the director of certificates.

■ Graduate Certificate CERG-CARW in World Religions, Diplomacy, and Conflict Resolution

Required Courses
Students take 12 credits of required course work. The semester in which the courses are generally offered is indicated in parentheses:
CONF 502 Intensive Introduction to Conflict Analysis and Resolution (fall and spring)
CONF 653 World Religions, Diplomacy, and Conflict Resolution (fall)
CONF 660 Conflict Assessment and Program Evaluation (spring)
CONF 668 Applied Integration for Graduate Certificates (summer)

Elective Courses
Students take 3 credits of elective course work. They may choose from the following:
CONF 656 Integrating Complementary Approaches in Conflict Analysis and Resolution (spring)
CONF 657 Facilitation Skills (spring)
CONF 658 Diversity in Conflict Analysis and Resolution (spring)
CONF 659 Leadership in Conflict Analysis and Resolution (spring)

Application of any other course toward fulfillment of the elective requirement must be approved by the director of certificates.
The College of Education and Human Development (CEHD) comprises the Division of Undergraduate Studies in Education (USIE); the School of Recreation, Health, and Tourism (RHT); and the Graduate School of Education (GSE). The college is committed to excellence, innovation, and collaboration in research and the preparation of professionals for the highest levels of practice and service in diverse schools, organizations, and communities.

CEHD provides leadership in transforming schools, organizations, and communities through research, teaching, and collaboration. CEHD faculty members prepare scholars and practitioners through multidisciplinary programs of study that facilitate the understanding, integration, and application of knowledge. Through research activities, faculty and students expand and refine the knowledge base for teaching and learning. In response to the richness and complexity of a pluralistic society, CEHD infuses diversity into academic programs and research. The faculty develops and supports knowledgeable, caring, and reflective professionals who facilitate excellence and equity for all learners. CEHD faculty and students demonstrate their growth and development in ways meaningful to their communication and professional organizations. Innovative programs and the integration of technology provide opportunities for students to develop, examine, evaluate, and practice professional knowledge, skills, and dispositions.

**Professional Teacher Licensure**

CEHD is responsible for professional courses, special standards, and licensure recommendations for students wishing to complete requirements for licensure programs approved by the commonwealth and the National Council for the Accreditation of Teacher Education to prepare teachers, administrators, counselors, and related instructional personnel.

Initial teacher licensure at the undergraduate level in dance and music education, physical education, and secondary education English is offered through the major program’s unit (College of Visual and Performing Arts, RHT, and USIE). Initial teacher licensure at the graduate level is provided within the following master’s programs: art education (College of Visual and Performing Arts), early childhood education (UTEEM), elementary education, English as a second language, foreign language, and secondary education. The Special Education Program offers initial teacher licensure exclusively through graduate certificates that include early childhood special education, severe disabilities, visual impairment, and students with disabilities accessing the general curriculum.

For more information and the dates and times of Think You Want to Be a Teacher? information sessions, call the CEHD admissions office at 703-993-2892 or visit cehd.gmu.edu.

**Administration**

Jeff Gorrell, Dean
Martin Ford, Senior Associate Dean
Peter Barcher, Associate Dean for Research
Joan Isenberg, Associate Dean for Outreach and Program Development
Ellen Rodgers, Associate Dean for Teaching and Academic Affairs
David Wiggins, Director of the School of Recreation, Health, and Tourism
Jeannine Tate, Director of the Division of Undergraduate Studies in Education

**Faculty**

**Professors:** Anderson, Behrmann, Bemak, Brayley, Brozo, Chung, Dimitrov, Earley, Galluzzo, Goor, Haley, Kelly, King-Sears, Levy, Mastropieri, Maxwell, Naunit, Norton, Schrum, Scruggs, Shaklee, Sterling, Sturtevant, White, Williams

**Associate professors:** R. Baker, Bannan-Ritland, Banville, Bauer, Berger, Bever, Bon, Brazer, Brigham, Burns, Castle, Clark, Dabbagh, Daniels, DeMulder, Dieke, Duck, Dunklee, Dzama, Falconer, Fowler, Fox, Grant, Hicks, Kaffenberg, Kidd, Kitsantas, Kozlowski, Miller, Ndura, Osterling, Pierce, Razeghi, Reaybold, Rigsby, Rikard, P. Rodgers, Samaras, Sanchez, Schack, Sprague, Talleyrand, Thomas, Thorp, Upperman, Walker, Werner, Wiggins, Wong


**Instructors:** Anderson, Bailly, Bartlett, Casserly, Hathaway, Neuber, Norden, Parham, Rioux-Bailey, Rollins, Stribling, Zam
Professional faculty: Anderson, Berlin, Biderman, Carter, Daniels, Fahe, Ganley, George, Graff, Hall, Jang, Klein, Landeros, Levy, Little, Loomis, Lux, Miller, Ok, Shahrokhi, Sharp, Steele, Stockton, Stull, Talbert, Waddell, Wiley

Course Work
CEHD offers all course work designated ATEP, EDAE, EDAL, EDCD, EDCI, EDEP, EDIT, EDLE, EDRD, EDRS, EDSE, EDUC, EDUT, EFHP, HEAL, IETT, PHED, PRLS, SPMT, and TOUR in the Course Description chapter of this catalog.

Academic Programs

School of Recreation, Health, and Tourism (RHT)

Undergraduate Minors
• Exercise Science (EXS)
• Health Promotion (HPR)
• Parks, Recreation, and Leisure Studies (PRLS)
• Sports Management (SPMT)

Undergraduate Certificate Program
• Outdoor Adventure

Undergraduate Degree Programs
• Athletic Training, BS
• Health, Fitness, and Recreation Resources, BS
  Exercise Science
  Health Promotion
  Parks and Outdoor Recreation
  Sport Management
  Therapeutic Recreation
  Tourism and Events Management
• Physical Education, BSEd
• Tourism and Events Management, BS (pending SCHEV approval)

Graduate Degree Programs
• Exercise, Fitness, and Health Promotion, MS

Division of Undergraduate Studies in Education (USIE)

Undergraduate Minors
• Education Studies (ESTU)
• Secondary Education English (SECE)
• Special Education Minors
  Assistive Technology (AT)
  Early Childhood Special Education (ECSE)
  Mild Disabilities (MDIS)
  Severe Disabilities (SPSD)

Collaborative Undergraduate Licensure Programs
• Chemistry Education Concentration for BS Chemistry
• Dance Licensure (PK–12)
• Music Education Concentration for BM Music
• Physics Education Concentration for BS Physics

Graduate School of Education (GSE)

Graduate Degree Programs
• Counseling and Development, MEd
• Community Agency Counseling
• School Counseling (PK–12)
• Curriculum and Instruction, MEd
• Advanced Studies in Teaching and Learning Advanced International Baccalaureate

Advanced Studies in Teaching and Learning
• Alternative Education
• Advanced Studies in Teaching and Learning Art Education
• Advanced Studies in Teaching and Learning Early Childhood Education
• Advanced Studies in Teaching and Learning Elementary Mathematics
• Advanced Studies in Teaching and Learning Foreign Language French
• Advanced Studies in Teaching and Learning Foreign Language Spanish
• Advanced Studies in Teaching and Learning Gifted Child Education
• Advanced Studies in Teaching and Learning History
• Advanced Studies in Teaching and Learning Individualized Concentration
• Advanced Studies in Teaching and Learning Instructional Technology
• Advanced Studies in Teaching and Learning Literacy: PK–12 Classroom Teachers
• Advanced Studies in Teaching and Learning Literacy: Reading Specialist (Licensure)
• Advanced Studies in Teaching and Learning Mathematics (Middle/Secondary)
• Advanced Studies in Teaching and Learning Physical Education
• Advanced Studies in Teaching and Learning Science
• Advanced Studies in Teaching and Learning Special Education
• Advanced Studies in Teaching and Learning Teacher Leadership
• Early Childhood Education (Unified Transformative Early Education Model—UTEEM)
• Early Childhood Education (PK–3)
• Educational Psychology: Assessment, Evaluation, and Testing
• Educational Psychology: Learning, Cognition, and Motivation
• Educational Psychology: Teacher Preparation
• Elementary Education (PK–6 Initial Teacher Licensure)
• English as a Second Language (PK–12)
• Foreign Language or Latin (PK–12)
• Instructional Technology: Assistive and Special Education Technology
• Instructional Technology: Instructional Design and Development Immersion
• Instructional Technology: Instructional Design and Development
• International Education FAST TRAIN ESOL (English as a Second Language PK–12)
• International Education FAST TRAIN (Elementary) PK–6
• Multilingual and Multicultural Education
• Secondary Education (6–12) Biology
• Secondary Education (6–12) Chemistry
• Secondary Education (6–12) Earth Science
• Secondary Education (6–12) English
• Secondary Education (6–12) History and Social Sciences
• Secondary Education (6–12) Mathematics
• Secondary Education (6–12) Physics
School of Recreation, Health, and Tourism

Phone: 703-993-2060
Web: rht.gmu.edu

The School of Recreation, Health, and Tourism (RHT) prepares students for careers in health and physical education, athletic training, parks and outdoor recreation, therapeutic recreation, exercise science, health promotion, tourism, and events management, and sports management. The BS in athletic training prepares students for careers in athletic training and is accredited by the Commission on the Accreditation of Allied Health Education Programs. The BSEd in physical education prepares students for a teaching career (K–12) in public and private schools. The BS in health, fitness, and recreation resources prepares students for supervisory and management careers in private and public parks and recreation systems (clinical and community), health promotion agencies, nonprofit and for-profit sport organizations, and tourism and events management sites. The parks and outdoor recreation and therapeutic recreation concentrations are accredited by the National Recreation and Parks Association. The MS in exercise science, fitness, and health promotion prepares professionals for advanced work in the field. The MAIS concentration in recreation resources management is designed for practicing professionals and students seeking advanced careers in recreation and natural resources management.

For more information and the dates and time of RHT Orientation Sessions, call RHT’s office at 703-993-2098 or visit rht.gmu.edu.

Faculty

Professors: Anderson, Brayley, Nauright, D. Wiggins
Associate professors: Baker, Banville, Bever, Daniels, Dieke, Kozlowski, Miller, Rikard, E. Rodgers, P. Rodgers, Schack, Walker, B. Wiggins
Assistant professors: Allen, Ambegaonkar, Caswell, Harmon, Lee, Park, Shelby, Winchester
Instructors: Norden, Parham
Professional faculty: Lux, Waddell

Course Work

RHT offers course work designated ATEP, EFHP, HEAL, PHED, PRLS, SPMT, and TOUR in the Course Descriptions chapter of this catalog. Additional courses are offered for elective credit to George Mason University students. These courses are included under PHED and PRLS.

UNDERGRADUATE MINORS

Students not obtaining a BS in health, fitness, and recreation resources (HFRR) may complement their degree with a minor chosen from five different areas.

Minor in Exercise Science

(16 credits, 8 credits unique to the minor)

Course Work

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAL 330 Nutrition ..................................................</td>
<td>3</td>
</tr>
<tr>
<td>PHED 200 Professional Dimensions of Health,</td>
<td>3</td>
</tr>
<tr>
<td>Recreation, and Physical Education</td>
<td></td>
</tr>
<tr>
<td>PHED 300 Kinesiology (prerequisites: BIOL 124</td>
<td></td>
</tr>
<tr>
<td>and 125) ..................................................................</td>
<td>3</td>
</tr>
</tbody>
</table>
Minor in Health Promotion
(18 credits, 8 credits unique to the minor)

Course Work Credits
HEAL 370 Health Determinants and Status .............3
HEAL 372 Health Communications ..........................3
HEAL 430 Seminars on Contemporary Health Problems...3
HEAL 450 Epidemiology and Environmental Health ......3
PHED 200 Professional Dimensions of Health, Recreation, and Physical Education ..........3
PRLS 310 Program Planning and Design or HEAL 323 Program Leadership and Evaluation ..........3

Minor in Parks, Recreation, and Leisure Studies
(18 credits, 8 credits unique to minor)

Course Work Credits
PRLS 210 Introduction to Recreation and Leisure ........3
PRLS 310 Program Planning and Design .....................3
PRLS 316 Outdoor Education and Leadership ..........3
PRLS 327 Foundations of Therapeutic Recreation ..........3
PRLS 410 Administration of RHT Organizations ...........3

*Students must complete PRLS 210, 310, 316, 327, and 410 before taking PRLS 241. PRLS 410 may be taken as a corequisite.

PRLS 241 Practicum .............................................3

Minor in Sport Management
(18 credits, 8 credits unique to the minor)

Course Work Credits
PRLS 410 Administration of RHT Organizations I ..........3
SPMT 201 Introduction to Sport Management ...............3
SPMT 405 Sport Operation and Planning ..................3
SPMT 412 Sport Marketing and Finance ....................3
SPMT 420 Economics and Finance in the Sport Industry ..3
SPMT 455 Governance and Policy in Sport Organizations ....3

Minor in Tourism and Events Management
(15 credits, 8 credits unique to minor)

Course Work Credits
TOUR 200 Introduction to Travel and Tourism .............3
TOUR 220 Introduction to Event Management ..............3
TOUR 340 Sustainable Tourism ................................3
Additional TOUR course credits ..............................6

UNDERGRADUATE CERTIFICATE PROGRAMS
Certificate in Outdoor Adventure

This 24-credit program provides students with specialized skills unique to a variety of outdoor adventure activities, such as backpacking, rock climbing, canoeing, kayaking, and challenge-course facilitation. Course work focuses on the acquisition of technical skills and application of theory-to-experiential learning in an outdoor adventure curriculum. Students completing the program will be certified as Wilderness First Responders and Leave-No-Trace Trainers and will be fully prepared to work as challenge-course facilitators at outdoor education and adventure education organizations. This initiative combines the resources and services of RHT and Hemlock Overlook Center for Experiential Education.

Course Work Credits
Required Core Courses (15 credits)
PRLS 110 Exploring Outdoor Adventure ..........................2
PRLS 200 Wilderness First Responder ........................2
PRLS 210 Introduction to Recreation and Leisure ..........3
PRLS 214 Field Study in Natural History .....................3
PRLS 220 Experiential Education Theory and Application ....3
PRLS 221 Challenge Course Facilitator Field Work ......2
PRLS 316 Outdoor Education and Leadership ..........3

Elective Courses (9 credits)
Choose 9 credits from the following:
PRLS 115 Introduction to Fly Fishing ............................1
PRLS 117 Introduction to Rock Climbing .......................2
PRLS 120 Introduction to Backpacking .......................2
PRLS 170 Introduction to Whitewater Kayaking ..........1
PRLS 173 Basic Coastal Kayaking ...............................2
PRLS 180 Whitewater Canoeing ................................2
PRLS 181 Whitewater Canoeing II ................................2
PRLS 190 Downhill and Cross-Country Skiing ............1
PRLS 250 Wilderness Travel and Sustainability Leadership ...........................................2
PRLS 480 Special Topics ...........................................3

Complementary Certificate Programs

Students also may complete a complementary graduate certificate outside RHT in the following areas:

Environmental management (27 credits) See the Environmental Science and Policy section of the College of Science chapter. (SC-CERG-EVMG)

Note: Students interested in the environmental management certificate should take BIOL 213 and either BIOL 303 or BIOL 304 instead of BIOL 103 and 104.

Gerontology (24 credits) See the College of Health and Human Services chapter. (HH-CERG-GERO)

Note: Students interested in the gerontology certificate should take BIOL 124 and BIOL 125.

UNDERGRADUATE DEGREE PROGRAMS

Athletic Training, BS

This program provides educational and clinical experiences concerning the management of injuries and health problems associated with physical activity. The goal is to equip students with the knowledge and skills that must be mastered to successfully challenge the Board of Certification (BOC®) Examination and practice as an entry-level certified athletic trainer.

Application Process

Freshmen Applications

Admission to George Mason University is competitive, and successful candidates generally have a B+ average or higher in a challenging college preparatory curriculum. All students accepted to George Mason University and declaring athletic training as a major are admitted into the preprofessional phase...
of the program (typically freshmen). Freshmen are bound to university admission criteria as stated in the University Catalog. To progress into the professional phase of the program, students must earn a minimum grade of C in all within-major courses and continuously maintain a cumulative minimum within-major GPA of 2.50 or greater.

Transfer Student Applications
Application for admission as a transfer student into the ATEP is competitive. Transfer applicants are evaluated based on satisfactory completion of standards identical to all other students enrolled in the ATEP. Students transferring from another institution must produce documentation that demonstrates successful completion of all preprofessional course work and related clinical experiences. Students must provide documentation of completion of all prerequisite course work with a letter grade of C or better and a cumulative within-major GPA of 2.50 or greater on a 4.00 scale. Additional documentation includes transcripts, course syllabi, letter from the ATEP director of previous institution certifying satisfactory completion of all clinical experiences, completed proficiency assessments signed and dated by an approved clinical instructor attained at previous institution, and current emergency cardiac care certification. Students unable to provide this documentation will not be admitted into the professional phase of the ATEP.

Degree Requirements
The degree requires a minimum of 120 credits. The Athletic Training Education Program (ATEP) is divided into preprofessional and professional phases. Students begin the preprofessional phase on admission to Mason by enrolling in prerequisite courses, including BIOL 124 and 125; HEAL 110, 205, and 330; and ATEP 228 and 229.

On successful completion of all preprofessional course work with a grade of C or better and a minimum cumulative GPA of 2.50, students may advance into the professional phase of the program and enroll in didactic and clinical education courses, along with other professional courses. The professional phase consists of three levels. In Level I, students enroll in their first clinical education course and begin the first of five semester-long clinical experiences. Typically, athletic training didactic courses are paired with a clinical education course. Levels I through III of the professional phase require satisfactory completion of prerequisites, including maintenance of a minimum cumulative within-major GPA of 2.50, successful completion of prerequisite courses, concurrent enrollment in didactic and clinical education courses, and maintenance of current emergency cardiac care (ECC) certification.

Preprofessional Courses

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEP 228 Introduction to Athletic Training</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 229 Clinical Experiences in Introductory Athletic Training</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 124 Human Anatomy and Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 125 Human Anatomy and Physiology</td>
<td>4</td>
</tr>
<tr>
<td>HEAL 110 Personal Health</td>
<td></td>
</tr>
<tr>
<td>HEAL 205 Principles of Accident Causation and Prevention</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 330 Nutrition</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional Courses (Level I)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEP 310 Athletic Injury Recognition of the Lower Extremity and Thorax</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 315* Clinical Evaluation Skills for Lower Extremity and Thorax</td>
<td></td>
</tr>
<tr>
<td>ATEP 320 Athletic Injury Recognition of the Upper Extremity, Head, and Neck</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 325* Clinical Evaluation Skills for the Upper Extremity, Head, and Neck</td>
<td></td>
</tr>
<tr>
<td>PHED 200 Professional Dimensions of Health, Recreation, and Physical Education</td>
<td>3</td>
</tr>
<tr>
<td>PHED 300 Kinesiology</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional Courses (Level II)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEP 350 Therapeutic Modalities</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 354 Rehabilitation of Athletic Injuries</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 357* Treatment and Rehabilitation Clinical Techniques</td>
<td></td>
</tr>
<tr>
<td>ATEP 413* Management Skills in Athletic Training</td>
<td></td>
</tr>
<tr>
<td>PHED 365 Measurement and Evaluation of Physical Fitness</td>
<td>3</td>
</tr>
<tr>
<td>PHED 410 Social/Psychological Aspects of Health and Fitness</td>
<td></td>
</tr>
<tr>
<td>PHED 450 Physiology of Exercise</td>
<td>4</td>
</tr>
<tr>
<td>PRLS 410 Administration of Recreation, Health, and Tourism Organizations I</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional Courses (Level III)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEP 441* Practicum in Athletic Training</td>
<td>3</td>
</tr>
<tr>
<td>EFHP 524 Phys for the Athletic Trainer/ Pharm of Sports Injuries</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 405 Planning, Design, and Maintenance of Leisure Facilities</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 450 Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 460 Sport and Recreation Law</td>
<td></td>
</tr>
</tbody>
</table>

*Denotes clinical education course requiring clinical experience component.

During Level III, students complete all courses, including ATEP 441 Practicum. This course is a capstone of the program, as well as a synthesis requirement of Mason’s general education program. ATEP 441 is offered following completion of the professional courses in the major; thus, ATEP 441 is offered during the spring semester of the students’ graduating year.

The professional phase of the ATEP involves clinical education. The five clinical education courses are ATEP 315, 325, 357, 413, and 441. Students may enroll in only one clinical course per semester. Therefore, students can expect to enroll in a clinical education course for five semesters to complete the degree. Each clinical course consists of a laboratory component and a clinical field experience. Students will be assigned to a George Mason University ATEP-approved clinical instructor to satisfactorily complete clinical experience requirements. Students will develop a schedule with the clinical instructor requiring approximately 10 to 20 hours per week throughout the semester at the clinical setting. Clinical experience assignments may be located in athletic training settings, such as secondary schools, colleges, and universities; professional sports programs; sports medicine and other medical clinics; industry; and military training programs. Students will be evaluated on the mastery of educational
competencies and clinical proficiencies in athletic training. Evaluation will occur in formal academic courses and clinical field experiences. Students should meet with their academic advisor every semester before scheduling courses.

**Writing-Intensive Requirement**

The university’s writing-intensive requirement is satisfied by the successful completion of PRLS 450.

**General Education Requirements (38 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written communication</td>
<td>6</td>
</tr>
<tr>
<td>Oral communication</td>
<td>3</td>
</tr>
<tr>
<td>Information technology</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative reasoning</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral science</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Natural science</td>
<td>8</td>
</tr>
</tbody>
</table>

**Professional Sequence (82 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEP 228 Introduction to Athletic Training</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 229 Clinical Experiences in Introductory</td>
<td>3</td>
</tr>
<tr>
<td>Athletic Training</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 310 Athletic Injury Recognition of the Lower Extremity and Thorax</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 315 Clinical Evaluation Skills for Lower Extremity and Thorax</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 320 Athletic Injury Recognition of the Upper Extremity, Head, and Neck</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 325 Clinical Evaluation Skills for the Upper Extremity, Head, and Neck</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 350 Therapeutic Modalities</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 354 Rehabilitation of Athletic Injuries</td>
<td>3</td>
</tr>
<tr>
<td>ATEP 357 Treatment and Rehabilitation Clinical Techniques</td>
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<tr>
<td>ATEP 413 Management Skills in Athletic Training</td>
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<tr>
<td>ATEP 441 Practicum in Athletic Training</td>
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<tr>
<td>EFHP 524 Phys for the Athletic Trainer/ Pharm of Sports Injuries</td>
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<tr>
<td>HEAL 110 Personal Health</td>
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<tr>
<td>HEAL 205 Principles of Accident Causation and Prevention</td>
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<td>HEAL 330 Nutrition</td>
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<tr>
<td>Electives</td>
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</tr>
</tbody>
</table>

**Special Requirements**

Fees and expenses specific to the ATEP are as follows: laboratory supplies and equipment, clinical attire, clinical supplies, and clinical education manuals. Preprofessional phase students enrolling in ATEP 229 will be assessed a laboratory fee $110. Preprofessional phase students will be assessed a laboratory fee of $100 for each clinical education course. Payment is due at the first meeting of each course.

After admission to the preprofessional phase, students must submit a technical standards certification statement indicating that they have read, understand, and can meet the technical standards for athletic training students, either with or without accommodation. These standards outline the essential functional tasks that students must be able to perform to enroll in and complete the program. Students requiring special accommodations are encouraged to contact the Office of Disability Services.

Athletic training students are required to obtain a health examination and immunizations before entering the professional phase of the program. Students must have evidence of completion of the three hepatitis B immunizations and provide proof of tuberculosis screening in accordance with current U.S. Public Health Service recommendations. Students choosing not to complete hepatitis B immunizations will be required to sign a declination waiver. All professional phase students must complete annual blood-borne pathogens training and may be required to submit to a criminal background check. All students must have emergency cardiac care (CPR, AED) certifications before entering their first clinical experience and maintain these certifications through the remainder of the ATEP. Examples of courses that provide the above certifications are Professional Rescuer + AED by the American Red Cross or Basic Life Support for the Healthcare Provider CPR + AED by the American Heart Association. Other providers are those adhering to the standards of the International Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiac Care.

**Health, Fitness, and Recreation Resources, BS**

**Writing-Intensive Requirement**

The university’s writing-intensive requirement is satisfied by the successful completion of PRLS 450.

**Internship Application**

The HFRR internship is a 12-credit course taken toward the end of a student’s academic program. Students must have earned 90 credit hours and met the specific prerequisites for their concentration to be eligible for the internship (see HEAL 490, PRLS 490, SPMT 490, and TOUR 490 prerequisites). The internship is designed to be a synthesis experience for each student in their specific concentration area. The initial phase of the internship process begins with an internship in-service run by the internship coordinator. During this stage, the student will develop learning goals and consult with faculty on viable internship sites. Once the internship site has been selected the student must complete 400 hours (480 for therapeutic recreation) of an applied experience in their field of study. Throughout the internship, the student will be monitored by a site supervisor, as well as a university supervisor, to facilitate a meaningful experience. All of the specific requirements for this course can be reviewed in the Internship Manual.
Degree Requirements

**Exercise Science Concentration (EXS)**
This concentration emphasizes promotion of healthy lifestyles outside school settings. This degree prepares students for supervisory and managerial careers in private and public fitness agencies and clinical and public safety settings. Students complete supervised internships in professional settings; a minor is available.

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<td>HEAL 220 Dimensions of Mental Health</td>
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<td>HEAL 323 Program Leadership and Evaluation</td>
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<td>HEAL 330 Nutrition</td>
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<td>HEAL 350 Interventions for Populations and Communities at Risk*</td>
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<tr>
<td>HEAL 430 Seminar in Exercise Science and Health Promotion</td>
<td>3</td>
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<td>HEAL 490 Internship</td>
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<td>PHED 200 Professional Dimensions of Health, Recreation, and Physical Education</td>
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<td>PHED 364 Strength Training: Concepts and Applications</td>
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<td>SPMT 304 Sport, Culture, and Society</td>
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</table>

*PRLS 327 may be substituted for this course
**PRLS 317 or PHED 410 may be substituted for this course.

**Health Promotion Concentration (HPR)**
This concentration prepares students for supervisory and managerial careers in voluntary health organizations, nonprofit and managed care organizations, hospital wellness centers, health departments, and health clubs. The degree includes courses on topics such as nutrition, contemporary health problems, and community health systems. Students complete supervised internships in professional settings; a minor is available.

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<td>HEAL 312 Health and Wellness Choices</td>
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<td>HEAL 325 Health Aspects of Human Sexuality</td>
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<td>HEAL 327 Women’s Health</td>
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<td>HEAL 314 Community Health Issues and Strategies: Drugs/Alcohol</td>
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<tr>
<td>HEAL 323 Program Leadership and Evaluation</td>
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</tr>
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</table>

*PRLS 317 or PHED 410 may be substituted for this course.
**PRLS 327 may be substituted for this course.

**Parks and Outdoor Recreation Concentration (POR)**
This concentration explores the contribution of recreation and parks to public well-being and quality of life. The curriculum includes courses in natural resources management, outdoor recreation programming, and environmental education. The program is accredited by the National Recreation and Park Association. Graduates are employed in national, state, and local recreation and park agencies, nonprofit organizations, and private and commercial operations. Students complete supervised internships in professional settings; a minor is available.

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<td>PRLS 210</td>
<td>Introduction to Recreation and Leisure</td>
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<td>Practicum</td>
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<td>People with Nature</td>
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<td>PRLS 310</td>
<td>Park Management and Operations</td>
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<td>PRLS 316</td>
<td>Outdoor Education and Leadership</td>
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<td>PRLS 317</td>
<td>Social Psychology of Play and Recreation</td>
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<td>PRLS 327</td>
<td>Foundations of Therapeutic Recreation</td>
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<tr>
<td>PRLS 402</td>
<td>Human Behavior in Natural Environments</td>
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<tr>
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**Sport Management Concentration (SPMT)**

This concentration enhances the professional development of liberal arts-educated students, thereby preparing them to assume entry-level managerial positions in the $300 billion sport industry, including private enterprises, government or public employment sectors, nonprofit or voluntary agencies, and commercial sport ventures. Preparation in sport marketing, finance, ethics, law, operations, planning, and program leadership fosters the skills that enhance students’ acquisition and advancement in sport management careers. An integral part of the program is the opportunity to complete two field experiences in sport organizations. A minor is available.

[General Education Requirements (38 credits)]

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<tr>
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**Therapeutic Recreation Concentration (TR)**

This concentration teaches students how to use activities as therapeutic tools toward a renewed quality of life for people with disabilities across the lifespan. Completion of the foundation, law, issues, and assessment courses, as well as an internship supervised by a certified therapeutic recreation specialist, prepares graduating seniors to sit for the national exam sponsored by the National Council for Therapeutic Recreation Certification (ntcrc.org). The program is accredited by the National Recreation and Park Association. Graduates find employment in local, state, and federal recreation settings; senior and adult health care; nonprofit organizations; and educational and clinical institutions.

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PRLS 418 Assessment in Therapeutic Recreation ..................3
PRLS 450 Research Methods .............................................3
PRLS 460 Sport and Recreation Law ..................................3
PRLS 490 Internship ............................................................3
PRLS 503 Disability Rights Law in Sport and Recreation ....3
PSYC 211 Developmental Psychology ................................3
PSYC 325 Abnormal Psychology .........................................3
Electives ...........................................................................12

▲ Tourism and Events Management Concentration (TEM)

This concentration prepares students to enter a diverse profession in the world’s third-largest industry. Built on the curricula cornerstones of resort management, environmental tourism, event management, and cultural and heritage tourism, courses equip students with knowledge, skills, and experience in managing the tourism experience for the benefit of the traveler, host, and supporting industry. Graduates are employed in commercial, private, and public agencies, and in a wide variety of jobs in many geographic or business settings. A minor is available with a work-experience option.

General Education Requirements (38 credits)

Written communication ......................................................6
Oral communication ...........................................................3
Information technology .......................................................3
Quantitative reasoning .......................................................3
Literature .............................................................................3
Arts ......................................................................................3
Western civilization ..........................................................3
Social and behavioral science ..............................................3
Global understanding .......................................................3
Natural science .....................................................................3

Professional Sequence (83 credits)

Course Work Credits
HEAL 323 Program Leadership and Evaluation ..................3
PRLS 310 Program Planning and Design ............................3
PRLS 410 Administration of HFRR Organizations ..............3
PRLS 450 Research Methods ............................................3
PRLS 460 Sport and Recreation Law ..................................3
TOUR 200 Introduction to Travel and Tourism .....................3
TOUR 220 Introduction to Event Management .....................3
TOUR 241 Practicum ...........................................................3
TOUR 312 Ecotourism ...........................................................3
TOUR 330 Resort Management ............................................3
TOUR 340 Sustainable Tourism .........................................3
TOUR 352 Heritage and Cultural Tourism .........................3
TOUR 362 Cultural and Environmental Interpretation ........3
TOUR 412 Tourism and Events Marketing .........................3
TOUR 414 Tourism and Events Finance ...............................3
TOUR 420 Tourism Planning/Policy .....................................3
TOUR 440 Meetings and Conventions .................................3
TOUR 470 Senior Seminar ....................................................1
TOUR 490 Internship ..........................................................12

Choose two of the following: ..............................................6
HEAL 350 Interventions for Populations and Communities at Risk ..................................................3
PRLS 317 Social Psychology of Play and Recreation ..........3
PRLS 402 Human Behavior in Natural Environments ........3
PRLS 405 Planning, Design, and Maintenance of Leisure Facilities ..................................................3
PRLS 411 Administration of Recreation, Health, and Tourism Organizations II ..........................3
TOUR 190 Wedding Planning ...............................................3

TOUR 210 Global Understanding through Travel and Tourism ..................................................3
TOUR 221 Event Implementation and Evaluation ................3
TOUR 311 Women and Tourism ..........................................3
TOUR 430 Tourism on Public Lands ...................................3
TOUR 480 Special Topics ....................................................3
TOUR 499 Independent Study .............................................1–3
Electives ...........................................................................13

■ Physical Education, BSEd BSED-PHED

The physical education degree program is accredited by the National Council for Accreditation of Teacher Education. Graduates of this degree earn full teacher licensure for grades PK–12 in health and physical education from the Virginia Department of Education. The degree requires a minimum of 120 credits, with the final semester dedicated to student teaching.

Student Teaching Internship

To enroll in student teaching, physical education majors must have a minimum 2.50 GPA in the last 60 credits of course work and submit copies of official passing scores for the VCLarts and PRAXIS II exams. The application must be completed one full semester before taking PHED 415 Student Teaching in Physical Education. Application deadlines are listed below and forms are located at rht.gmu.edu/phed/student_teaching.

Student Teaching Internship Application Deadlines

Fall Semester—February 1
Spring Semester—September 1

Admission

Four-year students: Students entering as freshmen with an interest in majoring in physical education will initially be accepted with BPRE (pre-PHED) status. Students must successfully complete a minimum of 45 credits and attain a cumulative GPA of 2.50 to apply to the BSED in Physical Education Program. In addition, students must submit passing Praxis I scores and have earned passing grades in BIOL 124, BIOL 125, PHED 201, and PHED 202.

Degree-seeking transfer students: Transfer students can apply for BSED status by having (1) a minimum of 45 credits from their previous institution with a cumulative GPA of 2.50 or by completing 12 credits at Mason with a minimum of a 2.50 GPA; (2) submitting passing scores for PRAXIS I or its approved substitutes; and (3) have passed BIOL 124 and 125, and PHED 201 and 202 (only a C grade or higher is accepted for BIOL 141 and 142 if transferred from a VCCS institution).

Writing-Intensive Requirement

The university’s writing-intensive requirement is satisfied by the successful completion of PHED 365.

Degree Requirements

General Education Requirements (38 credits)

Course Work Credits
Written communication ......................................................6
Oral communication ...........................................................3
Information technology .......................................................3
Quantitative reasoning .......................................................3
Literature .............................................................................3
Arts ......................................................................................3
Western civilization .......................................................... 3
Social and behavioral science ........................................... 3
Global understanding ....................................................... 3
Natural science ................................................................... 8
(PHED majors are required to take BIOL 124 and 125 to meet state licensure requirements.)

**Professional Sequence (82 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRD 300 Literacy and Curriculum Integration</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 110 Personal Health</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 205 Principles of Accident Causation and Prevention</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 220 Dimensions of Mental Health</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 310 Drugs and Health</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 325 Health Aspects of Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 350 Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 405 Teaching Methods in Health</td>
<td>3</td>
</tr>
<tr>
<td>PHED 108 Weight Training and Body Conditioning</td>
<td>1</td>
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<tr>
<td>PHED 110 Beginning Swimming</td>
<td>1</td>
</tr>
<tr>
<td>PHED 150 Intermediate Swimming</td>
<td>1</td>
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<tr>
<td>or PHED 159 Advanced Swimming</td>
<td>1</td>
</tr>
<tr>
<td>PHED 200 Prof Dimensions of Health, Recreation, and Physical Education</td>
<td>1</td>
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<tr>
<td>PHED 201 Developmental Motor Patterns</td>
<td>3</td>
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<tr>
<td>PHED 202 Teaching Skillful Movement</td>
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<tr>
<td>PHED 273 Net and Target Games</td>
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<tr>
<td>PHED 274 Dance and Educational Gymnastics</td>
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<tr>
<td>PHED 275 Field and Invasion Games</td>
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<tr>
<td>PHED 300 Kinesiology</td>
<td>3</td>
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<tr>
<td>PHED 306 Psychomotor Learning</td>
<td>3</td>
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<tr>
<td>PHED 308 Adapted Physical Education</td>
<td>3</td>
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<tr>
<td>PHED 365 Measurement and Evaluation of Physical Fitness</td>
<td>3</td>
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<tr>
<td>PHED 403 Elementary School Instruction in Physical Education</td>
<td>3</td>
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<tr>
<td>PHED 404 Middle and High School Instruction in Physical Education</td>
<td>3</td>
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<tr>
<td>PHED 415 Student Teaching</td>
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<tr>
<td>PHED 450 Physiology of Exercise</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 316 Outdoor Education and Leadership</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 460 Sport and Recreation Law</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** Students are not permitted to enroll in the following courses: HEAL 405 and PHED 308, 403, 404, and 415, until they have met all BSEd application requirements.

**Tourism and Events Management, BS (pending SCHEV approval)**

This 120-credit degree program prepares students to enter a diverse profession in the world’s third-largest industry. Built on the curricula cornerstones of resort management, environmental tourism, events management, and cultural and heritage tourism, courses equip students with knowledge, skills, and experience in managing the tourism experience for the benefit of the traveler, host, and supporting industry. Graduates are employed in commercial, private, and public agencies, and in a wide variety of jobs and many geographic or business settings. A minor is available. This program is also offered on the GMU-RAK Campus.

**Degree Requirements**

**General Education Requirements (37 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Written communication</td>
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<tr>
<td>Oral communication</td>
<td>3</td>
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<tr>
<td>Information technology</td>
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<tr>
<td>Quantitative reasoning</td>
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<tr>
<td>Literature</td>
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<tr>
<td>Arts</td>
<td>3</td>
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<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral science</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
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</tr>
<tr>
<td>Natural science</td>
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</table>

**Professional Sequence (83 credits)**

<table>
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<tr>
<th>Course Work</th>
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<tr>
<td>HEAL 323 Program Leadership and Evaluation</td>
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<tr>
<td>PRLS 310 Program Planning and Design</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 410 Administration of Recreation, Health, and Tourism Organizations I</td>
<td>3</td>
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<tr>
<td>PRLS 450 Research Methods</td>
<td>3</td>
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<td>PRLS 460 Sport and Recreation Law</td>
<td>3</td>
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<tr>
<td>TOUR 200 Introduction to Travel and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 220 Introduction to Events Management</td>
<td>3</td>
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<tr>
<td>TOUR 241 Practicum</td>
<td>3</td>
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<tr>
<td>TOUR 312 Ecotourism</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 330 Resort Management</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 340 Sustainable Tourism</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 352 Heritage and Cultural Tourism</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 362 Cultural and Environmental Interpretation</td>
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<td>TOUR 412 Tourism and Events Marketing</td>
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<tr>
<td>TOUR 440 Meetings and Conventions</td>
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<tr>
<td>TOUR 470 Senior Seminar</td>
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<tr>
<td>TOUR 490 Internship</td>
<td>12</td>
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**Choose two of the following:** ................................................... 13

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
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<tbody>
<tr>
<td>HEAL 350 Interventions for Populations and Communities at Risk</td>
<td>6</td>
</tr>
<tr>
<td>PRLS 317 Social Psychology of Play and Recreation</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 402 Human Behavior in Natural Environments</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 405 Planning, Design, and Maintenance of Leisure Facilities</td>
<td>3</td>
</tr>
<tr>
<td>PRLS 411 Administration of Recreation, Health, and Tourism Organizations II</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 190 Wedding Planning</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 210 Global Understanding through Travel and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 221 Event Implementation and Evaluation</td>
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<tr>
<td>TOUR 311 Women and Tourism</td>
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<td>TOUR 430 Tourism on Public Lands</td>
<td>3</td>
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<tr>
<td>TOUR 480 Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>TOUR 499 Independent Study</td>
<td>1–3</td>
</tr>
</tbody>
</table>

**Note:** TOUR 210 and 311 may not be used for both Tourism and Events Management and general education requirements.

**GRADUATE PROGRAMS**

**Admission Requirements**

In addition to fulfilling graduate admission requirements, applicants must submit three letters of recommendation,
transcripts of all college course work, and GRE or MAT scores. Applicants should also have completed undergraduate course work in human anatomy, physiology, nutrition, exercise physiology, and kinesiology. Applicants must provide a written goals statement from 500 to 1,000 words explaining how the program relates to their educational and career plans. Those who do not satisfy the above requirements may be offered provisional or nondegree status in accordance with the general regulations of the Graduate Council. Admission decisions are made whenever applicant files are complete. Following their admission, students may enroll in any term, although full enrollment is recommended given the sequence of courses.

Exercise, Fitness, and Health Promotion, MS

The master of science in exercise, fitness, and health promotion focuses on the role of physical activity in the promotion of health, fitness, and quality of life. Completion of this degree may lead to the pursuit of further academic study (doctoral programs) or preparation of professionals equipped to more adequately serve their communities. Students may select to pursue a thesis or nonthesis option for completion of this degree.

Core Course Work (18 credits)

EFHP 606 Foundations of Exercise, Fitness, and Health Promotion .................................................. 3
EFHP 610 Advanced Exercise Physiology ................................................................. 3
EFHP 611 Fitness Assessment: Theory and Practice .................................................. 3
EFHP 614 Advanced Exercise Nutrition ................................................................. 3
EFHP 618 Exercise and Sport Psychology .............................................................. 3
EFHP 623 Research Design and Statistical Reasoning .................................. 3
Thesis Option*
Electives .................................................................................................................. 6
EFHP 799 Thesis .................................................................................................. 1–6
or Nonthesis Option
Electives .................................................................................................................. 12

Written comprehensive examination

*Students must have an advisor to supervise thesis work and chair the three-member thesis committee. Committee members are appointed by the EFHP graduate coordinator. The advisor must be a member of the exercise, fitness, and health promotion graduate faculty; one committee member may be selected from faculty outside the program. Students may not register for thesis credit until a proposal has been approved by the student’s thesis committee and the EFHP graduate coordinator.

Additional RHT Courses

Physical Activity and Sports Courses

Our courses in physical activity and sports provide a broad range of opportunities that promote the health and wellness of students, faculty, and staff. Taught by experts with a wealth of experience and commitment to sharing their knowledge and skills, the courses include more traditional individual and dual sports, self-defense and martial arts, and recreation activities concerned with wilderness and outdoor pursuits. Open to students in any major, these courses are designed to foster educational growth, encourage leisure interests, and promote lifetime fitness for the entire Mason community.

PHED 103 Fencing .................................................. 1
PHED 105 Aerobics .............................................. 1
PHED 107 Social Dance ........................................ 1
PHED 108 Weight Training and Body Conditioning ..................................... 1
PHED 110 Beginning Swimming .............................................. 1

PHED 113 Latin Dance .............................................
PHED 118 Advanced Life Guarding .............................................
PHED 127 Social Dance .............................................
PHED 128 Fencing II ....................................................
PHED 129 Introduction to Yoga ............................................... 1
PHED 130 Intermediate Yoga ............................................... 1
PHED 134 Self-Defense for Men and Women ..................................... 1
PHED 135 Self-Defense for Men and Women II ................................ 1
PHED 136 Tae Kwon Do ....................................................
PHED 137 Intermediate Tae Kwon Do .............................................
PHED 138 Brazilian Jiu-Jitsu ....................................................
PHED 139 Brazilian Jiu-Jitsu II for Men and Women .................................... 2
PHED 140 Golf .................................................... 1
PHED 144 Intermediate Golf ....................................................
PHED 145 Beginning Judo for Men and Women ..................................... 1
PHED 146 Introduction to Badminton ....................................................
PHED 147 Advanced Tae Kwon Do .............................................
PHED 149 Tai Chi .................................................. 1
PHED 150 Intermediate Swimming ....................................................
PHED 151 Introduction to Tennis ....................................................
PHED 153 Intermediate Tennis ....................................................
PHED 155 Introduction to Springboard Diving ...........................................
PHED 156 Intermediate Springboard Diving ..........................................
PHED 157 Aikido for Men and Women ....................................................
PHED 158 Underwater Hockey ....................................................
PHED 159 Advanced Swimming ....................................................
PHED 160 Intermediate Tai Chi ....................................................
PHED 162 Introduction to Bowling ....................................................
PHED 163 Karate .................................................. 1
PHED 164 Intermediate Karate ....................................................
PHED 165 Introduction to Racquetball ....................................................
PHED 166 Intermediate Racquetball ....................................................
PHED 250 Water Safety Instruction ....................................................
PHED 255 Scuba Diving ....................................................
PRLS 110 Exploring Outdoor Adventure ....................................................
PRLS 115 Introduction to Fly Fishing ....................................................
PRLS 116 Introduction to Indoor Rock Climbing ...........................................
PRLS 117 Rock Climbing ....................................................
PRLS 118 Intermediate Rock Climbing ....................................................
PRLS 119 Trap and Skeet Shooting ....................................................
PRLS 120 Introduction to Backpacking ....................................................
PRLS 121 Intermediate Trap and Skeet Shooting ...........................................
PRLS 122 Introduction to Horsemanship ....................................................
PRLS 170 Introduction to Whitewater Kayaking ...........................................
PRLS 173 Introduction to Coastal Kayaking ....................................................
PRLS 174 Open Water Coastal Kayaking ....................................................
PRLS 175 Introduction to Rowing ....................................................
PRLS 180 Whitewater Canoeing ....................................................
PRLS 181 Whitewater Canoeing II ....................................................
PRLS 190 Downhill and Cross-Country Skiing ............................................
PRLS 191 Snowboarding ....................................................
PRLS 195 Introduction to Hot Air Ballooning ............................................
PRLS 200 Wilderness First Responders ....................................................
PRLS 250 Wilderness Travel and Sustainability ...........................................
PRLS 253 Florida Everglades Canoe Expedition ...........................................

Division of Undergraduate Studies in Education

Phone: 703-993-2078
Web: usie.gmu.edu

The Division of Undergraduate Studies in Education (USIE) is the unit within CEHD that supports and develops initiatives for undergraduate Mason students interested in the field of
education. Examples include undergraduate minors, certificates, teacher endorsement and licensure processes, and education courses of interest to the undergraduate population. USIE also has strong ties with GSE; RHT; the College of Humanities and Social Sciences, including New Century College; the College of Science; and the College of Visual and Performing Arts. USIE encourages faculty initiatives throughout Mason in developing curriculum that is integrated with the education professions.

UNDERGRADUATE MINORS

Minor in Education Studies
This 18-credit minor is designed for students with a strong interest in exploring the field of education to develop a conceptual and situated understanding of schools and schooling. Eight credits of course work must be unique to the minor. The minor in education studies is separate from teacher licensure programs in CEHD.

Course Work Credits
EDUC 300 Introduction to Teaching ................................. 3
SOCI 382 Education in Contemporary Society ................. 3

Electives: Choose four courses from the following:
EDIT 413 Technology, Society, and Culture of Learning .................................................. 3
EDLE 412 Schools and the Law ........................................... 3
EDLE 420 Organization and Management of Schools .... 3
EDUC 303 Politics of American Education ...................... 3
NCLC 312 Images and Experiences of Childhood: Social Construct, Literature, and Film ....... 3

Minor in Secondary Education English
This 24-credit minor in secondary education English provides undergraduates with all the course work needed to fulfill the Virginia Department of Education’s professional education requirements to teach English in grades 6 through 12. Eight credits of course work must be unique to the minor. For information, call the USIE advisor at 703-993-2078 or visit the web at usie.gmu.edu.

Course Work Credits
EDCI 370 Young Adult Literature in Multicultural Settings .................................................. 3
EDCI 469 Teaching English in the Secondary School ....... 3
EDCI 479 Advanced Methods of Teaching English in the Secondary School ......................... 3
EDCI 490 Student Teaching in Education ......................... 6
EDRD 419 Literacy in the Content Areas ....................... 3
EDUC 372 Human Development and Learning ............... 3
EDUC 422 Foundations of Secondary Education ............. 3

Special Education Minors
These four 15-credit special education minors provide undergraduate students with background knowledge in special education in one of the following specializations: assistive technology, mild disabilities, severe disabilities, or early childhood special education. Completing one of these minors may partially fulfill requirements for licensure in special education in Virginia. Eight credits of course work must be unique to the minor.

Minor in Assistive Technology
Course Work Credits
EDIT 410 Introduction to Assistive Technology ............... 3
EDIT 423 Accessibility/Input Modification ..................... 2
EDUC 203 Human Disabilities in American Culture ....... 3

Electives: choose 7 credits from the following:
EDIT 412 Assistive Technology for Individuals with Sensory Impairments ......................... 3
EDIT 425 Software for Individuals with Special Needs ..................................................... 3
EDIT 426 Web Accessibility and Design ......................... 3
EDIT 428 Low-Tech Assistive Technology Solutions 1
EDSE 422 Augmentative Communication ................... 3

Minor in Early Childhood
Special Education
Course Work Credits
EDSE 401 Introduction to Special Education .................... 3
EDSE 431 Transition and Community-Based Instruction 3
EDSE 434 Communication and Severe Disabilities ...... 3
EDSE 422 Augmentative Communication ..................... 3
EDSE 447 Medical and Developmental Risk Factors for Children with Disabilities .................. 3
EDSE 457 Language Development and Emergent Literacy for Diverse Learners, Ages 3–5 ........ 3

Minor in Mild Disabilities
Course Work Credits
EDSE 401 Introduction to Special Education .................... 3
EDSE 402 Classroom Management and Applied Behavior Analysis ...................................... 3
EDSE 403 Language Development and Reading .......... 3
EDSE 428 Elementary Reading, Curriculum, and Strategies for Mild Disabilities .................. 3
EDSE 440 Characteristics of Students with Emotional Disturbance and Learning Disabilities .... 3

Suggested additional courses:
EDUT 423 Language Acquisition and Communication for Diverse Infants/Toddlers ................ 3
or
EDSE 456 Language Development/Communication for Diverse Infants/Toddlers .................. 3

Minor in Severe Disabilities
Course Work Credits
EDSE 401 Introduction to Special Education .................... 3
EDSE 431 Transition and Community-Based Instruction 3
EDSE 434 Communication and Severe Disabilities ...... 3
EDSE 422 Augmentative Communication ..................... 3
EDSE 447 Medical and Developmental Risk Factors for Children with Disabilities .................. 3
EDSE 457 Language Development and Emergent Literacy for Diverse Learners, Ages 3–5 ........ 3

Collaborative Undergraduate Degree Licensure Programs
Chemistry Education Concentration
The bachelor of science in chemistry with a concentration in chemistry education allows students to obtain licensure to teach chemistry in Virginia public school systems. Requirements are listed in the College of Science chapter under the Department of Chemistry and Biochemistry. For more information, call the Department of Chemistry and Biochemistry at 703-993-1082.
Dance Licensure (PK–12)
To be considered for licensure in dance education, a student must successfully complete the requirements for a BA or BFA in dance. Additional requirements are listed in the College of Visual and Performing Arts chapter under the Department of Dance, Certification to Teach. For more information, call 703-993-1114.

Music Education Concentration (PK–12)
The bachelor of music with a concentration in music education allows students to obtain certification to teach in Virginia public school systems. Students may follow an instrumental or choral/general music emphasis in curriculum. Requirements are listed in the College of Visual and Performing Arts chapter under the Department of Music, Bachelor of Music, Concentration in Music Education. For more information, call the Department of Music at 703-993-3778.

Physics Education Concentration
The bachelor of science in physics with a concentration in physics education allows students to obtain licensure to teach physics in Virginia public school systems. Requirements are listed in the College of Science chapter under the Department of Physics and Astronomy. For more information, call the Physics Department at 703-993-1280.

Graduate School of Education
Phone: 703-993-2892
Web: cehd.gmu.edu
The Graduate School of Education (GSE) offers doctoral and master degrees, as well as teacher licensure and certificate programs.

Faculty
Associate professors: Bannan-Ritland, Bauer, Berger, Bon, Brazer, Brigham, Burns, Castle, Clark, Dabbagh, DeMulder, Duck, Dunklee, Dzama, Falconer, Fowler, Fox, Grant, Hicks, Kaffenberger, Kidd, Kitsantas, Ndura, Osterling, Pierce, Razeghi, Reybold, Samaras, Sanchez, Sprague, Talleyrand, Thomas, Thorp, Uperman, Werner, Wong
Instructors: Daniels, Ganley, George, Graff, Hanfman, Hathaway, Ingram, Jang, Neuber, Rollins, Rioux-Bailey, Zam
Administrative faculty: Barchek, Ford, Gorrell, Isenberg, McCreadie, Parker, E. Rodgers, Tate

Counseling and Development, MEd
The 45-52-credit master’s program offers two separate concentrations. The first option is community agency and the second is school counseling. It emphasizes the integration of theory and practice, and culminates with an internship in an appropriate setting. Those with a master’s degree in education or a related profession who are seeking licensure either as a school counselor or professional counselor may apply to the post-master’s counseling licensure graduate certificate program. For more information, see the Graduate Certificate Programs section of this chapter.

MEd Core (28 credits)

<table>
<thead>
<tr>
<th>Course Work</th>
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<tr>
<td>EDCD 525 Advanced Human Growth and Development</td>
<td>3</td>
</tr>
<tr>
<td>EDCD 601 Introduction to Research in Counseling</td>
<td>3</td>
</tr>
<tr>
<td>EDCD 602 Foundations of Counseling</td>
<td>3</td>
</tr>
<tr>
<td>EDCD 603 Counseling Theories and Practice</td>
<td>3</td>
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<tr>
<td>EDCD 604 Assessment and Appraisal in Counseling</td>
<td>3</td>
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<tr>
<td>EDCD 608 Group Processes and Analyses</td>
<td>4</td>
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<tr>
<td>EDCD 610 Career and Educational Counseling</td>
<td>3</td>
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<tr>
<td>EDCD 628 Counseling and Social Justice</td>
<td>3</td>
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<td>EDCD 660 Multicultural Counseling</td>
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Community Agency Concentration (CA) (18 credits)

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<tr>
<td>EDCD 609 Advanced Counseling Skills and Strategies</td>
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<tr>
<td>EDCD 652 Introduction to Substance Abuse Counseling</td>
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</tr>
<tr>
<td>EDCD 654 Counseling, Ethics, and Consultation in Community Agencies</td>
<td>3</td>
</tr>
<tr>
<td>EDCD 656 Diagnosis and Treatment Planning for Mental Health Professionals</td>
<td>3</td>
</tr>
<tr>
<td>EDCD 658 Couples and Family Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>2</td>
</tr>
</tbody>
</table>

School Counseling PK–12 Concentration (SC) (11 credits)

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCD 666 Counseling Children and Adolescents</td>
<td>4</td>
</tr>
<tr>
<td>EDCD 611 Introduction to Ethical and Legal Issues in School Counseling</td>
<td>2</td>
</tr>
<tr>
<td>EDCD 626 Principles and Practices of School Counseling</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>2</td>
</tr>
</tbody>
</table>

Practicum and Internship (6 credits)

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCD 755 Practicum in Counseling</td>
<td>3</td>
</tr>
<tr>
<td>EDCD 791 Internship in Counseling</td>
<td>3</td>
</tr>
</tbody>
</table>

Curriculum and Instruction, MEd
The master’s degree is offered to students preparing for initial teacher licensure, advanced teacher education, and ancillary educational programs.

Advanced Studies in Teaching and Learning (ASTL) Concentrations
The ASTL concentrations are for teachers and other educators with one or more years of teaching or education-related experience who want to continue to grow professionally. The program offers advanced study in a specific concentration area, including Virginia’s Standards of Learning content.
areas, cohort classes, an innovative schedule, and the use of technology. The courses, aligned with the National Board for Professional Teaching Standards, help teachers think and practice as board-certified teachers. The program develops teacher-leaders who practice reflection through action research, problem-based learning, and self-inquiry, and teacher expertise in a concentration that will identify the teacher as a potential leader in that area.

The program provides two options to experienced teachers and other educators. Educators with or without a master’s degree may apply for the full master’s degree program, which includes core and emphases, or an 18- to 21-credit graduate certificate program or advanced study in a particular area.

### Core Classes Required for MED (15 credits)

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 612 Inquiry into Practice</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 613 How Students Learn</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 614 Designing and Assessing Teaching and Learning</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 606 Education and Culture</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 615 Educational Change</td>
<td>3</td>
</tr>
</tbody>
</table>

#### ASTL: Advanced International Baccalaureate Concentration (AIB)

This 18-credit IB concentration provides advanced professional development for teachers on the philosophy, elements, and assessments of the PYP, MYP, and DP programs. The concentration focuses on the theory, pedagogy, and research underlying the IB programs.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 621 Teaching and Learning in International Baccalaureate Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 622 Curriculum Development across International Baccalaureate Programs</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 623 Models and Strategies for Teaching and Learning in International Baccalaureate Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 624 Assessment and Learning in International Baccalaureate Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 626 Inquiry into Action: International Baccalaureate Teachers, Learners, and Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 627 Contemporary Issues and International Baccalaureate Programs</td>
<td>3</td>
</tr>
</tbody>
</table>

#### ASTL: Alternative Education Concentration (AALT)

The 18-credit alternative education concentration provides advanced professional development for practicing teachers who work in programs for students who are at risk of dropping out of school, have significant life challenges, or have been suspended. Completion of the concentration provides a certificate in alternative education.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDAE 600 Alternative Education for At-Risk Youth</td>
<td>3</td>
</tr>
<tr>
<td>EDAE 601 Curriculum and Methods in Alternative Education</td>
<td>3</td>
</tr>
<tr>
<td>EDAE 602 Preparing Students for Employment and Living Independently</td>
<td>3</td>
</tr>
<tr>
<td>EDAE 603 Communication and Management Strategies for Alternative Education</td>
<td>3</td>
</tr>
<tr>
<td>EDAE 604 Multidisciplinary and Interagency Collaboration Elective (with advisor approval)</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 551 Classroom Management: Theory and Practice</td>
<td>3</td>
</tr>
</tbody>
</table>

#### ASTL: Art Education Concentration (AART)

The 18-credit art education concentration is designed for art teachers with current licensure in art PK–12. It consists of six required courses that address contemporary professional development content areas in art education.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVT 605 Issues and Research in Art Education</td>
<td>3</td>
</tr>
<tr>
<td>AVT 694 Advanced Studies in Teaching Critical Response to Art, PK–12</td>
<td>3</td>
</tr>
<tr>
<td>AVT 615 Technology for Art Teachers</td>
<td>3</td>
</tr>
<tr>
<td>AVT 697 Advanced Strategies and Curricular Innovations in the Visual Arts</td>
<td>2</td>
</tr>
<tr>
<td>EDEP 601 Creativity and Cognition in the Arts and Media</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one studio course from the following:
- AVT 667 Two-Dimensional Art Making: Form, Theme, and Context | 4 |
- AVT 668 Three-Dimensional Art Making across Cultures | 4 |
- AVT 669 Four-Dimensional Art Making: Technology and New Media | 4 |

*AVT 615 is considered a 3-credit studio course. Qualified students who test out of this course will elect two of the following 4-credit studio courses for a total of 8 studio credits.

#### ASTL: Early Childhood Education Concentration (AECE)

The 18-credit early childhood concentration provides advanced professional development in preschool through third grade content and includes three required courses and three electives. The concentration focuses on practicing teachers who may or may not be licensed to teach young children.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 603 Trends, Issues, and Research in Early Childhood Education</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 615 Advanced Human Development</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 784 Capstone Seminar in Early Childhood Education</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives: choose three from the following:
- EDCI 516 Bilingualism and Language Acquisition Research | 3 |
- EDCI 601 Applied Study of Communicative Competence and Classroom Discourse | 3 |
- EDCI 613 Curriculum and Assessment in Early Childhood Education | 3 |
- EDCI 614 Curriculum and Assessment in Early Childhood Education | 3 |
- EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood | 3 |
- EDSE 556 Language Development and Communication for Diverse Infants and Toddlers | 3 |
- EDSE 557 Language Development and Emergent Literacy for Diverse Learners Ages 3–5 | 3 |
- EDSE 656 Assessment of Diverse Young Learners Ages 3–5 | 3 |
- EDSE 667 Cognitive Development of Diverse Young Children | 3 |

#### ASTL: Elementary Mathematics Concentration (AEMA)

The 18-credit elementary math concentration combines the study of mathematics content appropriate for kindergarten
through eighth grade with the study of mathematics education research, curriculum, leadership, and assessment.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 600 Special Topics: Number Systems and Number Theory for K–8 Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 600 Special Topics: Geometry and Measurement for K–8 Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 600 Special Topics: Probability and Statistics for K–8 Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 600 Special Topics: Algebra and Functions for K–8 Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 600 Special Topics: Rational Numbers and Proportional Reasoning for K–8 Teachers</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives: choose one from the following:**
- EDCI 597 Special Topics in Education 3
- EDCI 666 Research in Mathematics Teaching 3

### ▲ ASTL: Foreign Language French Concentration (AFLF)

The 18-credit foreign language concentration provides advanced professional development and language study for practicing foreign language teachers. The 18 credits include a combination of modern language courses and targeted electives.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREN 515 Medieval French Literature</td>
<td>3</td>
</tr>
<tr>
<td>FREN 517 Studies in 17th-Century French Literature</td>
<td>3</td>
</tr>
<tr>
<td>FREN 518 Studies in 18th-Century French Literature</td>
<td>3</td>
</tr>
<tr>
<td>FREN 519 Studies in 19th-Century French Literature</td>
<td>3</td>
</tr>
<tr>
<td>FREN 525 Studies in Modern French Literature</td>
<td>3</td>
</tr>
<tr>
<td>FREN 550 Special Topics</td>
<td>3</td>
</tr>
</tbody>
</table>

Courses may be substituted with advisor-approved literature-related electives in French.

### Choose 6 credits in literature and linguistics.

- FREN 560 History of the French Language 3
- FREN 575 Grammatical Analysis 3
- FREN 576 Advanced Translation 3

Courses may be substituted with advisor-approved language- and linguistics-related electives.

### Choose 6 credits of electives in literature or language (select from above and below).

- FREN 580 Contemporary French Society and Culture 3
- FRLN 510 Bibliography and Research in Foreign Languages and Literature 3
- FRLN 525 Literary Translation 3
- FRLN 550 Special Topics 3
- FRLN 565 Theory of Translation 3
- FRLN 572 Integrating Technology into Language Learning 3
- FRLN 573 Basic Issues in Language Pedagogy 3
- FRLN 670 Foreign Language Learning and Teaching 3
- SPAN 501 Applied Spanish Grammar 3
- SPAN 520 Studies in Medieval Spanish Literature 3
- SPAN 525 Studies in Renaissance Literature 3
- SPAN 530 Studies in Literature of the Golden Age 3
- SPAN 540 Studies in 20th-Century Literature 3
- SPAN 545 Studies in Hispanic Literature 3
- SPAN 551 Special Topics in Spanish 3
- SPAN 560 Studies in Spanish American Poetry 3
- SPAN 565 Studies in Spanish American Drama 3
- SPAN 576 Advanced Translation 3
- SPAN 580 Contemporary Hispanic Institutions 3
- SPAN 635 Seminar in Don Quixote 3
- SPAN 655 Seminar in 20th-Century Prose 3
- SPAN 670 Seminar in Spanish American Prose 3
- SPAN 675 Seminar in Literature and Art 3
- SPAN 685 Seminar in Literature and Ideas 3

Courses may be substituted with advisor-approved language- and literature-related electives.

### ▲ ASTL: Foreign Language Spanish Concentration (AFLS)

The 18-credit foreign language concentration provides advanced professional development and language study for practicing foreign language teachers. The 18 credits include a combination of modern language courses and targeted electives.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN 502 Hispanic Sociolinguistics</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 505 Applied Spanish Stylistics</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 510 Introduction to the Graduate Study of Literature in Spanish</td>
<td>3</td>
</tr>
</tbody>
</table>

**Choose 9 credits from among the following:**

- FRLN 510 Bibliography and Research in Foreign Languages and Literature 3
- FRLN 525 Literary Translation 3
- FRLN 550 Special Topics 3
- FRLN 565 Theory of Translation 3
- FRLN 572 Integrating Technology into Language Learning 3
- FRLN 573 Basic Issues in Language Pedagogy 3
- FRLN 590 Internship and Seminar in Translation 3
- FRLN 620 Literary Theory and Criticism 3
- FRLN 650 The Teaching of Culture in Foreign Language Programs 3
- FRLN 660 Approaches to the Study of Language 3
- FRLN 670 Foreign Language Learning and Teaching 3
- SPAN 501 Applied Spanish Grammar 3
- SPAN 520 Studies in Medieval Spanish Literature 3
- SPAN 525 Studies in Renaissance Literature 3
- SPAN 530 Studies in Literature of the Golden Age 3
- SPAN 540 Studies in 20th-Century Literature 3
- SPAN 545 Studies in Hispanic Literature 3
- SPAN 551 Special Topics in Spanish 3
- SPAN 560 Studies in Spanish American Poetry 3
- SPAN 565 Studies in Spanish American Drama 3
- SPAN 576 Advanced Translation 3
- SPAN 580 Contemporary Hispanic Institutions 3
- SPAN 635 Seminar in Don Quixote 3
- SPAN 655 Seminar in 20th-Century Prose 3
- SPAN 670 Seminar in Spanish American Prose 3
- SPAN 675 Seminar in Literature and Art 3
- SPAN 680 Seminar in Literature and Society 3
- SPAN 685 Seminar in Literature and Ideas 3

Courses may be substituted with advisor-approved language- and literature-related electives.

### ▲ ASTL: Gifted Child Education Concentration (AGCE)

The 21-credit gifted education concentration provides advanced professional development through endorsement or master’s degree for teachers of gifted students. The concentration meets NAGC/CEC graduate standards and focuses on culturally diverse, multilingual, twice exceptional, and traditionally defined gifted students and programs.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 621 Introduction to Gifted and Talented Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 622 Curriculum Differentiation for Diverse Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 623 Models and Strategies for Teaching Gifted Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 624 Assessment, Identification, and Evaluation of Gifted Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 625 Contemporary Issues and Trends in Gifted Education</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 626 Action Research in Gifted Education</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 627 Advanced Practicum in Gifted Education</td>
<td>3</td>
</tr>
</tbody>
</table>

One year of successful full-time teaching in an accredited...
public or nonpublic school may be accepted in lieu of the practicum (VA Licensure Regulations for School Personnel, 1998).]

▲ **ASTL: History Concentration (AHIS)**
The 18-credit history concentration includes one geography and five history courses that are required. The concentration is designed for elementary, middle, and high school teachers who seek a foundation in the history courses that are taught within Virginia public schools.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 520 Geography for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>HIST 601 Themes in U.S. History I</td>
<td>3</td>
</tr>
<tr>
<td>HIST 602 Themes in U.S. History II</td>
<td>3</td>
</tr>
<tr>
<td>HIST 508 Themes in World History</td>
<td>3</td>
</tr>
<tr>
<td>HIST 603 Themes in European History</td>
<td>3</td>
</tr>
<tr>
<td>HIST 510 Approaches to Modern World History</td>
<td>3</td>
</tr>
</tbody>
</table>

Courses may be substituted with advisor-approved history electives.

▲ **ASTL: Individualized Concentration (AATL)**
The 18-credit individualized concentration is developed in concert with a student’s advisor to provide course work in a student’s specialized area that is not provided in other ASTL concentrations. The student works with the program director to design a program of study that provides individualized learning experiences in an area of expertise relevant to one’s professional educational setting.

▲ **ASTL: Instructional Technology Concentration (AINT)**
The 18-credit instructional technology concentration focuses on integrating current and emerging technologies into the K–12 classroom. The concentration includes four required courses and two electives.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDIT 611 Innovation in Distance Learning</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 725 Technology and Diversity</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 746 Educational Technology and Assessment</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 750 Emerging Educational Technologies</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose two of the following:

- EDIT 742 Interactive Technologies: Gaming and Robotics ........................................3
- EDIT 743 Technology and Community Partnerships ..................................................3
- EDIT 747 Technology and Teacher Education .........................................................3

▲ **ASTL: Literacy: PK–12 Classroom Teachers Concentration (API2)**
This 18-credit concentration includes three required literacy courses and three approved electives in ESOL, special education, psychology, secondary and elementary education, early childhood, writing, and other areas. Theory and strategies in literacy and reading for teachers in any discipline, PK–12.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 632 Literacy Assessments and Intervention for Groups</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives: choose three from among the following courses, or choose a course preapproved by advisor:

- EDCI 520 Assessment of Language Learners .........................................................3

EDRD 615 Reading and Writing for Multilingual Students .........................................3
EDRD 633 Literacy Assessments and Interventions for Individuals ................................3
EDRD 637 Supervised Literacy Practicum ..................................................................3
EDSE 662 Consultation and Collaboration ..................................................................3
EDSE 627 Psychoeducational Assessment ..................................................................3

▲ **ASTL: Literacy: Reading Specialist Concentration (ALRS)**
This concentration is a 21-credit state-approved sequence of courses leading to Virginia reading specialist licensure. Course work includes foundational knowledge, instructional and assessment strategies for individuals and groups, and preparation as a literacy coach and staff developer. Licensure also requires a master’s degree, passing of the Virginia Reading Assessment, and three years of teaching under contract.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 632 Literacy Assessments and Intervention for Groups</td>
<td>3</td>
</tr>
</tbody>
</table>
| EDRD 633 Literacy Assessments and Interventions for Individuals ................................3
| EDRD 637 Supervised Literacy Practicum ..................................................................3
| EDRD 634 School-Based Leadership in Literacy .....................................................3
| EDRD 635 School-Based Inquiry in Literacy .............................................................3

▲ **ASTL: Mathematics (Middle and Secondary) Concentration (AMTH)**
This 18-credit concentration provides advanced professional development in mathematics teaching and learning for practicing middle, or high school mathematics teachers. The 18 credits include five mathematics classes and one elective.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Education, Grades 6–8</td>
<td></td>
</tr>
<tr>
<td>EDCI 597 Special Topics in Education</td>
<td>3</td>
</tr>
<tr>
<td>MATH 601 Analysis I for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 604 Geometry for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 605 Discrete/Finite Mathematics for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 607 Algebraic Structures for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 608 Problem Solving in Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Secondary Education, Grades 9–12</td>
<td></td>
</tr>
<tr>
<td>EDCI 597 Special Topics in Education</td>
<td>3</td>
</tr>
<tr>
<td>MATH 601 Analysis I for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 602 Analysis II for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 604 Geometry for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 605 Discrete/Finite Mathematics for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 607 Algebraic Structures for Teachers</td>
<td>3</td>
</tr>
</tbody>
</table>

▲ **ASTL: Physical Education Concentration (APED)**
The 18-credit physical education concentration provides course work in research design, curriculum development, collaborative supervision, research in pedagogy, and advanced adapted content. It is designed for practicing teachers seeking to improve their professional knowledge and teaching performance for improving student learning.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFHP 623 Research Design and Statistical Reasoning Elective</td>
<td>3</td>
</tr>
<tr>
<td>PHED 670 Analysis of Teaching in Physical Education</td>
<td>3</td>
</tr>
</tbody>
</table>
PHED 672 Curriculum Development and Assessment in Physical Education .............................................. 3
PHED 673 Motor Development for Special Populations ................................................................. 3
PHED 680 Mentoring and Supervision in Physical Education ......................................................... 3

Choose one course below or a course preapproved by advisor:
DANC 553 Teaching Creative Movement ...................................................... 3
DANC 580 Laban Movement Analysis ............................................................... 3
EDLE 610 Leading Schools and Communities ....................................................... 3
EDUC 539 Human Development and Learning: PK–12 .................................................. 3
EDUC 672 Human Development and Learning: Secondary Education ......................... 3
EFHP 606 Foundations of Exercise, Fitness, and Health Promotion ........................................... 3
EFHP 610 Advanced Exercise Physiology ............................................................................. 3
EFHP 611 Fitness Assessment: Theory and Practice ...................................................... 3
EFHP 614 Advanced Exercise Nutrition ............................................................................. 3
EFHP 618 Exercise and Sport Psychology .......................................................................... 3

▲ ASTL: Science Concentration (ASCI)
The 18-credit science concentration provides advanced professional development in science teaching and learning for practicing elementary, middle, or high school science teachers. The 18 credits include a combination of three science courses including an internship and three science education courses.

Course Work Credits
EDCI 663 Research in Science Technology ............................................................. 3
EDCI 683 Curriculum Development and Evaluation in Science Education .................... 3
EDCI 693 Leadership and Organizational Issues in Science Education ............................. 3
EDLE 791 Internship in Educational Leadership ...................................................... 3

Science courses relevant to school level, with advisor approval ......................................... 6

▲ ASTL: Special Education Concentration (ASPE)
The 18-credit special education concentration provides advanced expertise for educators, administrators, and other professionals providing services to individuals with special needs. The following areas of focus are available: applied behavior analysis; assistive technology; emotional disturbance and learning disabilities; emotional disturbance, learning disabilities, and mental retardation; mental retardation; and severe disabilities. Select 18 credits from

Course Work Credits
Applied Behavior Analysis
EDSE 619 Applied Behavior Analysis: Principles, Procedures, and Philosophy ............... 3
EDSE 621 Advanced Applied Behavior Analysis Empirical Bases ........................................ 3
EDSE 623 Advanced Applied Behavior Analysis Assessments and Interventions ............... 3
EDSE 624 Applied Behavior Analysis Applications ....................................................... 3
EDSE 625 Applied Behavior Analysis Verbal Behavior .................................................. 3
EDSE 790 Internship in Special Education ................................................................. 1–4

Emotional Disturbance and Learning Disabilities (ED/LD) K–12
EDSE 501 Introduction to Special Education ............................................................... 3
EDSE 502 Classroom Management and Applied Behavior Analysis ..................................... 3
EDSE 503 Language Development and Reading ............................................................ 3
EDSE 540 Characteristics of Students with ED/LD ....................................................... 3
EDSE 627 Psychoeducational Assessment ....................................................................... 3
EDSE 628 Elementary Reading, Curriculum, and Strategies for Mild Disabilities ............... 3
EDSE 628 The Inclusive Classroom ............................................................................ 3
EDSE 629 Secondary Curriculum and Strategies for Mild Disabilities ............................ 3
EDSE 662 Consultation and Collaboration ................................................................ 3
EDSE 790 Internship Special Education ..................................................................... 1–4
EDSE 791 Midpoint Portfolio ...................................................................................... 1
EDSE 792 Final Portfolio ............................................................................................ 1

Mental Retardation (MR) K–12
EDSE 501 Introduction to Special Education ............................................................... 3
EDSE 502 Classroom Management and Applied Behavior Analysis ............................... 3
EDSE 503 Language Development and Reading ............................................................ 3
EDSE 540 Characteristics of Students with ED/LD ....................................................... 3
EDSE 542 Characteristics of Students with Mental Retardation ....................................... 3
EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities ........... 3
EDSE 627 Psychoeducational Assessment ....................................................................... 3
EDSE 628 Elementary Reading, Curriculum, and Strategies for Mild Disabilities ............... 3
EDSE 629 Secondary Curriculum Strategies for Mild Disabilities ..................................... 3
EDSE 661 Curriculum and Methods: Severe Disabilities .................................................. 3
EDSE 662 Consultation and Collaboration ................................................................ 3
EDSE 790 Internship Special Education ..................................................................... 1–4
EDSE 791 Midpoint Portfolio ...................................................................................... 1
EDSE 792 Final Portfolio ............................................................................................ 1

Severe Disabilities (SD) K–12
EDSE 531 Transition and Community-Based Instruction ................................................. 3
EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities ........... 3
EDSE 557 Language Development and Emergent Literacy for Diverse Learners ............... 3
EDSE 532 Positive Behavior Supports .......................................................................... 3
EDSE 502 Classroom Management and Applied Behavior Analysis ............................... 3

College of Education and Human Development
EDSE 534 Communication and Severe Disabilities ........................................... 3
or EDSE 622 Augmentative Communication .............................................. 3
EDSE 533 Curriculum and Assessment in Severe Disabilities ......................... 3
or EDSE 627 Psychoeducational Assessment ............................................ 3
EDSE 662 Consultation and Collaboration ................................................. 3
EDSE 669 Interdisciplinary Approaches for Children with Sensory and Motor Disabilities .............................................................. 3
EDSE 790 Internship Special Education ...................................................... 1–4
EDSE 791 Midpoint Portfolio ...................................................................... 1
EDSE 792 Final Portfolio .......................................................................... 1

▲ ASTL: Teacher Leadership Concentration (ATL)
This 18-credit concentration provides advanced professional development in school leadership. The educational leadership course work focuses on teachers as leaders in their classrooms, teams, departments, programs, and schools.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Work</td>
<td>Credits</td>
</tr>
<tr>
<td>EDLE 610 Leading Schools and Communities</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 612 Educational Law</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 618 Supervision and Evaluation of Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 620 Organizational Theory and Leadership Development</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 597 Special Topics in Education: Trends and Issues in Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 598 Directed Reading, Research, and Individual Projects</td>
<td>3</td>
</tr>
</tbody>
</table>

▲ Early Childhood Education–UTEEM Concentration (Licensure) (EDUT)
This 63-credit concentration prepares students to apply for triple teacher licensure. It provides professionals with the skills to work with culturally, linguistically, and ability-diverse young children and their families in schools and diverse community settings. Participation in the program requires a full-time, primarily daytime commitment for one summer and two academic years of integrated study and ongoing practice in four different internships. The program is designed to provide professionals with the specialized knowledge, skills, and dispositions needed to meet the developmental and educational needs of young children.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio</td>
<td>Credits</td>
</tr>
<tr>
<td>A professional portfolio is required. The portfolio reflects the student’s professional development throughout the program and contains examples of performance assessments associated with standards.</td>
<td></td>
</tr>
<tr>
<td>Course Work</td>
<td>Credits</td>
</tr>
<tr>
<td>Course Work</td>
<td>Credits</td>
</tr>
<tr>
<td>EDRS 590 Education Research</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 517 Computer Applications for Special Populations</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 511 Universality and Diversity in Child and Family Development, Ages 3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 512 Assessment of Diverse Young Learners, Ages 3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 513 Language Development and Emergent Literacy for Diverse Learners, Ages 3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 514 Creating Environments and Adapting Curriculum for Diverse Learners, Ages 3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 521 Infant and Toddler Development in Family and Cultural Contexts</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 522 Family-Centered Assessment of Diverse Infants and Toddlers</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 523 Language Acquisition and Communication for Diverse Infants and Toddlers</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 524 Culturally, Linguistically, and Developmentally Appropriate Practices with Infants, Toddlers, and Their Families</td>
<td>3</td>
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<tr>
<td>EDUT 612 Development and Assessment of Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 613 Language and Literacy Development for Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 614 Integrating and Adapting Curriculum across the Content Areas for Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 615 Developing Concepts in Early Childhood Mathematics and Science for Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 781 Frameworks for Unified, Transformative Early Care and Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 782 Policy Perspectives Affecting Diverse Young Learners and Their Families</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 790 Internship with Diverse Learners, Ages 3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 791 Internship with Diverse Infants and Toddlers and Their Families</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 792 Internship with Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 793 Specialization Internship with Diverse Learners and Their Families</td>
<td>6</td>
</tr>
</tbody>
</table>

▲ Early Childhood Education Program PK–3 Concentration (EPK3)
This 32-credit concentration prepares students to apply for initial teacher licensure. It provides professionals with the skills to work with culturally, linguistically, and ability-diverse young children and their families in schools and diverse community settings. The program is designed to provide professionals with the specialized knowledge, skills, and dispositions needed to meet the developmental and educational needs of young children in preschool to grade 3. A professional portfolio is required. The portfolio reflects the student’s professional development throughout the program and contains examples of performance assessments associated with standards.

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Work</td>
<td>Credits</td>
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<tr>
<td>EDUT 511 Universality and Diversity in Child and Family Development, Ages 3 to 5</td>
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</tr>
<tr>
<td>EDUT 513 Language Development and Emergent Literacy for Diverse Learners, Ages 3 to 5</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 514 Creating Environments and Adapting Curriculum for Diverse Learners, Ages 3 to 5</td>
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</tr>
<tr>
<td>EDUT 612 Development and Assessment of Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 613 Language and Literacy Development for Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 614 Integrating and Adapting Curriculum across the Content Areas for Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 615 Developing Concepts in Early Childhood Mathematics and Science for Diverse Learners, K to 3</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 781 Frameworks for Unified, Transformative Early Care, and Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 782 Policy Perspectives Affecting Diverse Young Learners and Their Families</td>
<td>3</td>
</tr>
<tr>
<td>EDUT 790 Internship with Diverse Learners</td>
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<tr>
<td>EDSE 791 Mid-Point Portfolio</td>
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</tr>
<tr>
<td>EDSE 792 Final Portfolio</td>
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</tr>
</tbody>
</table>

Education & Human Development

These 30-36-credit concentrations are designed to offer professionals and students the opportunity to apply principles
of learning, cognition, and motivation to vital problems in the area of education; develop a solid understanding of research, assessment, and evaluation methodologies; and develop an analytical and scholarly approach to critically assessing theoretical perspectives, research, and practice within and across content domains. By participating in a supportive and collegial environment with faculty from numerous educational disciplines and expertise, students are expected to develop the skills to meet the needs of diverse populations, and design and implement effective educational programs appropriate for a broad range of cultural contexts.

**Optional Supervised Project or Thesis 3–6 credits**

Students in the following educational psychology concentrations may choose to work on a supervised research project or a master’s thesis as part of completing the MEd in curriculum and instruction. Students who select this option will conduct research in an area of interest.

*Choose from the following:*

- EDUC 598 Directed Reading, Research, and Individual Project .................................................. 3
- EDUC 599 Thesis ..................................................... 3

▲ **Concentration in Learning, Cognition, and Motivation (EDPL)**

**Course Work**

<table>
<thead>
<tr>
<th>Credits</th>
<th>( \text{Credits} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Educational Psychology Core ........................................... ( \text{9} )</td>
</tr>
<tr>
<td>3</td>
<td>EDEP 550 Theories of Learning and Cognition ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDEP 551 Principles of Learner Motivation ( \text{Prerequisite: EDEP 550} ) ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>Elective ( \text{prerequisites: EDEP 550 and 551} ): choose one from the following: ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDUC 539 Human Development and Learning, PK–12 ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDUC 672 Human Development and Learning, Secondary Education ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDUC 597 Special Topics in Education ( \text{focus on human development} ) ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>PSYC 666 Cognitive and Perceptual Development ( \text{3} )</td>
</tr>
</tbody>
</table>

**Research Methodology Core ........................................... \( \text{12} \)**

| 3       | EDRS 590 Education Research* \( \text{3} \) |
| 3       | EDRS 620 Quantitative Inquiry in Education \( \text{prerequisite: EDRS 590 or appropriate prior experience} \) \( \text{3} \) |
| 3       | EDRS 621 Qualitative Inquiry in Education \( \text{prerequisite: EDRS 590 or appropriate prior experience} \) \( \text{3} \) |

▲ This course may be waived if student has appropriate prior experience or course work.

**Emphasis .......................................................... \( \text{3} \)**

| 3       | EDEP 652 Process of Learning and Development \( \text{3} \) |

▲ **Concentration in Assessment, Evaluation, and Testing (EDPA)**

**Course Work**

<table>
<thead>
<tr>
<th>Credits</th>
<th>( \text{Credits} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{9} )</td>
<td>Educational Psychology Core ........................................... ( \text{9} )</td>
</tr>
<tr>
<td>3</td>
<td>EDEP 550 Theories of Learning and Cognition ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDEP 551 Principles of Learner Motivation ( \text{Prerequisite: EDEP 550} ) ( \text{3} )</td>
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<tr>
<td>3</td>
<td>Elective ( \text{prerequisites: EDEP 550 and 551} ): choose one from the following: ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDUC 539 Human Development and Learning, PK–12 ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDUC 597 Special Topics in Education ( \text{focus on human development} ) ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>EDUC 672 Human Development and Learning, Secondary Education ( \text{3} )</td>
</tr>
<tr>
<td>3</td>
<td>PSYC 666 Cognitive and Perceptual Development ( \text{3} )</td>
</tr>
</tbody>
</table>

**Research Methodology Core ........................................... \( \text{12} \)**

| 3       | EDRS 590 Education Research* \( \text{3} \) |
| 3       | EDRS 620 Quantitative Inquiry in Education \( \text{prerequisite: EDRS 590 or appropriate prior experience} \) \( \text{3} \) |
| 3       | EDRS 621 Qualitative Inquiry in Education \( \text{prerequisite: EDRS 590 or appropriate prior experience} \) \( \text{3} \) |

▲ This course may be waived if student has appropriate prior experience or course work.

**Emphasis .......................................................... \( \text{9} \)**

| 3       | EDRS 630 Educational Assessment \( \text{3} \) |

**Electives \( \text{prerequisite: EDRS 630} \): choose two from the following:**

| 3       | EDRS 650 High Stakes Assessment and Accountability Systems \( \text{3} \) |
| 3       | EDEP 651 Test Design and Interpretation \( \text{3} \) |
| 3       | EDRS 631 Program Evaluation \( \text{3} \) |
| 3       | EDUC 597 Special Topics in Education \( \text{focus on assessment, evaluation, and/or testing} \) \( \text{3} \) |
| 3       | PSYC 557 Psychometric Methods \( \text{3} \) |

▲ **Concentration in Teacher Preparation (EDPT)**

The teacher preparation concentration is for individuals completing the requirements to become licensed to teach in a public school classroom and requires admission to and concurrent enrollment in one of the following teacher licensure certificate programs, administered by other programs in CEHD: secondary education, special education, foreign language, and English as a second language (ESL). For the teacher preparation concentration, students apply three courses (i.e., 9 credits) from within one teacher licensure certificate program toward their MS degree in educational psychology with the expectation that they will complete the teacher certification program.
Course Work

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDEP 550</td>
<td>Theories of Learning and Cognition</td>
<td>3</td>
</tr>
<tr>
<td>EDEP 551</td>
<td>Principles of Learner Motivation (prerequisite: EDEP 550)</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective (prerequisites: EDEP 550 and 551): choose one from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 539</td>
<td>Human Development and Learning, PK–12</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 597</td>
<td>Special Topics in Education (focus on human development)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 672</td>
<td>Human Development and Learning, Secondary Education</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 666</td>
<td>Cognitive and Perceptual Development</td>
<td>3</td>
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</tbody>
</table>

Research Methodology Core | 12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>EDRS 590</td>
<td>Education Research*</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 620</td>
<td>Quantitative Inquiry in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 621</td>
<td>Qualitative Inquiry in Education</td>
<td>3</td>
</tr>
</tbody>
</table>

*This course may be waived if student has appropriate prior experience or course work.

Elective (prerequisites: EDRS 620 and 621): choose one from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRS 531</td>
<td>Educational and Psychological Measurement</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 597</td>
<td>Special Topics in Education (focus on research methodology)</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 541</td>
<td>Survey Research</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 654</td>
<td>Naturalistic Methods in Psychology</td>
<td>3</td>
</tr>
</tbody>
</table>

Three approved teacher licensure certificate program courses | 9

### Elementary Education Concentration (ELED)

The 39-credit elementary education concentration and initial licensure component provides professionals with the specialized knowledge, skills, and dispositions needed to meet the educational needs of students attending today’s elementary schools. Specific content and endorsement courses are required. Two programs (one- or two-semester internships) provide flexibility for all students. The two-semester internship program (Professional Development Schools (PDS) Program) begins each fall semester; the one-semester internship program Partnership Schools (PS) Program begins each summer semester.

**Performance-Based Assessment**

All students are required to submit and successfully complete a series of performance-based assessments. These assessments include content knowledge, pedagogical skills, and dispositions.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 544</td>
<td>Curriculum and Methods of Teaching in Elementary Education</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 545</td>
<td>Differentiation and Assessment</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 546</td>
<td>Integrating Technology in Elementary Classrooms: Literacy</td>
<td>1</td>
</tr>
<tr>
<td>EDCI 547</td>
<td>Integrating Technology in Elementary Classrooms: Mathematics</td>
<td>1</td>
</tr>
<tr>
<td>EDCI 548</td>
<td>Integrating Technology in Elementary Classrooms: Social Studies/Fine Arts</td>
<td>1</td>
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<tr>
<td>EDCI 552</td>
<td>Mathematics Methods for the Elementary Classroom</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 553</td>
<td>Science Methods for the Elementary Classroom</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 554</td>
<td>Methods of Teaching Social Studies and Integrating Fine Arts in the Elementary Classroom</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 555</td>
<td>Literacy Teaching and Learning in Diverse Elementary Classrooms I</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 556</td>
<td>Literacy Teaching and Learning in Diverse Elementary Classrooms II</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 559</td>
<td>Research and Assessment in Elementary Education</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 790</td>
<td>Internship in Education</td>
<td>6</td>
</tr>
<tr>
<td>EDUC 542</td>
<td>Foundations of Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 543</td>
<td>Children, Family, Culture, and Schools, 4- to 12-Year-Olds</td>
<td>3</td>
</tr>
</tbody>
</table>

▲ **English as a Second Language (PK–12)**

Concentration (CISL)

This 39-credit ESL/ESOL PK–12 concentration provides initial state teacher licensure (endorsement) for candidates wanting to teach in Virginia public schools, grades PK to 12. This program provides teachers with the specialized knowledge, skills, and professional dispositions required to meet the educational needs of English language learners (ELLs). Candidates whose first language is not English may be required to pass an oral and written proficiency assessment in English to meet state licensing requirements and national professional standards. This program has a licensure component of 27 credits and requires an additional 12 credits for completion of the MEd.

**Prerequisite for admission:** 6 credits of a modern foreign language (graduate or undergraduate, do not count toward the MEd)

**Field experience:** Field experiences involving observations and analyses in public schools are required throughout the program; a maximum of 15 clock hours per course or 30 clock hours per term. Arrangements can be made with each course instructor.

**Licensure Requirements (27 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 510</td>
<td>Linguistics for PK–12 ESOL Teachers</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 516</td>
<td>Bilingualism and Language Acquisition Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 519</td>
<td>Methods of Teaching Multilingual Students</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 520</td>
<td>Assessment of Language Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 790</td>
<td>Internship in Education*</td>
<td>6</td>
</tr>
<tr>
<td>EDRD 615</td>
<td>Reading and Writing for Multilingual Students</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 537</td>
<td>Foundations of Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 539</td>
<td>Human Development and Learning, PK–12</td>
<td>3</td>
</tr>
</tbody>
</table>

* For licensed teachers only, the add-on endorsement in ESL PK–12 requires completion of all licensure course work with the exception of EDCI 790.

**MEd Requirements (12 credits)**

**Prerequisites:** all licensure course work listed above

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDCI 521</td>
<td>Curriculum Development for Language Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 777</td>
<td>Research to Practice (exit course)</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 590</td>
<td>Education Research</td>
<td>3</td>
</tr>
<tr>
<td>Elective: Any graduate course with preapproval of academic advisor</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Internship Options**

A 6-credit, 15-week daytime internship (EDCI 790) is required for completion of the state-approved licensure program. Both elementary and middle school or secondary school placements...
are required. Two options are available to meet the needs of most individuals:

- **Placement internship**: One semester, daytime internship in the classroom of a cooperating teacher in the public schools. Intern assumes coteaching and independent teaching responsibilities.

- **On-the-job internship**: Available only to students who are employed as full-time, provisionally licensed teachers* and are teaching ESL/ESOL in an accredited school. In addition to a fall or spring experience, this option includes a summer or other appropriate experience.

*Provisionally licensed teachers: In lieu of an internship, provisionally licensed teachers may use their full-time teaching to satisfy the internship requirements; however, the 39-credit master’s degree requires that candidates substitute 6 credits in approved courses for the internship.

▲ **Foreign Language or Latin (PK–12) Concentration (FLL)**

This 39-credit foreign language or Latin concentration with an initial licensure component prepares professionals with the knowledge, skills, and professional dispositions needed to teach specific foreign languages, including Spanish, German, French, Russian, Japanese, Chinese, Arabic, or Latin, to students in grades PK through 12. The program has a licensure component of 27 credits and requires an additional 12 credits for completion of the MEd.

**Prerequisite for admission**: A language proficiency test is required.

**Field experience**: Field experiences involving observations and analyses in public schools are required throughout the program; a maximum of 15 clock hours per course or 30 clock hours per term. Arrangements can be made with each course instructor.

**Licensure Requirements (27 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 516 Bilingualism and Language Acquisition Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 520 Assessment of Language Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 560 Methods of Teaching in Foreign and World Languages</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 684 Advanced Methods of Teaching Foreign and Second Languages in PK–12</td>
<td>3</td>
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<tr>
<td>EDCI 790 Internship in Education</td>
<td>6</td>
</tr>
<tr>
<td>EDRD 620 Reading and Writing in Foreign and World Languages</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 537 Foundations of Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 539 Human Development and Learning, PK–12</td>
<td>3</td>
</tr>
</tbody>
</table>

**MEd Requirements (12 credits)**

**Prerequisites**: all licensure course work listed above

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 521 Curriculum Development for Language Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 590 Education Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 777 Research to Practice (exit course)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 598 Independent Study (target language or culture; may include study-abroad program or total immersion program)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Internship Options**

A 6-credit, 15-week daytime internship (EDCI 790) is required for completion of the state-approved licensure program. Both elementary and middle school or secondary school placements are required. Two options are available to meet the needs of most individuals:

- **Placement internship**: One-semester daytime internship in the classroom of a cooperating teacher. Intern assumes coteaching and independent teaching responsibilities.

- **On-the-job internship**: Available only to students who are employed as full-time, provisionally licensed teachers and are teaching in their endorsement area in an accredited school. In addition to a fall or spring experience, this option includes a summer or other appropriate experience.

*Provisionally licensed teachers: In lieu of an internship, provisionally licensed teachers may use their full-time teaching to satisfy the experience requirements; however, the 39-credit master’s degree requires that candidates substitute 6 credits in approved courses for the internship.

### Instructional Technology Concentrations

Four concentrations with an instructional technology focus provide professionals the specialized knowledge and skills needed to apply a wide range of computer and telecommunications technologies in achieving educational goals within school, community, and corporate or public settings. The concentrations combine current theoretical foundations of technology development and integration with practical, hands-on experiences in using state-of-practice and state-of-the-art technologies. These concentrations serve the various needs and interests of specific types of instructional technology clients: instructional design and development, integration of technology in schools, technology innovations in education, and assistive and special education technology.

▲ **Assistive and Special Education Technology Concentration (IASP)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSE/EDIT 510 Introduction to Assistive Technology</td>
<td>3</td>
</tr>
<tr>
<td>EDSE/EDIT 526 Web Accessibility and Design</td>
<td>3</td>
</tr>
<tr>
<td>EDSE/EDIT 590 Special Education Research</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 610 Designing Adaptive Environments</td>
<td>2</td>
</tr>
<tr>
<td>EDSE 649 Advanced Clinical Psychoeducational Assessment in Special Education</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 782 Comprehensive Topics in Special Education: Final Project</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives**

Choose 8 credits from the following:

- EDSE/EDIT 522 Assistive Technology for Individuals with Sensory Impairments
- EDSE/EDIT 523 Accessibility/Input Modification
- EDSE/EDIT 524 Assistive Technology for Individuals with Learning Disabilities
- EDSE/EDIT 525 Software for Individuals with Special Needs
- EDSE 527 Adapted Sports, Recreation, and Leisure
- EDSE 528 Low-Technology Assistive Technology Solutions
- EDSE/EDIT 529 Internet as an Assistive Technology Tool
- EDSE 534 Communication and Severe Disabilities
- EDSE 622 Augmentative Communication

Choose an additional 5 credits from the following:

- EDSE 662 Educational Consultation and Collaboration
EDSE 669 Interdisciplinary Approach for Children with Sensory and Motor Disabilities .......... 3
EDIT 772 Web-Based Instructional Tools: Electronic Portfolio ........................................... 2

**Note:** Any EDIT course may be used as an additional elective.

**Total** ............................................................................................................ 30

### Instructional Design and Development Concentration (IDD)

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDIT 526 Web Accessibility and Design</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 704 Instructional Technology Foundations and Theories of Learning</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 705 Instructional Design</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 732 Advanced Instructional Design: Constructive Methods</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 730 Analysis and Design of Environments</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 752 Design and Production of Multimedia and Hypermedia Environments</td>
<td>3</td>
</tr>
<tr>
<td>EDIT/EDRS 590 Education Research in Technology</td>
<td>1</td>
</tr>
<tr>
<td>EDIT 601 IDD Portfolio</td>
<td>1</td>
</tr>
<tr>
<td>EDIT 701 Advanced IDD Portfolio</td>
<td>1</td>
</tr>
<tr>
<td>Electives</td>
<td>7</td>
</tr>
</tbody>
</table>

**Total** ............................................................................................................ 30

### Instructional Design and Development Immersion Concentration (IMDD)

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDIT 526 Web Accessibility and Design</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 705 Instructional Design</td>
<td>3</td>
</tr>
<tr>
<td>EDIT/EDRS 590 Research Methods</td>
<td>24</td>
</tr>
<tr>
<td>EDIT 730 Analysis and Design of Multimedia and Hypermedia Learning Environments</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 732 Advanced Instructional Design: Constructive Methods</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 752 Design and Production of Multimedia and Hypermedia Learning Environments</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 791 Project Development</td>
<td>6</td>
</tr>
<tr>
<td>EDIT 792 Project Development</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total** ............................................................................................................ 30

### Integration of Technology in Schools Concentration (IITS) (36 credits)

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 710 Technology and the Culture of Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 714 Methods of Integration</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 716 Principles of Integration</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 711 Teaching with Technology I: Telecommunications and Databases</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 712 Technology and Learning</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 713 Teaching with Technology II: Graphics, Video, and Simulations</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 715 Teaching with Technology III: Publishing and Computational Tools</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 719 Teaching with Technology IV: Hypermedia and Emerging Technologies</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 719 Tools 5: Web2 and Digital Video Editing</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 790 Practicum in Instructional Technology</td>
<td>6</td>
</tr>
<tr>
<td>EDIT 797 Advanced Topics in Education</td>
<td>3</td>
</tr>
</tbody>
</table>

### International Education FAST TRAIN ESOL (PK–12) Concentration (FTES)

This 30-credit concentration is specifically designed for teachers and educators who are working abroad or plan on teaching overseas, or individuals living outside the Washington, D.C., area who want a license and master’s degree in ESOL. This program has a licensure component of 21 credits and requires an additional 9 credits for completion of the MEd. Course work includes integrated fieldwork in schools and all requirements for a Virginia ESOL license PK–12. The convenient schedule enables participants to complete the program through on-campus study during two summers and online study during the academic year. On successful completion of course work and passing scores on the required exams, participants are eligible to receive a statement of eligibility from the state. After completing an internship requirement overseas (either one term of student teaching or one year of full-time teaching), candidates are eligible to apply for the ESOL PK–12 Virginia license.

**Licensure Requirements (21 credits)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 510 Linguistics for PK ESOL Teachers</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 516 Bilingualism and Second Language Acquisition Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 519 Methods of Teaching Multilingual Students (prerequisite: EDCI 516)</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 520 Assessment of Language Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 615 Reading and Writing for Multilingual Students (prerequisite: EDCI 516)</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 511 Introduction to Teaching in International Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 537 Foundations of Multicultural Education</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** Each licensure course has a 20-hour field experience requirement.

### Optional

EDCI 790 Internship in Education ........................................... 6

**Note:** All licensure course work, tests, and general education courses must be finished prior to the internship.

### MEd Requirements (9 credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 521 Curriculum Development for Language Learners (prerequisites: EDCI 516, 519; EDRD 615; EDCI 520)</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 777 Research to Practice (must be taken last)</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 590 Education Research</td>
<td>3</td>
</tr>
</tbody>
</table>

### International Education FAST TRAIN (Elementary) PK–6 Concentration (FTEL)

This 33-credit concentration is an alternative teacher licensure program that prepares educators for international teaching assignments.

This program has a licensure component of 18 credits and requires an additional 15 credits for completion of the MEd. The course work may be completed in the part-time evening program or during the summer completing five weeks of intensive study course work. All course work requires 20 hours of integrated fieldwork observation and practice. On successful completion of course work and passing scores on the required exams, participants are eligible to receive a statement of eligibility from the state. After completing an
internship requirement overseas (either one term of student teaching or one year of full-time teaching), candidates are eligible to apply for the elementary PK–6 Virginia license.

**Licensure Requirements (18 credits)**

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 511</td>
<td>Introduction to Teaching in International Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 512</td>
<td>Teaching Elementary Social Studies in International Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 513</td>
<td>Teaching Elementary Math in International Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 514</td>
<td>Teaching Elementary Science in International Schools</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 516</td>
<td>Language across the Elementary International School Curriculum</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 520</td>
<td>Curriculum and Elementary Instruction and Assessment in International Schools</td>
<td>3</td>
</tr>
</tbody>
</table>

**Optional**

EDCI 790 Internship in Education | 6

**Note:** All licensure course work, tests, and general education courses must be finished prior to the internship.

**MED Requirements (15 credits)**

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 516</td>
<td>Bilingualism Language Acquisition Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 519</td>
<td>Methods of Teaching Multilingual Students (prerequisite: EDCI 516)</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 777</td>
<td>Research to Practice (must be taken last; prerequisite: EDRS 590)</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 590</td>
<td>Education Research</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 537</td>
<td>Foundations of Multicultural Education</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** Some course work requires field experience.

**ESOL Endorsement Requirements for Licensed (In-Service) Teachers**

**Course Work to Add ESOL Endorsement**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 510</td>
<td>Linguistics for PK ESOL Teachers</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 516</td>
<td>Bilingualism Language Acquisition Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 519</td>
<td>Methods of Teaching Multilingual Students</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 520</td>
<td>Assessment of Learners</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 615</td>
<td>Reading and Writing for Multilingual Students</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 537</td>
<td>Foundations of Multicultural Education</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** These courses are required to add the ESOL endorsement in Virginia. Students should check with the state where they currently hold a license to see whether these courses will meet their requirements. No additional internship is required for licensed teachers.

**Multilingual and Multicultural Education Concentration (CIMM)**

This 30-credit concentration prepares professionals to work with a diverse population of individuals. It provides courses for licensed teachers and the required courses for an add-on endorsement in English as a second language (ESL) PK–12, also known as English for speakers of other languages (ESOL). The program is appropriate for individuals who are not licensed and wish to complete a master’s degree. Six credits of a foreign language (undergraduate or graduate level) are required but do not count toward the master’s degree.

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 516</td>
<td>Bilingualism and Language Acquisition Research</td>
<td>3</td>
</tr>
</tbody>
</table>

**Secondary Education (6–12) Concentrations**

The seven 33-credit secondary education concentrations with a licensure component are designed to meet the needs of individuals who wish to be licensed or need to satisfy the requirements of a provisional license to teach at the secondary level. Specific endorsement areas are biology, chemistry, Earth science, English, history and social science, mathematics, and physics. Add-on endorsements are available in speech communications, English as a second language, and algebra I.

The Career Switcher Program is an alternative licensure route that prepares experienced professionals for licensure as secondary school teachers with endorsements in biology, chemistry, Earth science, English, history and social science, mathematics, or physics. Successful applicants must have at least five years of work experience and passing scores on the Praxis I and II, and VCLA exams. In addition, they must have completed all required endorsement courses. The program consists of six months of course work and fieldwork, followed by a closely mentored year of full-time paid classroom teaching.

**Field Experience**

Field experiences in public schools will be required throughout the program; a maximum of 15 clock hours per course or 30 clock hours per term. Arrangements will be made at the beginning of each term.

**Concentration in Secondary Education Biology (SECB)**

**Licensure Requirements (21 credits)**

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 573</td>
<td>Curriculum and Methods of Teaching Science</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 673</td>
<td>Advanced Curriculum and Methods of Teaching Science</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 790</td>
<td>Internship in Secondary Education</td>
<td>6</td>
</tr>
<tr>
<td>EDRD 619</td>
<td>Literacy in the Content Areas</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 522</td>
<td>Foundations of Secondary Education</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 672</td>
<td>Human Development and Learning</td>
<td>3</td>
</tr>
</tbody>
</table>

**MED Requirements (12 credits)**

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 674</td>
<td>Assessing Learning and Teaching</td>
<td>3</td>
</tr>
<tr>
<td>Biology content elective (chosen with advisor’s approval)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Education elective (chosen with advisor’s approval)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Concentration in Secondary Education Chemistry (SECC)**

**Licensure Requirements (21 credits)**

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 573</td>
<td>Curriculum and Methods of Teaching Science</td>
<td>3</td>
</tr>
</tbody>
</table>

**MED Requirements (12 credits)**

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 674</td>
<td>Assessing Learning and Teaching</td>
<td>3</td>
</tr>
<tr>
<td>Biology content elective (chosen with advisor’s approval)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Education elective (chosen with advisor’s approval)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
EDCI 673 Advanced Curriculum and Methods of Teaching Science ........................................... 3
EDCI 790 Internship in Secondary Education ................................................................. 6
EDRD 619 Literacy in the Content Areas ........................................................................ 3
EDUC 522 Foundations of Secondary Education ......................................................... 3
EDUC 672 Human Development and Learning .......................................................... 3

**MEd Requirements (12 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDUC 674 Assessing Learning and Teaching ......................................................... 3
| Chemistry content elective (chosen with advisor’s approval) .......................... 3
| Education elective (chosen with advisor’s approval) ........................................ 3
| EDUC 675 Research in Secondary Education ......................................................... 3

▲ **Concentration in Secondary Education Earth Science (SECS)**

**Licensure Requirements (21 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDCI 573 Curriculum and Methods of Teaching Science ........................................... 3
| EDCI 673 Advanced Curriculum and Methods of Teaching Science .......................... 3
| EDCI 790 Internship in Secondary Education ................................................................. 6
| EDRD 619 Literacy in the Content Areas ........................................................................ 3
| EDUC 522 Foundations of Secondary Education ......................................................... 3
| EDUC 672 Human Development and Learning .......................................................... 3

**MEd Requirements (12 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDUC 674 Assessing Learning and Teaching ......................................................... 3
| Earth science content elective (chosen with advisor’s approval) .......................... 3
| Education elective (chosen with advisor’s approval) ........................................ 3
| EDUC 675 Research in Secondary Education ......................................................... 3

▲ **Concentration in Secondary Education English (SECH)**

**Licensure Requirements (21 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDCI 569 Curriculum and Methods of Teaching English ........................................... 3
| EDCI 669 Advanced Curriculum and Methods of Teaching English .......................... 3
| EDCI 790 Internship in Secondary Education ................................................................. 6
| EDRD 619 Literacy in the Content Areas ........................................................................ 3
| EDUC 522 Foundations of Secondary Education ......................................................... 3
| EDUC 672 Human Development and Learning .......................................................... 3

**MEd Requirements (12 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDCI 572 Young Adult Literature in a Multicultural Setting .................................. 3
| EDUC 674 Assessing Learning and Teaching ................................................................. 3
| Education elective (chosen with advisor’s approval) ........................................ 3
| EDUC 675 Research in Secondary Education ......................................................... 3

▲ **Concentration in Secondary Education History and Social Studies (SECH)**

**Licensure Requirements (21 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDCI 567 Curriculum and Methods of Teaching History and Social Studies .................. 3
| EDCI 667 Advanced Curriculum and Methods of Teaching History and Social Studies .... 3
| EDCI 790 Internship in Secondary Education ................................................................. 6

**MEd Requirements (12 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDUC 674 Assessing Learning and Teaching ................................................................. 3
| Physics content elective (chosen with advisor’s approval) ...................................... 3
| Education elective (chosen with advisor’s approval) ........................................ 3
| EDUC 675 Research in Secondary Education ......................................................... 3

▲ **Concentration in Secondary Education Mathematics (SECM)**

**Licensure Requirements (21 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDCI 572 Curriculum and Methods of Teaching Mathematics ......................................... 3
| EDCI 672 Advanced Curriculum and Methods of Teaching Mathematics .......................... 3
| EDCI 790 Internship in Secondary Education ................................................................. 6
| EDRD 619 Literacy in the Content Areas ........................................................................ 3
| EDUC 522 Foundations of Secondary Education ......................................................... 3
| EDUC 672 Human Development and Learning .......................................................... 3

**MEd Requirements (12 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDUC 674 Assessing Learning and Teaching ................................................................. 3
| Mathematics content elective (chosen with advisor’s approval) .......................... 3
| Education elective (chosen with advisor’s approval) ........................................ 3
| EDUC 675 Research in Secondary Education ......................................................... 3

▲ **Concentration in Secondary Education Physics (SECP)**

**Licensure Requirements (21 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDCI 573 Curriculum and Methods of Teaching Science ........................................... 3
| EDCI 673 Advanced Curriculum and Methods of Teaching Science .......................... 3
| EDCI 790 Internship in Secondary Education ................................................................. 6
| EDRD 619 Literacy in the Content Areas ........................................................................ 3
| EDUC 522 Foundations of Secondary Education ......................................................... 3
| EDUC 672 Human Development and Learning .......................................................... 3

**MEd Requirements (12 credits)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
</table>
| EDUC 674 Assessing Learning and Teaching ................................................................. 3
| Physics content elective (chosen with advisor’s approval) ...................................... 3
| Education elective (chosen with advisor’s approval) ........................................ 3
| EDUC 675 Research in Secondary Education ......................................................... 3

**Internship Options**

A 6-credit 15-week daytime internship (EDCI 790) is required for completion of the state-approved licensure program. Three options are available to meet the needs of most individuals:

- Professional Development School (PDS) internship: a one-term daytime internship as a PDS intern in a school identified by secondary faculty members
- Student teaching internship: a one-term daytime internship in the classroom of a cooperating teacher. Intern assumes coteaching and independent teaching responsibilities.


• On-the-job internship: Available only to students who are employed as full-time provisionally licensed teachers and teaching in their endorsement area in an accredited middle or secondary school and want to complete a master’s degree. In lieu of an internship, provisionally licensed teachers may choose to use their full-time teaching to satisfy the experience requirement for a full license; however, the 33-credit master’s degree requires that 6 credits of approved coursework be substituted for the internship.

### Education Leadership, MEd MED-EDLE

This master’s program with a licensure component prepares candidates for leadership and management positions in a variety of educational settings. The program emphasizes an understanding of the complexities of change in schools, communities, and organizations. Participants are expected to develop and demonstrate the knowledge, skills, and dispositions necessary to create and maintain learning environments that value diversity, continual knowledge acquisition, instructional leadership, innovative and ethical decision making, reflective practice, and successful achievement of all school-aged youth. Programs are also available in the mathematics or science education leadership concentration for those who desire to be specialists in the teaching of mathematics (K–8) or science (K–12).

**Course Work**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDLE 620 Organizational Theory and Leadership Development</td>
<td>3</td>
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<tr>
<td>EDLE 690 Using Research to Lead School Improvement</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 791 Internship in Educational Leadership*</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 612 Education Law</td>
<td>3</td>
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<tr>
<td>EDLE 614 Managing Financial and Human Resources</td>
<td>3</td>
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<tr>
<td>EDLE 616 Curriculum Development and Evaluation</td>
<td>3</td>
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<tr>
<td>EDLE 618 Supervision and Evaluation of Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 619 Leading Schools and Communities</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 634 Contemporary Issues in Education Leadership</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 636 Adult Motivation and Conflict Management in Educational Settings: A Case Study Approach</td>
<td>3</td>
</tr>
</tbody>
</table>

*Internship experiences are required in a variety of administrative settings with the guidance of professionals on site and at Mason. The internship that is integral to the Education Leadership Program provides an opportunity to synthesize and apply the knowledge and practice the skills identified in the Educational Leadership Constituency Consortium standards through substantial, sustained work in educational settings.

### Licensure Requirements

Participants who are admitted into the program who already have a master’s degree and three years of teaching may complete only the licensure course work for the administration and supervision PK–12 license. The licensure course work is the first 24 credits of the master’s degree program and must be taken in the sequence shown above.

### Mathematics Education Leadership (K–8) Concentration (EDML)

The 33-credit concentration in mathematics education leadership prepares individuals for master teacher, lead teacher, or schoolwide leadership positions in elementary or middle school mathematics. Course work includes study or experiences in education leadership, mathematics teaching and learning, instructional technology, and curriculum development. Program participants study and use research that has significant positive effects on professional development and teaching and learning mathematics. Program experiences prepare students to select, develop, and implement school-based curricula and teaching and learning materials, as well as in-service and professional development programs for teachers. The internship is an individual experience designed and developed in consultation with a faculty advisor or mentor.

**Course Work**

<table>
<thead>
<tr>
<th>Course Work</th>
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<tbody>
<tr>
<td>EDCI 646 Mathematics Education Leadership for School Change</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 663 Research in Science Teaching</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 666 Research in Mathematics Teaching</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 705 Instructional Design</td>
<td>3</td>
</tr>
<tr>
<td>EDIT 704 Instructional Technology Foundations and Theories of Learning</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 616 Curriculum Development and Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 618 Supervision and Evaluation of Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDLE 791 Internship in Education Leadership</td>
<td>3</td>
</tr>
</tbody>
</table>

*Mathematics elective: 3

Technology elective: 3

### Mathematics Specialist Leader (K–8) Concentration (MSLR)

The 33-credit math specialist leader concentration includes the required course work for state licensure as a K–8 mathematics specialist. Students study mathematics content and mathematics pedagogy in the program. Students who apply for math specialist licensure must have three years of successful teaching experience and a master’s degree.

**Course Work**

<table>
<thead>
<tr>
<th>Course Work</th>
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<tbody>
<tr>
<td>EDCI 645 Curriculum Development in Mathematics Education</td>
<td>3</td>
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<tr>
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<td>3</td>
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<tr>
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<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>EDLE 791 Internship in Education Leadership</td>
<td>3</td>
</tr>
<tr>
<td>MATH 600 Special Topics: Number Systems and Number Theory for K–8 Teachers</td>
<td>3</td>
</tr>
</tbody>
</table>

*MATH 600 Special Topics: Geometry and Measurement for K–8 Teachers | 3
Probability and Statistics for K–8 Teachers | 3
Algebra and Functions for K–8 Teachers | 3
Rational Numbers and Proportional Reasoning for K–8 Teachers | 3

### Science Education Leadership (PK–12) Concentration (EDSL)

This 30-credit concentration in science education leadership is a PK–12 program that focuses on education leadership and science teaching and learning. It includes the required course work for the administration and supervision PK–12 license in Virginia. Students study the changing nature of science, science teaching, assessment, curriculum, technology, safety, and meeting the diverse needs of learners. Students also develop skills in science teaching and learning, data-driven decision making, systematic and continual improvement, and leading dynamic organizations. Internship experiences include working with a practicing scientist in a research setting and

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Probability and Statistics for K–8 Teachers | 3
Algebra and Functions for K–8 Teachers | 3
Rational Numbers and Proportional Reasoning for K–8 Teachers | 3

### Science Education Leadership (PK–12) Concentration (EDSL)

This 30-credit concentration in science education leadership is a PK–12 program that focuses on education leadership and science teaching and learning. It includes the required course work for the administration and supervision PK–12 license in Virginia. Students study the changing nature of science, science teaching, assessment, curriculum, technology, safety, and meeting the diverse needs of learners. Students also develop skills in science teaching and learning, data-driven decision making, systematic and continual improvement, and leading dynamic organizations. Internship experiences include working with a practicing scientist in a research setting and
interacting with school leaders at the state and local levels who directly and indirectly influence science education. The science education leadership concentration includes the required course work for state licensure in administration and supervision PK–12. Students who apply for licensure must have three years of successful classroom teaching experience and a master’s degree.

Course Work Credits
EDCI 663 Research in Science Teaching ..................3
EDCI 666 Research in Mathematics Teaching Technology Elective ..................................3
EDCI 683 Curriculum Development and Evaluation in Science Education .........................3
EDCI 693 Leadership and Organizational Issues in Science Education ..............................3
EDLE 610 Leading Schools and Communities ..................3
EDLE 612 Education Law .......................................3
EDLE 614 Managing Financial and Human Resources ....3
EDLE 618 Supervision and Evaluation of Instruction ..................3
EDLE 791 Internship in Education Leadership ........3
Elective ....................................................................3

Educational Psychology, MS-EDP

MS (pending SCHEV approval)

This 30-credit master’s program is designed to offer professionals and students the opportunity to apply principles of learning, cognition, and motivation to vital problems in the area of education; develop a solid understanding of research, assessment, and evaluation methodologies; and develop an analytical and scholarly approach to critically assessing theoretical perspectives, research, and practice within and across content domains. By participating in a supportive and collegial environment with faculty from numerous educational disciplines and expertise, students are expected to develop the skills to meet the needs of diverse populations and design and implement effective educational programs appropriate for a broad range of cultural contexts.

Educational Psychology Core (9 credits)

Course Work Credits
EDEP 550 Theories of Learning and Cognition ........3
EDEP 551 Principles of Learner Motivation (prerequisite: EDEP 550) ..................3
Elective choose 3 credits from the following:
EDUC 539 Human Development and Learning, PK–12 ...3
EDUC 597 Special Topics in Education (focus on human development) ..................3
EDUC 672 Human Development and Learning, Secondary Education ........................3
PSYC 666 Cognitive and Perceptual Development ..........3

Research Methodology Core (9 credits)

Course Work Credits
EDRS 531 Educational and Psychological Measurement ...3
EDRS 620 Quantitative Inquiry in Education (prerequisite: EDRS 590 or appropriate prior experience or course work) ..................3
EDRS 621 Qualitative Inquiry in Education (prerequisite: EDRS 590 or appropriate prior experience or course work) ..................3

Areas of Concentration (12 credits)

Learning, Cognition, and Motivation Concentration (EDPL)

Course Work Credits
EDEP 652 Processes of Learning and Development ..........................3
EDEP 598 Directed Reading, Research, and Individual Projects ..................3
or EDUC 599 Thesis ........................................3
Electives (Choose two of the following):
EDEP 653 Culture and Intelligence ..................3
EDEP 654 Learning, Motivation, and Self-Regulation ..........................3
EDSE 667 Cognitive Development of Diverse Young Children ..........................3
EDUC 597 Special Topics (focus on learning, cognition, or motivation) ..................3

Assessment, Evaluation, and Testing Concentration (EDPA)

Course Work Credits
EDRS 630 Educational Assessment ..................3
EDEP 598 Directed Reading, Research, and Individual Projects ..................3
or EDUC 599 Thesis ........................................3
Electives (Choose two of the following):
EDEP 650 High Stakes Assessment and Accountability Systems ..................3
EDEP 651 Test Design and Interpretation ..................3
EDRS 631 Program Evaluation ................................3
EDUC 597 Special Topics (focus on research methodology assessment, evaluation, and/or testing) ........3
PSYC 541 Survey Research ................................3
PSYC 557 Psychometric Methods ..................3

Teacher Preparation Concentration (EDPT)

Course Work Credits
Choose three courses (9 credits) from one of the following teacher licensure certificate programs: secondary education, special education, foreign language, or English as a second language (ESL).* ..................3
EDEP 598 Directed Reading, Research, and Individual Projects ..................3
or EDUC 599 Thesis ........................................3
*Educational psychology or appropriate teacher education faculty must approve courses in a coherent field of study.

New Professional Studies, MA

Concentration in Teaching (PSTT)

This 36-credit master’s degree is a track of the New Professional Studies curriculum for in-service teachers seeking to improve their approach to a wide range of issues connected to the craft of teaching and learning for K–12 children. Graduate course work is linked to school-based issues for teachers. Class days are designed to complement a teacher’s schedule during the summer and school year. Specific information is available from the Initiatives in Educational Transformation web site, gse.gmu.edu/iet, or by calling 703-993-8320.

Course Work Credits
EDUC 597 Special Topics in Education ..................3
IETT 750 Studies in Language and Culture I ..........3
IETT 751 Studies in Language and Culture II ..........3
EDSE 501 Introduction to Special Education .......... 3
EDSE 503 Language Development and Reading ........ 3
EDSE 557 Language Development and Emergent Literacy for Diverse Learning .......... 3
EDSE 571 Computer Applications for Special Populations .......... 3
EDSE 590 Research in Special Education .......... 3
EDSE 662 Consultation and Collaboration .......... 3
EDSE 782 Comprehensive Topics in Special Education: Trends and Issues (may be substituted for portfolio courses by nonlicensure students) .......... 3
EDSE 791 Midpoint Portfolio .......................... 1
EDSE 792 Final Portfolio .......................... 1
Electives from EDSE courses .......................... 13

Early Childhood Special Education (Nonlicensure) Concentration (SPEC)

This 30-credit concentration leads to a master of special education degree for professionals who already hold an early childhood special education teacher license or are interested in working in an early childhood special education context outside the classroom.

Course Work Credits
EDSE 501 Introduction to Special Education .......... 3
EDSE 557 Language Development and Emergent Literacy for Diverse Learning .......... 3
EDSE 571 Computer Applications for Special Populations .......... 3
EDSE 590 Research in Special Education .......... 3
EDSE 662 Consultation and Collaboration .......... 3
EDSE 782 Comprehensive Topics in Special Education: Trends and Issues (may be substituted for portfolio courses by nonlicensure students) .......... 3
EDSE 791 Midpoint Portfolio .......................... 1
EDSE 792 Final Portfolio .......................... 1
Electives from EDSE courses .......................... 13

Notable courses include:
- EDSE 517 Computer Applications for Special Populations
- EDSE 590 Research in Special Education
- EDSE 662 Consultation and Collaboration
- EDSE 782 Comprehensive Topics in Special Education
- EDSE 791 Midpoint Portfolio
- EDSE 792 Final Portfolio

Electives from EDSE courses

Certificate in ASTL: Alternative Education

This 18-credit certificate is designed for professionals who are interested in or are working in alternative education settings. It offers the knowledge and skills necessary to work effectively with at-risk students, their families, and involved agencies.

Course Work Credits
EDAE 600 Alternative Education for At-Risk Youth .......... 1
EDAE 601 Curriculum and Methods in Alternative Education .......... 3
EDAE 602 Preparing Students for Employment and Living Independently .......... 2
EDSE 551 Classroom Management: Theory and Practice .......... 3
EDAE 603 Communication and Management Strategies for Alternative Education .......... 3
EDAE 604 Multidisciplinary and Interagency Collaboration .......... 3
Elective, with advisor approval .......... 3

Certificate in ASTL: Art Education

The 18-credit art education certificate is designed for art teachers with current licensure in art PK–12. It consists of six required courses that address contemporary professional development content areas in art education.

Course Work Credits
AVT 605 Issues and Research in Art Education .......... 3
AVT 694 Advanced Studies in Teaching Critical Response to Art, PK–12 .......... 3
AVT 615 Technology for Art Teachers .......... 3
AVT 697 Advanced Strategies and Curricular Innovations in the Visual Arts .......... 2
EDEP 601 Creativity and Cognition in the Arts and Media .......... 3
Note: AVT 615 is considered a 3-credit studio course.

Qualified students who test out of this course will elect two of the following 4-credit studio courses for a total of 8 studio credits.

Choose one studio course from the following:
- AVT 667 Two-Dimensional Art Making: Form, Theme, and Context
- AVT 668 Three-Dimensional Art Making across Cultures
- AVT 669 Four-Dimensional Art Making: Technology and New Media
### Certificate in ASTL: Early Childhood Education

This 18-credit certificate is designed for early childhood professionals who work in various roles with young children and their families. It focuses on the practice and study of early childhood education and is based on the early childhood generalist standards of the National Board for Professional Teaching Standards.

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDCI 603 Trends, Issues, and Research in Early Childhood Education</td>
<td>3</td>
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<tr>
<td>EDCI 615 Advanced Human Development</td>
<td>3</td>
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<tr>
<td>EDCI 784 Capstone Seminar in Early Childhood Education</td>
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</table>

**Electives (choose three from the following):**

- EDCI 516 Bilingualism and Language Acquisition Research
- EDCI 613 Curriculum and Assessment in Early Childhood Education
- EDCI 614 Curriculum and Assessment in Early Childhood Education II
- EDCI 616 The Creative Arts and Play in Early Childhood Education and Classroom Discourse
- EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood
- EDSE 556 Language Development and Communication for Diverse Infants and Toddlers
- EDSE 557 Language Development and Emergent Literacy for Diverse Learners, Ages 3–5
- EDSE 656 Assessment of Diverse Young Learners, Ages 3–5
- EDSE 667 Cognitive Development of Diverse Young Children

**Note:** Courses may be substituted with advisor-approved language- and literature-related electives.

### Certificate in ASTL: Foreign Language Spanish

This 18-credit certificate offers course work for practicing teachers who wish to deepen their expertise in Spanish and augment their teacher development through course work in advanced pedagogy that is aligned with the propositions of the National Board for Professional Teaching Standards.

**Course Work**

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>SPAN 502 Hispanic Sociolinguistics</td>
<td>3</td>
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<tr>
<td>SPAN 505 Applied Spanish Stylistics</td>
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<tr>
<td>SPAN 510 Introduction to the Graduate Study of Literature in Spanish</td>
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</table>

**Choose 9 credits from the following:**

- FRLN 510 Bibliography and Research in Foreign Languages and Literature
- FRLN 525 Literary Translation
- FRLN 550 Special Topics
- FRLN 565 Theory of Translation
- FRLN 572 Integrating Technology into Language Learning
- FRLN 573 Basic Issues in Language Pedagogy
- FRLN 590 Internship and Seminar in Translation
- FRLN 620 Literary Theory and Criticism
- FRLN 660 Approaches to the Study of Language
- FRLN 670 Foreign Language Learning and Teaching

**Note:** Courses may be substituted with advisor-approved language- and literature-related electives.
Certificate in ASTL: Gifted  CERG-AGCE  Child Education
This 21-credit certificate program is designed for professionals who are interested in working with gifted children. It offers course work for an add-on endorsement in gifted education for currently licensed teachers.

Course Work 18 or 21*
EDCI 621 Introduction to Gifted and Talented Learners .............................................. 3
EDCI 622 Curriculum Differentiation for Diverse Learners .................................................. 3
EDCI 623 Models and Strategies for Teaching Gifted Learners ............................................ 3
EDCI 624 Assessment, Identification, and Evaluation of Gifted Learners .............................. 3
EDCI 625 Contemporary Issues and Trends in Gifted Education .......................................... 3
EDCI 626 Action Research in Gifted Education I ............................................................... 3
EDCI 627 Advanced Practicum and Research in Gifted Education*..................................... 3

*Only 21 credits required for those not currently teaching.

Certificate in ASTL: History  CERG-AHIS
This 18-credit certificate is designed for PK–12 classroom teachers who wish to gain depth in history content to become leaders in their discipline.

Course Work
GEOG 520 Geography for Teachers .............................................. 3
HIST 510 Approaches to Modern World History .......................................................... 3
HIST 601 Themes in U.S. History I ........................................................................... 3
HIST 602 Themes in U.S. History II ........................................................................... 3
HIST 508 Themes in World History ............................................................................. 3
HIST 605 Themes in European History ......................................................................... 3

Courses may be substituted with advisor-approved history electives.

Certificate in ASTL: Instructional Technology  CERG-AINT
This 18-credit certificate is designed for PK–12 classroom teachers who wish to gain depth in instructional technology content to become leaders in their discipline.

Course Work
EDIT 611 Innovation in Distance Learning ................................................................. 3
EDIT 725 Technology and Diversity ............................................................................... 3
EDIT 746 Educational Technology and Assessment .................................................... 3
EDIT 750 Emerging Technology .................................................................................... 3

Choose two from the following:
EDIT 742 Interactive Technologies: Gaming and Robotics .............................................. 3
EDIT 743 Technology and Community Partnerships ..................................................... 3
EDIT 747 Technology and Teacher Education ................................................................. 3

Certificate in ASTL: Literacy: Reading Specialist  CERG-ALRS
This 21-credit certificate, a state-approved sequence of courses leading to Virginia reading specialist licensure, is designed for teachers who have a master’s degree. Course work includes foundational knowledge, instructional and assessment strategies for individuals and groups, and preparation as a literacy coach and staff developer. Licensure also requires a master’s degree, passing of the Virginia Reading Assessment, and three years of teaching under contract.

Course Work  Credits
EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood ......................................................... 3
EDRD 631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood ....................................................... 3
EDRD 632 Literacy Assessments and Intervention for Groups ........................................................................................................... 3
EDRD 633 Literacy Assessments and Intervention for Individuals .................................................................................................. 3
EDRD 634 School-Based Leadership in Literacy ........................................................................ 3
EDRD 635 School-Based Inquiry in Literacy ........................................................................ 3
EDRD 637 Supervised Literacy Practicum ............................................................................. 3

Certificate in ASTL: Literacy: PK–12 Classroom Teachers
This 18-credit certificate includes three required literacy courses and three approved electives in ESOL, special education, psychology, secondary and elementary education, early childhood, writing, and other areas. Theory and strategies in literacy and reading for teachers in any discipline, PK–12.

Course Work
EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood ......................................................... 3
EDRD 631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood ....................................................... 3

Electives: choose four of the following:
EDCI 520 Assessment of Language Learners ................................................................ 3
EDRD 615 Reading/Writing for Multilingual Students ................................................... 3
EDRD 633 Literacy Assessments and Interventions for Individuals ......................................................... 3
EDRD 637 Supervised Literacy Practicum ............................................................................. 3
EDSE 662 Consultation and Collaboration .......................................................................... 3
EDSE 627 Psychoeducational Assessment ......................................................................... 3

Certificate in ASTL: Mathematics (Middle/Secondary)  CERG-AMTH
This 18-credit certificate provides advanced professional development in mathematics teaching and learning for practicing middle or high school mathematics teachers. The 18 credits include five mathematics classes and one special topic in education course. Students must choose to pursue either middle or secondary education requirements.

Course Work  Credits
Middle Education, Grades 6–8:
EDCI 597 Special Topics in Education ............................................................................. 3
MATH 601 Analysis I for Teachers ................................................................................... 3
MATH 604 Geometry for Teachers ................................................................................... 3
MATH 605 Discrete and Finite Mathematics for Teachers ..................................................... 3
MATH 607 Algebraic Structures for Teachers ..................................................................... 3
MATH 608 Problem Solving in Mathematics ..................................................................... 3

Secondary Education, Grades 9–12:
EDCI 597 Special Topics in Education ............................................................................. 3
MATH 601 Analysis I for Teachers ................................................................................... 3
MATH 602 Analysis II for Teachers ................................................................................... 3
MATH 604 Geometry for Teachers ................................................................................... 3
MATH 605 Discrete and Finite Mathematics for Teachers ..................................................... 3
MATH 607 Algebraic Structures for Teachers ..................................................................... 3
■ Certificate in ASTL: Physical Education

This 18-credit certificate program is designed for professionals who are interested in enhancing and promoting teacher knowledge, abilities, and status as educators and professional leaders in physical education.

Course Work

- EDLE 623 Research Design and Statistical Reasoning ............................. 3
- PHED 670 Analysis of Teaching in Physical Education .......................... 3
- PHED 672 Curriculum Development and Assessment in Physical Education ............................................ 3
- PHED 673 Motor Development for Special Populations .......................... 3
- PHED 680 Mentoring and Supervision in Physical Education .................. 3

Elective: choose one from the following or a course pre-approved by advisor

- DANC 553 Teaching Creative Movement .............................................. 3
- DANC 580 Laban Movement Analysis .................................................... 3
- EDIT/EDCI 705 Instructional Design ...................................................... 3
- EDLE 610 Leading Schools and Communities ......................................... 3
- EDUC 539 Human Development and Learning, PK–12 ......................... 3
- EDUC 672 Human Development and Learning, Secondary Education ...... 3
- EFHP 606 Foundations of Exercise, Fitness, and Health Promotion ........ 3
- EFHP 610 Advanced Exercise Physiology ................................................ 3
- EFHP 611 Fitness Assessment: Theory and Practice .................................. 3
- EFHP 614 Advanced Exercise Nutrition ................................................. 3
- EFHP 618 Exercise and Sport Psychology ............................................... 3

■ Certificate in ASTL: Science

This 18-credit certificate provides course work in the area of science related to the Virginia Standards of Learning. Students are prepared to be lead teachers on either of two levels: K–6 or 6–12.

Course Work

- EDCI 663 Research in Science Teaching ............................................... 3
- EDCI 683 Curriculum Development and Evaluation in Science Education ........................................................................ 3
- EDCI 693 Leadership and Organizational Issues in Science Education ........................................................................ 3
- EDLE 791 Internship in Education Leadership ........................................ 3

Science courses relevant to school level with advisor’s approval ................. 6

■ Certificate in ASTL: Teacher Leadership

This 18-credit certificate provides practicing teachers with course work in educational leadership that can be applied in their school settings.

Course Work

- EDLE 612 Educational Law .................................................................. 3
- EDLE 618 Supervision and Evaluation of Instruction ............................ 3
- EDLE 610 Leading Schools and Communities ................................ ........ 3
- EDLE 620 Organizational Theories and Leadership Development .......... 3
- EDUC 597 Special Topics in Education: Trends and Issues in Instruction ........................................................................ 3
- EDUC 598 Directed Reading, Research, and Individual Projects .......... 3

■ Certificate in Applied Behavior Analysis

This 15-credit nonlicensure certificate is designed to increase the professional training of individuals responsible for designing, implementing, and monitoring behavioral treatment programs in schools, agencies such as psychiatric hospitals, and training centers for people with severe disabilities.

Course Work

- EDSE 619 Applied Behavior Analysis Principles, Procedures, and Philosophy .................................................. 3
- EDSE 621 Advanced Applied Behavior Analysis Empirical Basis ........ 3
- EDSE 623 Advanced Applied Behavior Analysis Assessments and Interventions ....................................................... 3
- EDSE 624 Applied Behavior Analysis Applications ............................. 3
- EDSE 625 Applied Behavior Analysis Verbal Behavior ......................... 3
- EDSE 790 Internship Special Education* ............................................. 1–6

* May be taken to meet BCACA supervised practicum requirements

■ Certificate in Assistive Technology

This 15-credit certificate provides supplemental training for practitioners, families, and caregivers who use assistive technology while working with people with disabilities. The certificate is appropriate for general and special educators, related service personnel, adult service providers, and families and caregivers who need to apply assistive technology solutions within their specific discipline or school, work, home, or community setting.

Course Work

- EDSE/EDIT 510 Introduction to Assistive Technology ......................... 3
- EDSE 610 Designing Adaptive Environments ...................................... 2

Electives: Choose ten credits from the following:

- EDIT 522 Assistive Technology for Individuals with Sensory Impairments ......................................................... 2
- EDSE/EDIT 523 Accessibility and Input Modification ..................... 1
- EDSE/EDIT 524 Assistive Technology for Individuals with Learning Disabilities .................................................. 2
- EDSE/EDIT 525 Software for Individuals with Special Needs ............ 2
- EDSE/EDIT 526 Web Accessibility and Design ................................. 1
- EDSE 527 Adapted Sports, Recreation, and Leisure ......................... 1
- EDSE 528 Low-Technology Assistive Technology Solutions ............ 1
- EDSE/EDIT 529 Internet as an Assistive Technology Tool ................ 2
- EDSE 534 Communication and Severe Disabilities ......................... 3
- EDSE 622 Augmentative Communication ........................................ 2
- EDIT 797 Special Topics ............................................................. 1–3
- EDUC 600 Workshop in Education .................................................. 1–6

■ Certificate in E-Learning

This 15-credit graduate certificate provides professionals with the specialized knowledge and skills needed to apply today’s Internet and web-based technologies to educational and training goals within school, community, and corporate settings. Courses are delivered in online, face-to-face, and blended formats that model e-learning delivery modes.
### Certificate in FAST
- **CERG-ADIB**
  - **TRAIN Advanced International Baccalaureate (Studies)**
  
  This 18-credit certificate provides advanced professional development for teachers on the philosophy, elements, and assessments of the PYP, MYP, and DP programs. The concentration focuses on the theory, pedagogy, and research underlying the International Baccalaureate programs.
  
  - EDUC 621 Teaching and Learning in the International Baccalaureate Primary Years Program ........................................ 3
  - EDUC 622 Curriculum Development across International Baccalaureate Programs .................................................. 3
  - EDUC 623 Models and Strategies for Teaching and Learning in International Baccalaureate Schools .......................... 3
  - EDUC 624 Assessment and Learning in International Baccalaureate Schools ......................................................... 3
  - EDUC 626 Inquiry into Action: International Baccalaureate Teachers, Learners, and Schools ................................. 3
  - EDUC 627 Contemporary Issues in International Baccalaureate ................................................................. 3

### Certificate in FAST
- **CERG-SPFT**
  - **TRAIN Special Education**
  
  This 15-credit certificate is designed for preservice and inservice international teacher educators who desire additional training in special education. All course work may be applied to the MEd in special education program and will count for Virginia licensure in special education PK through grade 12.
  
  - **Course Work**
  - EDUC 501 Introduction to Special Education .......................... 3
  - EDUC 502 Classroom Management and Applied Behavior Analysis ................................................................. 3
  - EDUC 540 Characteristics of Students with ED/LD ............. 3
  - EDUC 627 Psychoeducational Assessment .......................... 3
  - EDUC 622 Consultation and Collaboration ........................ 3
  
  **Note:** Most course work has some field experience component.

### Certificate in Integration
- **CERG-ITTS**
  - **Technology in Schools**
  
  This 16-credit certificate is offered to teachers who wish to gain the necessary knowledge and skills for integrating technology into the K–12 curriculum. It is designed to fulfill the state-mandated technology competencies for teachers.
  
  - **Course Work**
  - EDUC 514 Methods of Integration ..................................... 3
  - EDIT 561 Teaching with Telecommunications ................... 1
  - EDIT 562 Teaching with Databases .................................. 1
  - EDIT 566 Teaching with Multimedia and Hypermedia .......... 2
  - EDIT 579 Advanced Topics in Education: Web-Based Learning ................................................................. 3
Certificate in the Online Academy for Teachers

This 15-credit certificate is offered to teachers who want to gain the necessary knowledge and skills to teach students in virtual environments.

Course Work Credits
EDCI 714 Designing Online Learning .........................3
EDIT 641 Understanding Virtual Schools ..................1
EDIT 642 The Online Academy .................................1
EDIT 643 Online Mentoring 1: Building Virtual Relationships .................................................................1
EDIT 644 Online Mentoring 2: Promoting Self-Regulation .................................................................1
EDIT 645 Online Mentoring 3: Conceptual Learning ....1
EDIT 646 Online Mentoring 4: Moderating .................2
EDIT 790 Practicum in Instructional Technology ........2
EDIT 611 Innovations in Distance Learning .................3

Certificate in Post-Master’s Counseling Licensure

This 15-credit certificate offers courses toward school counseling and community agency counseling licensure for post-master’s degree students. These certificates are designed for individuals who possess a master’s degree in counseling or a highly related field and seek at least 15 credits of post-graduate course work to meet licensure requirements for a Virginia school counselor or licensed professional counselor.

Course Work Credits
Choose 9 to 16 credits from the following:
Post-Master’s Counseling Licensure – Virginia School Counselor
EDCD 606 Counseling Children and Adolescents ..........4
EDCD 611 Introduction to Ethical and Legal Issues in School Counseling ..................................................2
EDCD 626 Principles and Practices of School Counseling .................................................................3

Post-Master’s Counseling Licensure – Licensed Professional Counselor
EDCD 609 Advanced Counseling Skills and Strategies ....4
EDCD 652 Introduction to Substance Abuse Counseling ..3
EDCD 654 Counseling, Ethics, and Consultation in Community Agencies .........................................................3
EDCD 656 Diagnosis and Treatment Planning for Mental Health Professionals ...............................................3
EDCD 658 Couples and Family Counseling ..................3
Choose 3 to 6 credits from the following (with permission of the instructor):
EDCD 597 Special Topics in Education .....................1–3
EDCD 895 Emerging Issues in Counseling and Development ........................................................................3
EDCD 896 Advanced Multicultural Counseling ................3
EDCD 897 Advanced Group Counseling ....................3

Choose from the following (may be substituted for other courses):
EDCD 755 Practicum in Counseling ..........................3
EDCD 791 Internship in Counseling ..........................3

Certificate in Secondary Education Licensure

This 21-credit certificate offers course work for teacher licensure to students enrolled in nonlicensure graduate programs at Mason or those who already have a master’s degree.

Course Work Credits
EDUC 522 Foundations of Secondary Education ...........3
EDCI 500-level Curriculum and Methods
Choose one content course specific to your program: ....3
EDCI 567 Social Science
EDCI 569 English
EDCI 572 Mathematics
EDCI 573 Science
EDUC 672 Human Development and Learning ..........3
EDCI 600-level Advanced Curriculum and Methods.
Choose one content course specific to your program: ....3
EDCI 667 Social Science
EDCI 669 English
EDCI 672 Mathematics
EDCI 673 Science
EDRD 619 Literacy in the Content Areas (must be taken with the internship) .........................................3
EDCI 790 Internship in Secondary Education .............6

Certificate in Severe Disabilities

This 36-credit certificate offers required course work for teacher licensure in severe disabilities to be completed with 15 to 36 credits based on the number of equivalent courses completed prior to enrollment.

Course Work Credits
EDSE 501 Introduction to Special Education .................3
EDSE 531 Transition and Community-Based Instruction ..3
EDSE 532 Positive Behavior Supports or EDSE 502 Classroom Management and Applied Behavior Analysis .........................................................3
EDSE 534 Communication and Severe Disabilities .......3
EDSE 533 Curriculum and Assessment in Severe Disabilities or EDSE 627 Psychoeducational Assessment ..........3
EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities ....................................3
EDSE 557 Language Development and Emergent Literacy for Diverse Learners, Ages 3–5 .........................3
EDSE 661 Curriculum and Methods: Severe Disabilities ........................................................................3
EDSE 662 Consultation and Collaboration ....................3
EDSE 669 Interdisciplinary Approaches for Children with Sensory and Motor Disabilities ..................3
EDSE 790 Internship Special Education* (two experiences) .................................................................4
EDSE 791 Midpoint Portfolio ......................................1
EDSE 792 Final Portfolio ...........................................1
*One elementary level and one secondary level. May be taken to meet BCABA supervised practicum.

Certificate in Special Education Leadership

This 15-credit certificate is designed to provide training for educators who administer program implementation efforts for learners with exceptional needs. It is appropriate for those who have an interest in becoming special education directors, program coordinators, department chairs, or lead teachers; however, opportunities beyond special education also exist.

Course Work Credits
EDSE 743 Leadership in Special Education Administration .................................................................3
EDSE 744 Current Issues in Special Education .............3
Choose three from the following:
EDSE 626 The Inclusive Classroom........................................3
EDSE 701 Legal Issues and Special Populations..................3
EDSE 702 Managing Resources for Special Education
Programs........................................................................3
EDSE 703 Creating a Collaborative Culture.......................3

■ Certificate in Students CERG-SDGC
with Disabilities who Access
the General Curriculum (Licensure)
This 33-credit certificate offers required course work for
teacher licensure in learning disabilities, emotional distur-
ance, and mental retardation to be completed with 15 to 36
credits based on the number of equivalent courses completed
prior to enrollment.
**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSE 501 Introduction to Special Education</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 502 Classroom Management and Applied</td>
<td></td>
</tr>
<tr>
<td>Behavior Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 503 Language Development and Reading</td>
<td></td>
</tr>
</tbody>
</table>
| EDSE 540 Characteristics of Students with Disabilities
  Who Access the General Curriculum           | 3       |
| EDSE 544 Adaptive Instructional Methods and
  Transition for Secondary Learners           | 3       |
| EDSE 627 Psychoeeducational Assessment      | 3       |
| EDSE 628 Elementary Reading, Curriculum, and
  Strategies for Students with Mild Disabilities| 3      |
| EDSE 629 Secondary Curriculum and Strategies for
  Students with Mild Disabilities             | 3       |
| EDSE 662 Consultation and Collaboration     |         |
| EDSE 790 Internship in Special Education    | 4       |
| (two experiences)                           |         |
| EDSE 791 Midpoint Portfolio                 |         |

Note: Must be taken concurrently with the fourth or fifth
special education course.

EDSE 792 Final Portfolio
Note: Must be taken concurrently with last special education
course.

■ Certificate in Teaching CERG-ETSE
Students with Autism
This 15-credit certificate is designed to provide teacher train-
ing in topic areas required to implement instructional programs
for students with autism. This certificate is appropriate for
those special education teachers providing instruction to
students with autism in a variety of educational settings.
**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSE 534 Communication and Severe Disabilities</td>
<td>3</td>
</tr>
</tbody>
</table>
| EDSE 620 Managing Severely Challenging Behaviors and
  Applied Behavior Analysis                   | 3       |
| EDSE 634 Characteristics of Students with Autism | 3       |
| EDSE 635 Interventions for Students with Autism |         |
| EDSE 665 Collaboration with Families of Children
  with Special Needs                         | 3       |

■ Certificate in Visual CERG-VILI
Impairments Licensure, PK–12
This 32-credit certificate is designed for students seeking
initial teacher licensure in visual impairments, PK–12, to be
completed with 15 to 32 credits based on the number of
equivalent courses completed prior to enrollment.

**Course Work**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSE 511 Characteristics of Students with Visual Impairments</td>
<td>1</td>
</tr>
<tr>
<td>EDSE 512 Braille Code</td>
<td></td>
</tr>
<tr>
<td>EDSE 513 Medical and Educational Implications of Visual Impairments</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 514 Orientation and Mobility for Students with Visual Impairments</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 518 Curriculum and Assessment for Students with Visual Impairments</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 522 Assistive Technology for Individuals with Sensory Impairments</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 532 Positive Behavior Supports</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 613 Teaching Methods for Students with Visual Impairments</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 616 Braille Reading and Writing</td>
<td></td>
</tr>
<tr>
<td>EDSE 662 Consultation and Collaboration</td>
<td>3</td>
</tr>
<tr>
<td>EDSE 790 Internship in Special Education</td>
<td>4</td>
</tr>
<tr>
<td>EDSE 791 Midpoint Portfolio</td>
<td>1</td>
</tr>
<tr>
<td>EDSE 792 Final Portfolio</td>
<td>1</td>
</tr>
</tbody>
</table>

■ Education, PhD PHD-EDUC
The PhD in education provides advanced professional educa-
tion for experienced educational practitioners pursuing or
planning careers in educational settings. The program requires
85–96 credits beyond the baccalaureate degree or a minimum of
55–66 credits beyond the master’s degree. A student’s individu-
Al credit requirement depends on goals, program require-
ments, and previous preparation. A limited number of
graduate credits taken previously may be applied; however,
a student’s total program typically requires 10 more credits
than those minimum requirements, depending on goals,
program requirements, and previous preparation.

With the guidance of faculty, students develop individual
programs of study in concert with their goals, program re-
quirements, and self-assessed skills and knowledge. Each
student’s program must include study in a professional field,
such as education administration, educational psychology,
instructional technology, special education, curriculum, in-
struction, international education, bilingual education,
counseling and development, early childhood education, or
literacy. The specific nature of courses is determined by the
student in conjunction with a faculty doctoral advising com-
mittee after completing two semesters. Students also complete
a secondary concentration of study consisting of 12 credits.

To complete the PhD program, each student must demonstrate
competence in oral and written English, computer literacy,
mastery of knowledge and skills in the area of professional
expertise, and the ability to apply general and specific knowl-
edge and skills to significant educational problems. Students
demonstrate these competencies by successfully completing
courses, seminars, and a doctoral portfolio, and preparing and
orally defending a doctoral dissertation. Students have five
years from the time they enroll in their first class to complete
all course work and the doctoral portfolio. Five additional
years, starting with the date on which students are advanced
to candidacy, are allowed to complete the dissertation.

**Admission Requirements**
Candidates are admitted to study by GSE; admission is
highly selective. Applicants must fulfill the following admis-
sion requirements:

- A minimum of three years of successful experience as a
  practitioner in an educational setting
• Baccalaureate or master’s degree from an accredited institution
• Demonstrated high intellectual capability
• Demonstrated leadership potential
• Three letters of recommendation
• GRE general test scores and the writing assessment
• Written goals statement relating study in the PhD program to educational and career plans
For more information, call the PhD in Education Program Office at 703-993-2011.
Completed applications must be submitted to the GSE Graduate Admissions Office by February 1 for admission for the following summer or fall, or by September 1 for admission for the following spring.

Degree Requirements

Course Work

<table>
<thead>
<tr>
<th>General Culture</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 800 Ways of Knowing</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 802 Leadership Seminar</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 805 Doctoral Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>

Research Methods

<table>
<thead>
<tr>
<th>Research Methods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRS 810 Problems and Methods in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 811 Quantitative Methods in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 812 Quantitative Methods in Education Research</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective (choose one of the following):
- EDRS 820 Evaluation Methods for Educational Programs and Curricula

EDRS 821 Advanced Applications of Quantitative Methods

EDRS 822 Advanced Applications of Qualitative Methods

EDRS 823 Advanced Research Methods in Single Subject and Case Design

Professional Specialization

These courses differ according to a student’s major specialization but always include 3 internship credits. Professional specialization fields of study include counseling and development, early childhood education, education leadership, educational psychology, international education, instructional technology, literacy and reading, mathematics or science education leadership, multilingual or multicultural education (English as a second language), research methodology, special education, and teaching and teacher education.

Secondary Emphasis

Students have several options including secondary emphasis within GSE or other Mason units, interdisciplinary secondary emphasis, or using the master’s degree as part of the secondary emphasis requirements.

Dissertation

<table>
<thead>
<tr>
<th>Dissertation</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 998 Doctoral Dissertation Proposal</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 999 Doctoral Dissertation Research</td>
<td>9</td>
</tr>
</tbody>
</table>

Internships

Students enroll in at least one and up to three internships designed to broaden their professional expertise. One internship must be taken in a setting that differs from the student’s work setting.
The mission of the College of Health and Human Services (CHHS) is to equip professionals to provide leadership, care, and services related to health promotion, wellness, disease prevention, and quality of life through the promotion of physical, social, and environmental health practices. Graduates practice in a variety of roles in settings that are complex, multicultural, and dynamic. The college is a resource for health promotion to the university, as well as to citizens of Virginia.

The State Council of Higher Education for Virginia and the State Board of Nursing approved the baccalaureate nursing program in 1974. Since then, the program has grown from a department of nursing to a school of nursing. In 1993, the school was reorganized into the College of Nursing and Health Science, and in 2006, into the College of Health and Human Services to provide the breadth needed to respond to dramatic and dynamic fundamental changes occurring in health care and social work. The expanded, multidisciplinary CHHS offers degree programs and research opportunities in health administration, health policy, health information systems, health services research, nursing, nutrition, rehabilitation science, senior care, and social work.

Administration
Shirley Travis, Dean
Robin Remsburg, Associate Dean and Director, School of Nursing
J. Goodlett McDaniel, Associate Dean, Practice, Marketing, and Finance
Frank J. Whittington, Associate Dean, Academic Affairs
Vacant, Assistant Dean, Student Affairs and Enrollment Management
Lisa Pawloski, Chair, Global and Community Health
P. J. Maddox, Chair, Health Administration and Policy
Miriam Raskin, Acting Chair, Social Work

Faculty
Faculty emeriti: Ailinger, Carty, Cohelan, Jenkins, Johnson-Brown, Parker-Smith, Redmond, Silva, Walker

Professors: Alemi, Butler, Gaffney, Gerber, Hadley, Howell, Maddox, Meiners, Metcalf, Moore, Raskin, Ritchie, Rose, Sluzki, Sorrell, Travis, Whittington


Assistant professors: Boland, Boyd, Brenkus, Cangelosi, Carle, Cartwright, Cleaveland, Gewa, Hahn, Ihara, Jacobsen, Kitsantas, Kodadek, Mariedegue, Miklancie, Normile, Oh, Perlin, Roberts, Rudowski, Smoczynski, Telford, Tompkins, Urban, Webster, Weinstein, Willis, Yang, Young, Zhou

Instructors: Almond, Blasser, Campo, Clark, Cox, Davis, Dickman, Durham, Gaston, Gillette, Hall, Henderson, Kiernan-Stern, Liss, Middle, Moss, Mulqueen, Shiver, Stoehr, Toulouse, Venske, Welsh

Course Work
CHHS offers all course work designated GCH, HAP, HHS, NURS, and SOCW in the Course Descriptions chapter of this catalog.

Academic Programs
School of Nursing
- Bachelor of Science in Nursing (BSN)
  Traditional Pathway
  Second Degree
  LPN-BSN
  RN-BSN
- Master of Science in Nursing (MSN)
  Advanced Clinical Nursing
  Advanced Clinical Nursing (Master’s International)
  Clinical Nurse Leader
  Nurse Educator
  Adult Nurse Practitioner in Primary Care
  Adult/Gerontological Nurse Practitioner in Primary Care
  Family Nurse Practitioner in Primary Care
  Nursing Administration
  Nursing Administration (Master’s International)
  RN-MSN
- MSN/MBA Program
- PhD in Nursing
  Nursing Administration
Health and Human Services in a variety of agencies in the Northern Virginia area. Continuing education is a commitment of CHHS and Mason.

Academic Outreach

Continuing education is a commitment of CHHS and Mason. Activities are planned to meet the special needs of individuals and groups in the community. CHHS offers opportunities for credit and noncredit courses. Contract courses are offered in a variety of agencies in the Northern Virginia area. Comments and suggestions for programming from the health care community are welcomed. For information about specific activities, call 703-993-1910 or 703-993-2120.

Professional Conduct Policy

CHHS reserves the right to place on probation, suspend, or dismiss any student in the program who does not demonstrate professional conduct. This conduct includes, but is not limited to, verbal abuse or insubordination, as well as behavior that threatens the safety of a client, another student, a faculty member, or other health care provider when the behavior occurs within the context of the academic program. The student has the right to appeal.

Student Affairs and Enrollment Management

The Office of Student Affairs and Enrollment Management maintains student records and reviews for degree completion, acts on all student issues with the exception of grade appeals (which are filed according to university policy described in the Academic Policies chapter of this catalog), and processes all academic actions for undergraduate and graduate students enrolled in the college. Student health and immunization records, copies of active licenses, and copies of current CPR certification are maintained in student files. All students are assigned an academic advisor and are expected to meet with the advisor at least one time per semester.

Many clinical agencies and practicum sites mandate that all students have a criminal background check. All students enrolled in the School of Nursing are required to complete a background check prior to beginning their program. Students enrolled in other CHHS programs may be required to complete background checks before entering a practicum environment.

Information obtained from the background check is confidential and may result in a student’s inability to perform clinical or practicum activities and, therefore, will disqualify the student from entering or continuing in the academic program. Students must pay a fee for the background check. Students also are responsible for notifying the assistant dean of student affairs and enrollment management of any arrests, regardless of adjudication, that occur after acceptance and during enrollment in the program. Failure to promptly notify the assistant dean of student affairs and enrollment management may be grounds for dismissal from the student’s program.

To comply with the regulations established by the Commonwealth of Virginia and the agencies to which students are assigned and minimize risks to student health, every student enrolled in a CHHS program requiring clinical or practicum course work must document and submit evidence of good health and currency in immunization requirements on admission to the CHHS. Immunizations can be obtained from Student Health Services in Student Union Building I on the Fairfax Campus, the Truland Building on the Arlington Campus, or the Occoquan Building on the Prince William Campus. Students must submit copies of required health records to the CHHS Office of Student Affairs and Enrollment Management. That office may verify compliance for clinical and practicum agencies but will not release health records to any agency without authorization from the student. Students should keep their own copies of health records available for clinical and practicum assignments should the agency require documentation. All costs associated with immunization and certifications are the student’s responsibility.
All students are required to have an active Mason e-mail account. Students are responsible for their own uniforms and transportation. Student liability insurance is provided by the university. Students are strongly advised to maintain health insurance coverage at all times. An accident and health insurance plan is available through Mason. Students are responsible for their own health care, including emergency care. CHHS assumes no financial responsibility for the health care of students.

**School of Nursing**

**UNDERGRADUATE PROGRAMS**

**Bachelor of Science in Nursing**

The Bachelor of Science in Nursing (BSN) Program is accredited by the Virginia State Board of Nursing and the Commission on Collegiate Nursing Education. The undergraduate nursing program prepares students to deliver superior nursing care and provide leadership in nursing in the increasingly complex and challenging field of modern health care. Graduates are in demand as professional nurses in hospitals, long-term care facilities, and community health and other health care agencies. The program emphasizes health promotion and disease prevention, capitalizing on early detection of potential health problems, health maintenance in ambulatory services, and preparation for the managerial responsibilities of nursing.

The School of Nursing offers four pathways to complete the BSN, all of which lead to completion of the objectives of the undergraduate program. The traditional pathway is a two-year curriculum following the completion of general education and prerequisite requirements. The LPN-to-BSN pathway is offered for students holding current LPN licenses and is also a two-year curriculum following completion of general education and prerequisite requirements. An accelerated RN-to-BSN pathway for students holding current registered nurse (RN) licenses can be completed in one year (full-time) following completion of general education and prerequisite requirements. The accelerated, second degree pathway is a 12-month, full-time pathway for students holding a baccalaureate degree outside of nursing. The nursing programs may be completed on a full-time or a part-time basis, with the exception of the accelerated second degree program. Students who are interested in pursuing a major in nursing, with the exception of those currently licensed as RNs, must make an additional and separate application through the School of Nursing and are encouraged to contact the nursing program for advising prior to applying to the nursing major.

Clinical nursing begins at the junior level. Students must complete a prenursing curriculum and be admitted to junior standing or one of the accelerated pathways. These conditions do not apply to students who are already RNs.

Attendance at the first meeting of all nursing courses (lectures, on-campus laboratories, and agency laboratories) is mandatory.

**Acceptance into the Traditional Nursing Pathway**

To be eligible to apply for junior standing, traditional prenursing students must complete the designated nursing prerequisite course work (wherever taken). The acceptable GPA may increase each year based on the number of spaces available in the nursing program. Transfer students and those changing their majors to nursing are ranked downward from 4.00 on the basis of the number of junior spaces available in any given year. Students admitted as prenursing freshmen must have a minimum GPA of 3.00 in the designated nursing prerequisites.

Students are accepted for junior standing each fall. The application deadline is March 1, and students are notified of their status in June. Permission to register for courses with NURS prefixes requires prior acceptance into junior standing in nursing. Full-time nursing requires carrying a heavy schedule; therefore, outside obligations should be limited to ensure success. Mason provides opportunity for credit by exam in several courses for students presenting evidence of previous education.

**Traditional BSN Pathway Requirements**

Candidates for the degree must present at least 120 credits. Specific requirements are as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Education</strong></td>
<td>30</td>
</tr>
<tr>
<td><strong>Composition</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Information Technology</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Literature</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Arts</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Western Civilization</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Global Understanding</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Sociology or Anthropology</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Psychology</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Anatomy and Physiology</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Microbiology</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Ethics</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Statistics</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Developmental Psychology</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Traditional Nursing Major</strong></td>
<td>62</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120</td>
</tr>
</tbody>
</table>

No more than 3 credits of nursing electives may be used to satisfy this requirement.
BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. Statistics 250 fulfills the quantitative reasoning portion of Mason’s general education requirements. Nursing students must take an approved synthesis course (HHS 465, 3 credits).

**Acceptance into the LPN-to-BSN Nursing Pathway**

To be eligible to apply for junior standing, students who are LPNs must complete the designated nursing prerequisites and general education requirements by the end of the spring semester preceding entry to the nursing program. Students must earn a C or better in anatomy and physiology (BIOL 124 and 125, 8 credits); microbiology (BIOL 246 and 306, 4 credits); statistics (STAT 250, 3 credits); nutrition (GCH 295, 3 credits); developmental psychology (PSYC 211, 3 credits); and ethics (PHIL 151 or 309, 3 credits). Applicants to the second degree pathway must achieve a minimum GPA of 3.00 in the designated prerequisite course work.

Students who are interested in pursuing a major in nursing must make an additional and separate application for junior standing through CHHS. Admission to the nursing program is competitive. It is based on a minimum cumulative GPA of 3.00 in the designated nursing prerequisite course work (wherever taken). The acceptable GPA may increase each year based on the number of spaces available in the nursing program.

Students are accepted for junior standing each fall. The application deadline is March 1, and students are notified of their status in June. Permission to register for courses with NURS prefixes requires prior acceptance into junior standing in nursing. Full-time nursing requires carrying a heavy schedule; therefore, outside obligations should be limited to ensure success. Mason provides opportunity for credit by exam in several courses for students presenting evidence of previous education.

▲ **LPN-to-BSN Pathway Requirements (LPN)**

Candidates for the degree must present at least 120 credits. Specific requirements are as follows:

<table>
<thead>
<tr>
<th>General Education</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition (ENGL 101 and 302)</td>
<td>6</td>
</tr>
<tr>
<td>Communication (COMM 100 or 101)</td>
<td>3</td>
</tr>
<tr>
<td>Information technology (IT 103)</td>
<td>3</td>
</tr>
<tr>
<td>Literature (at the 200 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization (HIST 100 or 125)</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding (GCH 205 recommended)</td>
<td>3</td>
</tr>
<tr>
<td>Sociology or anthropology (SOCI 101 or ANTH 114)</td>
<td>3</td>
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<tr>
<td>Psychology (PSYC 100)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designated Nursing Prerequisites</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and physiology (BIOL 124 and 125)</td>
<td>8</td>
</tr>
<tr>
<td>Microbiology (BIOL 246 and 306)</td>
<td>4</td>
</tr>
<tr>
<td>Ethics (PHIL 151 or 309)</td>
<td>3</td>
</tr>
<tr>
<td>Statistics (STAT 250)</td>
<td>3</td>
</tr>
<tr>
<td>Developmental psychology (PSYC 211)</td>
<td>3</td>
</tr>
<tr>
<td>Nutrition (GCH 295)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LPN-to-BSN Nursing Major</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHS 465</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>1</td>
</tr>
</tbody>
</table>

**Credit by Exam**

5

On successful completion of NURS 334, LPN students will be awarded 5 credits in nursing.

**Total**

120

BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. Statistics 250 fulfills the quantitative reasoning portion of Mason’s general education requirements. Nursing students must take an approved synthesis course (HHS 465, 3 credits).

**Acceptance into the Accelerated, Second Degree BSN Pathway**

The Accelerated, Second Degree BSN Pathway is designed for students who already hold a degree who are interested in pursuing an undergraduate degree in nursing. Students must have a baccalaureate degree from an accredited college or university. This full-time accelerated program begins in the fall semester and is completed in 12 months. Students must earn a C or better in anatomy and physiology (BIOL 124 and 125, 8 credits); microbiology (BIOL 246 and 306, 4 credits); statistics (STAT 250, 3 credits); nutrition (GCH 295, 3 credits); developmental psychology (PSYC 211, 3 credits); and ethics (PHIL 151 or 309, 3 credits). Applicants to the second degree pathway must achieve a minimum GPA of 3.00 in the designated prerequisite course work.

Admission to the second degree nursing program is competitive. Students must have a minimum cumulative GPA of 2.75 in their first degree or a 3.00 GPA in the last 30 credits of the undergraduate degree. They also must complete the application including an intentional essay. To be eligible to apply to this program, students must complete the designated nursing prerequisites by the end of the spring semester preceding entry into the nursing program.

The application deadline is March 1, and students are notified of their status in June. Permission to register for courses with NURS prefixes requires prior acceptance into junior standing in nursing. Full-time nursing requires carrying a heavy schedule; therefore, outside obligations should be limited to ensure success. Mason provides opportunity for credit by exam in several courses for students presenting evidence of previous education.

▲ **Accelerated, Second Degree BSN Pathway Requirements (SEC)**

Candidates for the degree must present at least 120 credits: 24 credits are required prerequisites, and 49 credits are transfer credits from the first degree. Specific requirements are as follows:

<table>
<thead>
<tr>
<th>General Education</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mason general education requirements are satisfied by the initial degree and fulfilled through transfer credit.</td>
<td>49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designated Nursing Prerequisites</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and physiology (BIOL 124 and 125)</td>
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<tr>
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</tr>
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<td>Developmental psychology (PSYC 211)</td>
<td>3</td>
</tr>
<tr>
<td>Nutrition (GCH 295)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Degree Nursing Major</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 305, 309, 310, 319, 334, 343, 350, 351, 419, 425, 427, 428, 429, 436, 440, 453</td>
<td>47</td>
</tr>
<tr>
<td>HHS 465</td>
<td>3</td>
</tr>
</tbody>
</table>
Total ................................................................. 120
Nursing students must take an approved synthesis course (HHS 465, 3 credits).

Acceptance into the Accelerated RN-to-BSN Pathway

Students who hold current RN licenses need to apply only to the university and have no separate application to the School of Nursing. The Accelerated RN-to-BSN Pathway allows RNs to progress quickly through the program while meeting the objectives of the undergraduate curriculum. On completion of the general education requirements and designated nursing prerequisites, RN students can complete the BSN in two semesters of full-time study. The program can also be completed on a part-time basis.

RN students must satisfy all general education requirements and nursing prerequisites. Transfer credits are accepted for many general education and prerequisite courses that may have been completed at other colleges or universities. RN students may use any 6 credits of psychology to satisfy the PSYC 100/211 requirement. Mason provides opportunity for credit by exam in several courses for students presenting evidence of previous education.

▲ Accelerated RN-to-BSN Pathway Requirements (RN)
Candidates for the degree must present at least 120 credits. A minimum of 30 credits must be earned at Mason to fulfill requirements for graduation. Specific requirements are as follows:

<table>
<thead>
<tr>
<th>Credits</th>
<th>General Education and Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition (ENGL 101 and 302)</td>
<td>6</td>
</tr>
<tr>
<td>Communication (COMM 100 or 101)</td>
<td>3</td>
</tr>
<tr>
<td>Literature (at the 200 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization (HIST 100 or 125)</td>
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<tr>
<td>Global understanding (GCH 205 recommended)</td>
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<tr>
<td>Sociology or anthropology (SOCI 101 or ANTH 114)</td>
<td>3</td>
</tr>
<tr>
<td>Psychology</td>
<td>6</td>
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<tr>
<td>Anatomy and physiology (BIOL 124 and 125)</td>
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<tr>
<td>Ethics (PHIL 151 or 309)</td>
<td>3</td>
</tr>
<tr>
<td>Statistics (STAT 250)</td>
<td>3</td>
</tr>
<tr>
<td>RN-to-BSN Nursing Major</td>
<td>27</td>
</tr>
<tr>
<td>NURS 334, 425, 436, 440, 441, 442, 453, and 400- or 500-level elective</td>
<td></td>
</tr>
<tr>
<td>HHS 465</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>9</td>
</tr>
<tr>
<td>No more than 3 credits of nursing electives may be used to satisfy this requirement.</td>
<td></td>
</tr>
<tr>
<td>Credit by Exam</td>
<td>33</td>
</tr>
<tr>
<td>On successful completion of NURS 334, RN students will be awarded 30 credits in nursing and 3 credits in general education.</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
</tr>
</tbody>
</table>

BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. Statistics 250 fulfills the quantitative reasoning portion of Mason’s general education requirements. Nursing students must take an approved synthesis course (HHS 465, 3 credits).

Writing-Intensive Requirement

Mason requires all students to complete at least one course in their majors designated “writing intensive” at the 300 level or above. Students majoring in nursing fulfill this requirement by successfully completing HHS 465.

Academic Grade Standards

Students who earn a final grade lower than a C in a nursing course must repeat the course and earn a grade of C or higher. In these cases, students are placed on nursing academic warning. Students on nursing academic warning must notify the assistant dean for Student Affairs and Enrollment Management of their intent to repeat the course in writing, within two weeks of the course. Students should be aware that space may not be available in some clinical nursing courses that they may need to repeat. Although attempts at placement will be made, students must understand that they may have to sit out a semester or more until space becomes available.

Nursing majors who fail a course must repeat the course and earn a C or higher to resume progression in classes with the NURS prefix. Before the course is repeated, the student may not register for any other courses with a NURS prefix without permission from CHHS.

Dismissal from any one of the nursing pathways constitutes dismissal from the School of Nursing.

Professional Conduct Policy

All students in the School of Nursing are expected to adhere to the Professional Conduct Policy outlined for CHHS.

Readmission

Readmission to the School of Nursing for nonacademic or professional infractions is not automatic. Former students must apply in writing for readmission to the assistant dean for student affairs and enrollment management by September 1 for the spring semester, February 1 for the fall semester, or November 1 for Summer Term. The letter should include a description of the circumstances surrounding the nonacademic suspension, a description of interim activities, steps taken to support success on readmission, reasons readmission is justified, and rationale to support expectation of success on readmission. Students meeting the above criteria are considered for readmission on a space-available basis. Students have the right to appeal unfavorable decisions.

Leave of Absence

Students in good standing may request a leave of absence from the program of up to two semesters. Readmission following the leave of absence is granted only on a space-available basis.

Appeal Process

Faculty members in the nursing program are generally the best judges of a student’s professional performance; however, some students may feel that the faculty member’s
judgment of readmission or dismissal is unfair. In such cases, the student should ask the assistant dean for undergraduate programs to reconsider the decision. If the student remains dissatisfied, the matter may be appealed to the director of the School of Nursing. If the director believes the student may have a legitimate complaint, the director will appoint a committee of three faculty members and a student peer to review the decision. After the committee thoroughly reviews the student’s case, it will issue a written recommendation to the director with a copy to the assistant dean for student affairs and enrollment management.

Student Learning Portfolio
All BSN students in the School of Nursing initiate a learning portfolio during the first semester of their junior year. The portfolio provides evidence of a student’s ability to meet programmatic outcomes as a care provider; designer, manager, and coordinator of care; and member of the profession. The portfolio also demonstrates development of professional values and behaviors by providing evidence of work completed throughout the nursing program. A Best Works Portfolio at the conclusion of the nursing program evaluates program outcomes and is used for ongoing professional development. Each course requires elements of the portfolio and is integrated into the course syllabus.

NCLEX Assessment
All BSN students, with the exception of RN-to-BSN students, must participate in preparation for the NCLEX-RN exam as specified in the School of Nursing. This may include taking a practice computerized NCLEX-preparation exam and achieving a passing score, as well as completion of remediation activities. Successful completion of the NCLEX review exam and any required remediation is required to achieve a passing grade in HHS 465.

Special Requirements
Fees and expenses specific to the nursing program are as follows: laboratory equipment kit, standardized testing, uniforms, stethoscope, name pin, books, course materials, transportation to and from agencies, CPR certification, review of health forms, immunizations, and any other additional fees as mandated by clinical agencies, such as the criminal background check.
A one-time lab fee and criminal background check are required of all students.

Nursing students are required to obtain a health exam and immunizations before registering for their first clinical course. Students must complete the three hepatitis B immunizations in accordance with current U.S. Public Health Service recommendations before entering the first clinical setting. The cost of the immunizations is the responsibility of the student. Students also must have annual tuberculosis screenings by PPD. Student immunization records are monitored at the CHHS Office of Student Affairs and Enrollment Management.

All students must have CPR certification before entering the first clinical nursing course and maintain it through the remainder of the program. Either the American Red Cross Professional Rescuer or the American Heart Association Basic Life Support is required. Clinical agencies sometimes require additional records and documentation before student participation. Any cost is the responsibility of the student.

Student assignments are based on the learning needs of the student without regard to the HIV or HBV status of the client. Failure to practice universal precautions and blood-borne pathogen safety results in dismissal from the program.

No student or faculty member will be discriminated against or denied admission to the nursing program for the sole reason that the student or faculty member has been exposed to, infected with, or diagnosed with HIV or HBV. In the event that a student has a clinical experience or practicum exposure to body fluids of a client, procedures and appropriate incident reports are to be completed according to institutional and nursing policies. Information related to exposure or infection is confidential, and dissemination of such information is based on the need-to-know criteria that apply generally in health care situations. A complete and detailed HIV/HBV policy is available in the CHHS Office of Student Affairs and Enrollment Management.

The drop period for nursing courses offered for fewer than 14 weeks is 3 weeks.

Because knowledge, skills, and behavior patterns in the major field of this program are so vital to the health and perhaps even the survival of individuals or groups being served, failure or borderline achievement cannot be tolerated. Therefore, the faculty of the nursing program has established, with approval of university faculty and administration, special major field quality standards that go beyond the general university quality standards printed elsewhere in this catalog.

RN and LPN Licensure Requirement
RN and LPN students are required to submit a copy of their current license prior to entering the first nursing course. RN- and LPN-licensed students must maintain their licensure throughout the academic program.

GRADUATE PROGRAMS

■ Master of Science MSN-NURS in Nursing

The Master of Science in Nursing (MSN) Program is accredited by the Virginia State Board of Nursing and the Commission on Collegiate Nursing Education. The program prepares nurses for a variety of leadership roles in the health care delivery system. The adult, adult/gerontological, and family nurse practitioner primary care concentrations are part of a collaborative program with George Washington University School of Medicine and Health Sciences. These concentrations have been approved by the state boards of nursing and medicine in Virginia. The concentration in advanced clinical nursing prepares nurses to provide and manage care of individuals, families, and groups, including the chronically ill, the elderly, and others with self-care limitations. The concentration in nursing administration prepares nurses to function in management positions in hospitals, nursing homes, community health agencies, and other health-related facilities. The nurse educator concentration prepares graduates for faculty positions in schools of nursing, as well as nurse educator positions in hospitals and community health agencies. The clinical nurse leader concentration prepares nurses as generalists with solid foundations in health policy and finance to provide competent care and clinical leadership within the health care system.
Admission Requirements
In addition to meeting graduate admission requirements, applicants to MSN programs must have a cumulative GPA of 3.00 for the last 60 credits of undergraduate work, hold an active license as a registered nurse (RN), and submit two letters of recommendation, a résumé, and a goals statement. Although the GRE is not formally required, applicants may be asked to submit GRE scores at the discretion of the school when it believes those scores will lead to a clearer presentation of the applicant’s qualifications. Applicants must have successfully completed undergraduate statistics and a graduate bivariate statistics course. (HHS 597)

Students applying to the advanced clinical nursing, clinical nurse leader, nurse educator, and all the nurse practitioner concentrations must have a health assessment skills continuing education course within 18 months prior to taking NURS 514 or 719. In addition, applicants to the nursing administration concentration are required to have the equivalent of one year’s experience in direct patient care as a registered nurse. Students applying to any nurse practitioner concentration are required to have a minimum of one year experience in direct patient care. It is recommended that students applying to the advanced clinical nursing concentration have the equivalent of one year’s experience in direct patient care as an RN.

Special Requirements
Graduate students are required to have annual health exams and immunizations before enrolling in practicum courses. Students must be in the process of completing a hepatitis B immunization series when they enroll for their first practicum course. Student health and immunization records are monitored at the CHHOS Office of Student Affairs and Enrollment Management. Criminal background checks are required of all School of Nursing students. All students are required to have an active Mason e-mail account.

Degree Requirements
The master’s program in nursing requires 37 to 48 graduate credits. Of these, a 13-credit core consists of course work in the theoretical foundations of nursing, applications in nursing research, a seminar in the ethics of health care, and a course on the organization of nursing and health care delivery systems. The nursing administration and clinical nurse leader concentrations require an additional 24 credits; the nurse educator concentration, an additional 25 credits; the advanced clinical nursing concentration, an additional 25 to 31 credits; the adult nurse practitioner concentration, an additional 29 credits; and the adult/gerontological and family nurse practitioner concentrations, an additional 35 credits. A graduate course in which a grade of C or below is earned may be repeated only once. Graduate students (both master’s and doctoral) may repeat no more than two courses in their total program of study.

Actual clinical hours may exceed those listed in the catalog. Actual clinical hours will meet those required for certification purposes. Credits listed in the catalog reflect the minimum required credits.

RN-to-MSN Pathway
This pathway allows RNs who have completed the general education requirements (as listed in the undergraduate RN-to-BSN Pathway) and have demonstrated substantial involvement in professional nursing within the past two years to earn the MSN degree. Students entering a concentration through this pathway must meet all the requirements for admission to that concentration.

In addition to fulfilling admission requirements for degree status at Mason, applicants must hold a current license to practice nursing, have earned a 3.00 GPA in the general education courses at an accredited institution, and demonstrate substantial involvement in professional nursing within the past two years as an RN in clinical practice.

Students in the RN-to-MSN pathway are required to take the following bridge course:

**NURS 595 RN-MSN Transition: Evidence-Based Community Health Nursing**
3 credits

After completion of the bridge course, students choose one of the seven concentrations and meet all requirements of the graduate program.

Degree Requirements

**MSN Core Courses (required of all students)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 660 Seminar in the Ethics of Health Care</td>
<td>3</td>
</tr>
<tr>
<td>NURS 680 Theoretical Foundations Related to Nursing</td>
<td>2</td>
</tr>
<tr>
<td>NURS 685 Advanced Nursing Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>NURS 686 Projects in Nursing Research</td>
<td>2</td>
</tr>
<tr>
<td>NURS 688 Organization of Nursing and Health Care Delivery Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

**Nursing Concentrations (select one):**

▲ **Adult Nurse Practitioner in Primary Care Concentration (ANPR)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 623 Clinical Concepts in Community-Oriented Primary Care</td>
<td>17</td>
</tr>
<tr>
<td>NURS 746 Practicum in Adult Primary Care  Nursing I</td>
<td>6</td>
</tr>
<tr>
<td>NURS 748 Practicum in Adult Primary Care  Nursing II</td>
<td>8</td>
</tr>
</tbody>
</table>

▲ **Adult/Gerontological Nurse Practitioner in Primary Care Concentration (AGNP)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 623 Clinical Concepts in Community-Oriented Primary Care</td>
<td>23</td>
</tr>
<tr>
<td>NURS 746 Practicum in Adult Primary Care  Nursing I</td>
<td>6</td>
</tr>
<tr>
<td>NURS 748 Practicum in Adult Primary Care  Nursing II</td>
<td>8</td>
</tr>
<tr>
<td>NURS 780 Practicum in Gerontological Primary Care Nursing I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 781 Practicum in Gerontological Primary Care Nursing II</td>
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</tbody>
</table>

▲ **Family Nurse Practitioner in Primary Care Concentration (FNUP)**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 623 Clinical Concepts in Community-Oriented Primary Care</td>
<td>23</td>
</tr>
<tr>
<td>NURS 720 Practicum in Family Primary Care  Nursing I</td>
<td>4</td>
</tr>
<tr>
<td>NURS 721 Practicum in Assessment and Management of the Developing Family</td>
<td>8</td>
</tr>
<tr>
<td>NURS 722 Practicum in Family Primary Care  Nursing II</td>
<td>8</td>
</tr>
</tbody>
</table>
Nurse Practitioner-Related Discipline Support

Course Work ................................................................. 12
NURS 719 Advanced Health Assessment ......................... 2
NURS 723 Clinical Decision Making ............................... 2
NURS 745 Pharmacology ................................................. 3
NURS 747 Pharmacology in Disease and Pathophysiology ......................... 1
NURS 756 Advanced Pathology and Pathophysiology .......... 4

* Required for ANPR, AGNP, and FNUP concentrations.
Colloquium with George Washington University (GWU) School of Medicine and Health Sciences. All courses offered at GWU are charged at GWU’s tuition rates. Nurse practitioner students must have taken a continuing education health assessment course with a skills component within 18 months of taking NURS 719.

▲ Advanced Clinical Nursing Concentration (NUAC)

Course Work ................................................................. 25
NURS 513 Advanced Pharmacology in Nursing ................ 3
NURS 514 Application of Advanced Health Assessment Methods* ......................................................... 1
NURS 550 Pathophysiologic Bases for Major Health Deviations of Individuals ................................. 3
NURS 773 Advanced Clinical Nursing I ........................... 3
NURS 775 Advanced Specialty Practice I ......................... 3
NURS 776 Advanced Clinical Nursing II ......................... 3
NURS 778 Advanced Specialty Practice II ......................... 3
Nursing Electives .............................................................. 6

*A continuing education health assessment course with a skills component is required within 18 months prior to taking NURS 514.

Clinical Nurse Specialist Emphasis

Students in the advanced clinical nursing concentration may opt for the clinical nurse specialist emphasis and accrue 500 clinical hours by completing NURS 740 Clinical Nurse Specialist Internship. NURS 740 is 3 credits and can be repeated for up to 6 credits.

▲ Nursing Administration Concentration (NUAD)

Course Work ................................................................. 12
NURS 763 Administrative Theory in Nursing .................. 3
NURS 765 Practicum in Nursing Administration I ............. 3
NURS 766 Administrative Strategies in Nursing ............... 3
NURS 768 Practicum in Nursing Administration II ............. 3

Nursing Administration Support Courses ........................ 12
NURS 654 Nursing Administration Financial Management or HAP 703 Financial Management in Health Organizations ................................................................. 3
Management/organizational theory ..................................... 3
Recommended courses include HAP 621, LRNG 601, or PUAD 620.
Nursing or related discipline electives ............................... 6

▲ Nurse Educator Concentration (NURE)

Course Work ................................................................. 15
NURS 556 Principles of Assessment and Evaluation in Nursing Education or EDRS 531 Educational and Psychological Measurement ................................................................. 3
NURS 726 Perspectives in Nursing Education .................. 3
NURS 727 Application of Nursing Education Principles to Curriculum and Program Development ......................... 3
NURS 728 Practicum and Seminar in Nursing Education I ........................................................................ 3
NURS 729 Practicum and Seminar in Nursing Education II ........................................................................ 3

Nurse Educator Support Courses .................................... 10
NURS 514 Application of Advanced Health Assessment Methods* ......................................................... 1
NURS 550 Pathophysiologic Bases for Major Health Deviations of Individuals ................................. 3
Nursing or related discipline electives ............................... 6

*A continuing education health assessment course with a skills component is required within 18 months prior to taking NURS 514.

▲ Clinical Nurse Leader Concentration (NUCL)

Course Work ................................................................. 17
HAP 586 Quality Management in Health Care ................. 3
NURS 654 Nursing Administration Financial Management ................................................................. 3
NURS 730 Leadership Strategies for the Clinical Nurse Leader ................................................................. 2
NURS 731 Clinical Nurse Leader Role Integration ............. 2
NURS 732 Practicum: Clinical Nurse Leader ..................... 7

Clinical Nurse Leader Support Courses ........................ 7
NURS 513 Advanced Pharmacology in Nursing ............... 3
NURS 550 Pathophysiologic Bases for Major Health Deviations of Individuals ................................. 3
NURS 514 Application of Advanced Health Assessment Methods* ......................................................... 1

*A continuing education health assessment course with a skills component is required within 18 months prior to taking NURS 514.

Master’s International

The MSN prepares nurses for a variety of leadership roles in health care delivery systems. Courses are held on the Fairfax Campus and in distributed local health care facilities. Most classes are offered after 4 p.m., Monday through Friday. Mason is a public institution with excellent tuition rates for those who qualify for Virginia residency. Peace Corps volunteers accepted into the MSN program who are not Virginia residents may be eligible for the tuition support program to obtain the in-state rate. The program has been rated in the top 50 graduate nursing programs by U.S. News & World Report.

The Master’s International (MI), a joint program of Mason and the Peace Corps, enables participants to prepare for Peace Corps service while earning the MSN. Participants apply separately to the Peace Corps and to Mason. The MSN offers several concentrations, but two are more appropriate to the Peace Corps experience: advanced clinical nursing, a 38-credit program, and nursing administration, a 37-credit program. Students are able to complete initial requirements of 31 or 32 credits within one year (to include summer sessions). Six credits are earned as practicum credits for the overseas Peace Corps service. Students return to Mason for their final project presentation, during which they discuss and share their Peace Corps experiences with faculty and other MSN students.

Requirements

Applicants should hold a BSN. They must submit a completed application for graduate admission, along with the nonrefundable application fee; application for Virginia in-state rates for those claiming eligibility; original transcripts from all previously attended colleges or universities; GRE scores
Applications are reviewed throughout the year for admission to either the fall or the spring semester, although new students may take their initial course during Summer Term. Students accepted into the program but waiting for notification of acceptance from the Peace Corps may begin their master’s program but will not be eligible for tuition support until they have been accepted into the Peace Corps.

For more information about Master’s International, contact the Peace Corps regional office at 1-800-424-8580. For the Fellows/USA program, call the above number and then extension 1440.

**MSN/MBA Program MSNBA-NBA**

The MSN/MBA Program, offered with the School of Management (SOM), prepares nurses for mid- and top-level administrative, leadership, and health policy roles in health and health-related organizations. A variety of health care and health-related settings are used for clinical practice experiences. The program requires 58 graduate credits, including graduate nursing, business, decision sciences, and elective courses.

Applicants must have GMAT scores sent directly to Mason and must meet admission requirements for graduate degree status in both CHHS and SOM.

**MSN Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP 703</td>
<td>Financial Management of Health Systems</td>
<td>3</td>
</tr>
<tr>
<td>NURS 660</td>
<td>Seminar in the Ethics of Health Care</td>
<td>3</td>
</tr>
<tr>
<td>NURS 680</td>
<td>Theoretical Foundations Related to Nursing</td>
<td>2</td>
</tr>
<tr>
<td>NURS 685</td>
<td>Advanced Nursing Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>NURS 686</td>
<td>Projects in Nursing Research</td>
<td>2</td>
</tr>
<tr>
<td>NURS 688</td>
<td>Organization of Nursing and Health Care Delivery Systems</td>
<td>3</td>
</tr>
<tr>
<td>NURS 763</td>
<td>Administrative Theory in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS 765</td>
<td>Practicum in Nursing Administration I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 766</td>
<td>Administrative Strategies in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS 768</td>
<td>Practicum in Nursing Administration II</td>
<td>3</td>
</tr>
</tbody>
</table>

**MBA Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 603</td>
<td>Managerial Economics and Decisions of the Firm</td>
<td>3</td>
</tr>
<tr>
<td>MBA 612</td>
<td>Managing Costs and Evaluating Performance</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 613</td>
<td>Financial Reporting and Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 623</td>
<td>Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 633</td>
<td>Statistics for Business Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 638</td>
<td>Managing Operations and Technology for the Digital Enterprise</td>
<td>3</td>
</tr>
<tr>
<td>MBA 643</td>
<td>Managerial Finance</td>
<td>3</td>
</tr>
<tr>
<td>MBA 653</td>
<td>Organizational Behavior and Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 663</td>
<td>Introduction to Information Technology and Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 673</td>
<td>Legal Environment for Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 678</td>
<td>Strategy and Organizational Leadership</td>
<td>3</td>
</tr>
</tbody>
</table>

**Graduate Certificates in Nursing**

**Certificate in Nursing CERG-NUAD Administration**

This program offers formal study in theory and practice in nursing administration in the health care delivery system.

**Certificate Requirements**

Applicants must hold a bachelor’s degree in nursing. Application is made through CHHS.

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 556</td>
<td>Administrative Theory in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS 563</td>
<td>Practicum in Nursing Administration I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 772</td>
<td>Perspectives in Nursing Education</td>
<td>3</td>
</tr>
<tr>
<td>NURS 727</td>
<td>Application of Nursing Education</td>
<td>3</td>
</tr>
<tr>
<td>NURS 728</td>
<td>Principles to Curriculum and Program Development</td>
<td>3</td>
</tr>
<tr>
<td>NURS 729</td>
<td>Practicum and Seminar in Nursing Education I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 660</td>
<td>Seminar in the Ethics of Health Care</td>
<td>3</td>
</tr>
<tr>
<td>NURS 680</td>
<td>Theoretical Foundations Related to Nursing</td>
<td>2</td>
</tr>
<tr>
<td>NURS 685</td>
<td>Advanced Nursing Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>NURS 686</td>
<td>Projects in Nursing Research</td>
<td>2</td>
</tr>
<tr>
<td>NURS 688</td>
<td>Organization of Nursing and Health Care Delivery Systems</td>
<td>3</td>
</tr>
<tr>
<td>NURS 763</td>
<td>Administrative Theory in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS 765</td>
<td>Practicum in Nursing Administration I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 766</td>
<td>Administrative Strategies in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS 768</td>
<td>Practicum in Nursing Administration II</td>
<td>3</td>
</tr>
</tbody>
</table>

(Students who qualify for a 3-credit practicum because of their educational experience may choose the remaining 3 credits from courses designated by the graduate nursing program.)

To earn the certificate, students must complete all courses with a 3.00 GPA.

**Certificate in Forensic CERG-NUED Nursing**

This program provides advanced education at the graduate level to students who are actively involved or wish to pursue a career in forensic nursing. The certificate will provide the educational requirements for certification as a sexual assault nurse examiner (SANE) through the International Association of Forensic Nurses (IFAN) and as a certified forensic nurse through the American College of Forensic Examiners (ACFE).
Certificate Requirements
Applicants must have a current nursing license and a bachelor’s degree from an accredited institution of higher education. Courses are open to other graduate students, with the exception of NURS 734, which requires students to have a current nursing license.

Required Courses .............................................................. 15
NURS 733 Introduction to Forensic Science ......................... 3
NURS 734 Role of the Sexual Assault Nurse Examiner and Interpersonal Violence* ........................................... 3
NURS 735 Crime Lab and Crime Scene Investigation ............. 3
NURS 736 Psychological and Legal Aspects of Forensic Science ................................................................. 3
NURS 737 Investigation of Injury and Death ........................ 3

*Students who are currently certified as a SANE take GCH 602 Global Health Issues Related to Violence in place of NURS 734.

PhD in Nursing

The PhD in Nursing Program builds on the MSN degree. The objective of the program is to prepare nurses for executive and educational roles in nursing and health care. Graduates of the program exemplify the administrative and the leadership characteristics essential to assuming executive roles; conduct and support research in nursing and health care ethics, health care administration, health policy, and nursing education; and influence the formation and implementation of public policy in health care through analysis of sociocultural, economic, fiscal, political, ethical, and governmental processes.

Admission Requirements
In addition to fulfilling admission requirements for degree status in CHHS, applicants must hold a master’s degree in nursing from an accredited program equivalent to 30 credits or a master’s degree in a related health field with a baccalaureate degree in nursing. They must have earned a minimum GPA of 3.50 on a 4.00 scale in a master’s program. They also must show evidence of one year of experience as an RN prior to enrollment. Other requirements are as follows:

• For international students, a TOEFL score of at least 250 (computer-based exam) or 600 (paper-based exam)
• Evidence of current licensure to practice professional nursing. Students on foreign student visas must present evidence of their country’s nursing licensure or the equivalent.
• Three letters of recommendation from professional or academic sources, with at least two of the references from people who have had contact with the applicant within the past two years
• Interview with one or more members of the doctoral admissions committee
• Writing sample describing goals in pursuing preparation for the PhD
• Evidence of prerequisite graduate-level course work in applied statistics (past two years)
• A résumé of professional experience

Students are admitted for fall semester only. All materials for admission must be submitted to Mason’s Admissions Office by March 1 of the year of application.

Students must supply official transcripts documenting satisfactory grades for graduate-level semester credits (as designated by the educational institution where taken), as well as official catalog descriptions of each course petitioned for transfer. Students may transfer up to 12 credits from other academic institutions. Transfer credits may be applied to degree requirements pending approval from the director of the program.

Other requirements are as follows:

• Successfully complete the program of study outlined in the PhD curriculum.
• Successfully complete a written doctoral candidacy comprehensive exam after completing all PhD credit requirements, except NURS 998 and 999.
• Successfully pass the final oral doctoral dissertation defense, and submit the doctoral dissertation approved by the doctoral dissertation committee, the director of doctoral program, and the CHHS dean. (The dissertation is submitted in the approved format to University Libraries and the director of the doctoral program.)
• Complete application material for graduation and the PhD degree in accordance with prevailing Mason policies.

Degree Requirements
The PhD in Nursing Program offers a concentration in nursing education (minimum 58 credits), a concentration in nursing administration (minimum 58 credits), and an individualized area of concentration (minimum 51 credits). Before advancing to candidacy and enrolling for dissertation credit (12 credits), students must have their program of study approved by CHHS and the director of the CHHS doctoral program.

Concentration in Nursing Education (NUED)
Prerequisites for this concentration are PUAD 620 Organizational Behavior and HHS 597 Approaches to Quantitative Data Analysis in Health Care Research, or the equivalent.

Credits

Scientific Base/Research Core .................................................. 19
NURS 804 Advanced Quantitative Data Analysis for Health Care Research I ................................................. 3
NURS 805 Advanced Quantitative Data Analysis for Health Care Research II ................................................. 3
NURS 855 Ethics in Health Administration .......................... 3
NURS 875 Research internship ............................................. 1
NURS 920 Qualitative Research in Nursing and Health Care ................................................................. 3
NURS 930 Quantitative Methods in Nursing and Health Care ................................................................. 3
NURS 955 Philosophical Bases of Inquiry .............................. 3

Nursing Education Core ........................................................ 18
NURS 556 Principles of Assessment and Evaluation in Nursing Education or EDRS 531 Educational and Psychological Measurement or EDEP 651 Test Design and Interpretation ................................................. 3
NURS 727 Application of Nursing Education Principles to Curriculum and Program Development .............. 3
NURS 810 Evaluation Research in Nursing Education ........ 3
NURS 811 Nurse as Educator and Scholar ........................... 2
NURS 870 Nursing and Health Care Administration I ........ 3
NURS 874 Internship Health Care Administration/Policy/Education ................................................................. 4

Dissertation (minimum 12 credits) ........................................ 12
NURS 998 Dissertation Proposal Development .................... 3
(may be repeated up to four times)
NURS 999 Doctoral Dissertation ........................................ 1–9
Students must complete a minimum of 11 credits from a Scientific Base/Research Core.

### Scientific Base/Research Core
- NURS 804 Advanced Quantitative Data Analysis for Health Care Research I .............................................. 3
- NURS 805 Advanced Quantitative Data Analysis for Health Care Research II ............................................ 3
- NURS 855 Ethics in Health Administration ......................... 3
- NURS 875 Research internship .................................... 1
- NURS 920 Qualitative Research in Nursing and Health Care ................................................................. 3
- NURS 930 Quantitative Methods in Nursing and Health Care ................................................................. 3
- NURS 955 Philosophical Bases of Inquiry .............................................. 3

### Nursing Administration Core
- HAP 703 Financial Management in Health Care Organizations ................................................................. 3
- NURS 750 Legal Issues Relevant to Health Care Administration ................................................................. 3
- NURS 866 Health Care Public Policy .............................................. 3
- NURS 870 Nursing and Health Care Administration I .............................................. 3
- NURS 871 Nursing and Health Care Administration II ...... 2
- NURS 874 Internship Health Care Administration/Policy/Education ......................................................... 4

### Concentration in Nursing Administration (NUAD)
Prerequisites for this concentration are PUAD 620 Organizational Behavior and HHS 597 Approaches to Quantitative Data Analysis in Health Care Research, or the equivalent.

### Dissertation (minimum 12 credits)
- NURS 998 Dissertation Proposal Development ............... 3
- NURS 999 Doctoral Dissertation ................................ 1–9

### Total
- 21
- 9
- 58

### Concentration in Individualized Study (INDV)
The prerequisite for this concentration is HHS 597 Approaches to Quantitative Data Analysis in Health Care Research or the equivalent. Other prerequisites are determined individually.

### Scientific Base/Research Core
- NURS 804 Advanced Quantitative Data Analysis for Health Care Research I .............................................. 3
- NURS 805 Advanced Quantitative Data Analysis for Health Care Research II ............................................ 3
- NURS 855 Ethics in Health Administration ......................... 3
- NURS 875 Research internship .................................... 1
- NURS 920 Qualitative Research in Nursing and Health Care ................................................................. 3
- NURS 930 Quantitative Methods in Nursing and Health Care ................................................................. 3
- NURS 955 Philosophical Bases of Inquiry .............................................. 3

### Individualized Core (minimum 18 credits)
- NURS 866 Health Care Public Policy .............................................. 3
- NURS 874 Internship in Health Care Administration/Policy/Education ......................................................... 4
- Electives ................................................................................... 11

### Electives
- 9

### Total
- 21
- 9
- 58

### Advancement to Candidacy
After students have successfully completed the qualifying exam and all required course work, the director of the School of Nursing doctoral program approves advancement to candidacy.

### Dissertation Proposal
The proposal must focus on a topic in nursing and be approved by the doctoral dissertation committee, the doctoral program director, and the CHHS dean. The dissertation proposal and written dissertation must be consistent with the guidelines outlined in Mason’s Guide for Preparing Graduate Theses, Dissertations, and Projects.

### Doctoral Dissertation
Before enrolling for dissertation credit, the student must have advanced to candidacy. The completed dissertation must be approved by the doctoral dissertation committee, the doctoral program director, and the CHHS dean.

### Final Oral Doctoral Exam
The doctoral dissertation committee chair, on preliminary approval of the doctoral dissertation by the committee, petitions the doctoral program director in the CHHS to schedule the final oral doctoral exam, which includes a defense of the doctoral dissertation. The final oral doctoral exam also demonstrates the candidate’s intellectual command and maturity of judgment in the area of emphasis chosen by the candidate and approved by the doctoral dissertation committee. At the close of the final oral doctoral exam, the committee makes a final judgment regarding approval of the doctoral dissertation and successful completion of PhD degree requirements.

### Time Requirements
Students must complete all planned course work, including electives, and advance to candidacy within six years of admission to degree or provisional status in the PhD program. The student must successfully complete the doctoral dissertation, final oral doctoral exam, and all PhD degree requirements within five years following the semester of advancement to candidacy.
■ Doctor of Nursing Practice  DNP-NURS (pending SCHEV approval)

The Doctor of Nursing Practice (DNP) builds on the MSN degree. The objective of the program is to prepare graduates for the highest level of nursing practice. Emphasis will be placed on evaluating and applying the evidence that supports practice, understanding and creating practice delivery systems based on patient outcomes, and assuming leadership roles in practice settings. Along with these core competencies, the degree will offer concentrations to develop greater expertise in education and leadership in clinical practice. The DNP will be the terminal practice degree in the profession. The degree will draw on expertise from throughout CHHS in such areas as health economics, health policy, and epidemiology. Graduates of the program will be able to assume many roles in the health care system, including direct patient care, clinical nursing faculty, practice management, and policy development.

Admission Requirements

In addition to fulfilling admission requirements for the CHHS, applicants for the DNP must have a master of science degree in nursing from an accredited program equivalent to a minimum of 30 credits and be currently licensed as an RN. They must be advanced practice nurses with evidence of certification and a minimum of 500 practice hours in their field. They must demonstrate a GPA of 3.50 or better in their graduate program. Students must show evidence of a graduate course in research methodology. Students seeking admission will be asked to provide a 500-word statement outlining an area of practice inquiry interest. Other requirements are as follows:

- Three letters of recommendation of which a minimum of two are from persons able to speak to the applicant’s clinical expertise
- A statement describing the applicant’s area of practice inquiry interest
- An interview with program faculty
- A current résumé
- Evidence of RN licensure and advanced certification
- Evidence of a graduate-level research methodology course

Applicants will be accepted for the fall semester only. All application material must be submitted by June 1 of the year in which admission is sought.

Degree Requirements

<table>
<thead>
<tr>
<th>Course Listings</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNP Core</td>
<td>21</td>
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<tr>
<td>GCH 714 Epidemiology for Nursing Practice</td>
<td>3</td>
</tr>
<tr>
<td>HAP 703 Financial Management in Health Systems</td>
<td>3</td>
</tr>
<tr>
<td>HAP 866 Health Care Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>NURS 870 Nursing and Health Care Administration I</td>
<td>3</td>
</tr>
<tr>
<td>NURS 880 Informatics Inquiry for the Doctor of Nursing Practice</td>
<td>3</td>
</tr>
<tr>
<td>NURS 881 Issues and Methodology in Translational Research</td>
<td>4</td>
</tr>
<tr>
<td>NURS 882 Theoretical Foundations Related to Human Health Behaviors</td>
<td>2</td>
</tr>
<tr>
<td>Concentration Courses (Education or Clinical Leadership)</td>
<td>15</td>
</tr>
</tbody>
</table>

Course listings are detailed below. It is anticipated that students will take advantage of other courses not listed here that are offered in departments throughout the university based on their experience, educational needs, and interests with the guidance of their advisor.

▲ Education Concentration (EDUC)

Select from the following courses:

- EDUC 606 Education and Culture .................................................. 3
- EDUC 612 Inquiry into Practice .................................................... 3
- EDUC 615 Educational Change .......................................................... 3
- NURS 556 Principles of Assessment and Evaluation in Nursing Education or EDRS 531 Educational and Psychological Measurement .................................................. 3
- NURS 726 Perspectives in Nursing Education ...................................... 3
- NURS 727 Application of Nursing Education ....................................... 3
- Principles to Curriculum and Program Development ...................... 3
- NURS 728 Practicum and Seminar in Nursing Education I .................. 3
- NURS 729 Practicum and Seminar in Nursing Education II ................. 3
- NURS 810 Evaluation Research in Nursing Education ....................... 3
- NURS 811 Nurse as Educator and Scholar ......................................... 3

▲ Clinical Leadership Concentration (CLNL)

Select from the following courses:

- GCH 637 Normal Aging and Health Deviations .................................. 3
- GCH 722 Infectious Disease Epidemiology ........................................ 3
- HAP 727 Program Evaluation in Health Care ....................................... 3
- HAP 730 Health Care Decision Analysis ............................................ 3
- HAP 740 Management of Health Information Systems ........................ 3
- HHS 750 Legal Issues Relevant to Health Care .................................... 3
- HHS 855 Ethics in Health Care Administration ...................................... 3
- NURS 733 Introduction to Forensic Science ......................................... 3
- NURS 734 Role of the Sexual Assault Nurse Examiner and Interpersonal Violence .................................................. 3
- NURS 735 Crime Lab and Crime Scene Investigation ........................... 3
- NURS 736 Psychological and Legal Aspects of Forensic Science ............. 3
- NURS 737 Investigation of Injury and Death ......................................... 3
- PUBP 730 National Policy Systems and Theory .................................... 3
- PUBP 753 Ethics and Public Policy .................................................... 3
- PUBP 762 Social Institutions and Public Policy ...................................... 3

Practice Inquiry* ........................................................................... 8

- NURS 980 Practice Inquiry I .......................................................... 4
- NURS 981 Practice Inquiry II .......................................................... 4

Total ................................................................................. 44

* Required of all DNP students

Advancement to Candidacy

The final step in completion of the degree is the implementation of a practice inquiry project. The proposal for this project must be prepared with ample time for submission to the Human Subjects Review Board at George Mason University. The student will identify a committee of three faculty members to serve as advisors for the practice inquiry. At a minimum, the chair and one member of this committee must be from the School of Nursing. The third member may be drawn from other university faculty with expertise in the area of practice inquiry or from outside the university with permission from the committee chair and the director of the DNP program. The committee is responsible for approving the final written report of the project and its oral defense by the student. The practice inquiry project must demonstrate to the
Committee’s satisfaction knowledge in the core competencies of finance, policy, technology, and health care delivery systems. This project will be completed within two semesters.

**Time Requirements**
The student must successfully complete all aspects of the program within 6 years of admission to the program.

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### Global and Community Health

#### UNDERGRADUATE PROGRAMS

- **Bachelor of Science in Community Health**
  
  **BS-COMH**

  **(pending SCHEV approval)**

  Upon final approval of the bachelor of science in community health, this degree will replace the community health concentration under the bachelor of science in health science.

  This degree prepares students with a basic knowledge and understanding of public health, the health care system, and issues and policies related to health promotion, disease prevention, and education. The focus is to understand health issues related to specific communities and larger populations at the national and international levels.

  Public health and community health professionals work in partnerships with other professionals in private and public community organizations and are expected to confront complex behavioral, cultural, and social health issues within communities. The skills and knowledge gained through this program prepare graduates to address the local, national, and global health needs of communities and populations, providing understanding, education, monitoring, evaluation, and interventions within a community setting.

  The program may be completed on a full-time or part-time basis. Interested students are encouraged to contact the Department of Global and Community Health before admission.

  A criminal background check may be required of students prior to beginning the internship if the organization requires one. A minimum grade of C must be maintained in all major courses. Students may substitute two 3-credit GCH courses for the internship, depending on the student’s work experience, with their advisor’s approval.

#### Program Requirements

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>35</td>
</tr>
<tr>
<td>Composition (ENGL 101 and 302)</td>
<td>3</td>
</tr>
<tr>
<td>Communication (COMM 101 or 100)</td>
<td>3</td>
</tr>
<tr>
<td>Statistics (STAT 250)</td>
<td>3</td>
</tr>
<tr>
<td>Literature (at the 200-level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>Anatomy and physiology (BIOL 124 and 125)</td>
<td>8</td>
</tr>
<tr>
<td>Western civilization (HIST 100 or 125)</td>
<td>3</td>
</tr>
<tr>
<td>General psychology (PSYC 100)</td>
<td>3</td>
</tr>
<tr>
<td>Information technology (IT 103)</td>
<td>3</td>
</tr>
<tr>
<td>International health (GCH 205, fulfills the global understanding requirement)</td>
<td>3</td>
</tr>
<tr>
<td>American government (GOVT 103)</td>
<td>3</td>
</tr>
<tr>
<td>Developmental psychology (PSYC 211)</td>
<td>3</td>
</tr>
<tr>
<td>Health behavior (HEAL 230)</td>
<td>3</td>
</tr>
<tr>
<td>Health communication (COMM 399 or HEAL 372)</td>
<td>3</td>
</tr>
<tr>
<td>Microbiology (BIOL 246 and 306)</td>
<td>4</td>
</tr>
<tr>
<td>Foreign language/GCH focus</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Community Health Major Courses

- GCH 295, 332, 350, 440, 460, 498
- HAP 303, 378, 416
- HHS 465
- Electives | 24 |
- Community health electives | 15 |
- General electives | 9 |

| Total | 120 |

BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. HHS 465 fulfills the university synthesis requirement.

- **Bachelor of Science in Health Science**
  
  **BS-HSCI**

  This degree prepares students to become managers and clinicians in a variety of settings, including hospitals; clinics; schools; community health, home care, long-term care, employee health, and managed care organizations; group medical practices; manufacturing, medical technology, and supply organizations; the insurance industry; and financial consultant services. Concentrations are offered in community health and gerontology.

  The community health concentration prepares students to understand health issues related to the community and larger populations at the national and international levels. The community health concentration will be replaced by the bachelor of science in community health upon SCHEV approval of the degree.

  The gerontology concentration is designed for students interested in providing services to the elderly in a variety of settings such as hospitals, clinics, community health centers, home health situations, senior centers, senior housing, long-term care, and many other service arenas. The program provides foundational knowledge in health science and aging, and is suitable for students who wish to work as clinicians, managers, and advocates for the elderly.

  The program may be completed on a full- or part-time basis. Interested students should contact the Department of Global and Community Health before admission. All pathways lead to completion of the objectives of the undergraduate program.

  A criminal background check may be required of all students prior to beginning the internship, if the organization requires one.

  A minimum grade of C must be obtained in all major courses.

  Students pursuing the gerontology concentration must be prepared to complete a 128-hour practicum experience of six to eight hours per week in an appropriate organization.

  Students must check with their advisor to ensure that all university general education requirements have been met prior to graduation. Students may substitute two 3-credit GCH courses for the internship with the approval of the advisor, depending on work experience.
Program Requirements

▲ Concentration in Community Health (COMH)

Credits
General Education ............................................................. 35
Composition (ENGL 101 and 302) ........................................ 6
Communication (COMM 101) ............................................... 3
Statistics (STAT 250) ......................................................... 3
Literature (at the 200 level or above) .................................. 3
Arts ...................................................................................... 3
Anatomy and physiology (BIOL 124 and 125) .................... 8
Psychology 100 ................................................................... 3
Information technology (IT 103) .......................................... 3

Required Courses ............................................................ 28
International health (GCH 205, fulfills global understanding) .. 3
American government (GOVT 103) ...................................... 3
Developmental psychology (PSYC 211) ............................ 3
Health behavior (HEAL 230) .............................................. 3
Health communication (COMM 399 or HEAL 372) .......... 3
Microbiology (BIOL 246, 306) ........................................... 4
Foreign language/GCH focus .............................................. 9

Community Health Concentration ......................................... 33
GCH 295, 352, 350, 440, 460, 498
HAP 303, 378, 416
HHS 465

Electives ............................................................................. 24
Community health electives .............................................. 15
General electives ................................................................. 9

Total Credits ........................................................................ 120

BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. HHS 465 fulfills the university synthesis requirement.

▲ Concentration in Gerontology (GERO)

Credits
General Education ............................................................. 38
Composition (ENGL 101 and 302) ........................................ 6
Communication (COMM 101) ............................................... 3
Statistics (STAT 250) ......................................................... 3
Literature (at the 200 level or above) .................................. 3
Arts ...................................................................................... 3
Anatomy and physiology (BIOL 124 and 125) .................... 8
Western civilization (HIST 100 or 125) .............................. 3
Global understanding (GCH 205 recommended) ............... 3
Psychology 100 ................................................................... 3
Information technology (IT 103) .......................................... 3

Required Courses ............................................................ 6
Sociology (SOCI 101) .......................................................... 3
Ethics (PHIL 151 or 309) .................................................... 3

Gerontology Concentration ................................................ 33
GCH 332, 440, 460, 480, 498
HAP 307, 416
HHS 465
SOCI 441
PSYC 415

Electives ............................................................................. 43
Gerontology electives .......................................................... 6
General electives ................................................................. 9
GCH, HAP, HHS, or NURS electives ................................. 28

Total Credits ...................................................................... 120

BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. HHS 465 fulfills the university synthesis requirement.

Minor in Nutrition

The minor in nutrition offers a variety of courses for students pursuing undergraduate degrees at Mason. Students who may be interested in completing the minor include those pursuing degrees related to nutrition, health, and education. The minor is intended to increase knowledge of nutrition issues. This minor is not equivalent to the registered dietitian license and does not provide a license to practice therapeutic nutrition.

Minor Requirements

Applications are encouraged from all areas at Mason. Application is made through CHHS. Students are required to take an introductory nutrition course such as GCH 295. To complete the minor, students are required to pass 15 credits of undergraduate course work. At least 6 credits must be completed at Mason, and no more than 3 credits of C- or D in the minor are accepted.

Credits
Required Courses ............................................................. 12
GCH 420 Strategies for Nutrition Education ....................... 3
GCH 421 Community Nutrition ......................................... 3
GCH 422 Nutrition throughout the Life Cycle .................... 3
GCH 423 Nutrition and Chronic Illnesses ......................... 3

Electives ............................................................................. 3
Select one of the following:
CHEM 102 Introduction to Organic and Biological Chemistry .................................................... 3
CHEM 463 General Biochemistry ......................................... 3
GCH 466 Nutrition and Weight Management* .................. 3
GCH 530 Nutrition: A Global Perspective ......................... 3
GCH 583 Food and Culture: Biocultural Perspectives on Food and Nutrition ........................................ 3

*GCH 466 can be used to substitute for either GCH 420 or GCH 421.

Undergraduate Certificates in Global and Community Health

■ Undergraduate Certificate CERB-GERO in Gerontology

The undergraduate certificate program in gerontology prepares students for work with older adults, as well as with professionals who are already working with the elderly. The program provides a background of basic knowledge in gerontology and prepares students in professional skill areas such as counseling, recreation, social work, nursing, and administration.

The certificate program is administered by CHHS. Three other academic units participate in the program: the College of Education and Human Development, the Department of Psychology, and the Department of Sociology and Anthropology. A Gerontology Certificate Committee determines program policy and curriculum.

Academic advising and an application form are available through CHHS.

Certificate Requirements

The certificate program consists of 24 credits. Students receiving the certificate must already hold a baccalaureate degree or
have earned one from Mason by the time they receive the certificate.

**Course Requirements**

**Core Courses** ................................................. 12

Select four from the following:

- GCH 480 Health Maintenance and Health Aspects of Aging
- NURS 505 Case Management
- NURS 570 Cultural Dimension of Aging
- PSYC 415 Psychological Factors in Aging
- SOCI 441 The Sociology of Aging
- SOCW 483 Selected Approaches to Social Work Intervention

Gerontology Practicum (GCH 498) .................................. 6

Students must have completed at least 9 credits of core courses before enrolling in the practicum.

**Electives** ......................................................... 6

Select from the following:

- GCH 332; HEAL 110, 323, 480; PHED 415, 450, 499;
- PRLS 210, 310; PSYC 211, 325, 326, 415, 423; PUAD 502;
- SOCI 350, 390, 599; SOCW 200, 351, 352; reading and research in gerontology from any department

**Undergraduate Certificate CERB-NUTR in Nutrition**

This program offers a variety of courses in nutrition for future and present health care professionals, researchers, and others who are commonly faced with community-related nutrition issues. The program is intended to help health care professionals and others who would like to increase their knowledge in nutrition. This certificate is not equivalent to the registered dietitian license and does not provide a license to practice therapeutic nutrition.

**Certificate Requirements**

Applicants need not have a bachelor’s degree. Applications are encouraged from all areas of nursing and health sciences. Application is made through CHHS. A requirement for the certificate is 24 credits of undergraduate course work.

**Program of Study** .............................................. 12

Required Courses ................................................... 21

- GCH 295 Nutrition for Health Professionals
- GCH 420 Strategies for Nutrition Education
- GCH 421 Community Nutrition
- GCH 422 Nutrition throughout the Life Cycle
- GCH 423 Nutrition and Chronic Illnesses
- One sociology or anthropology course (which may include GCH 583)
- One developmental course such as in psychology or education

General Nutrition Electives ....................................... 3

Select one that has not been taken as a required course:

- CHEM 102 Introduction to Organic and Biological Chemistry
- CHEM 463 General Biochemistry
- GCH 466 Nutrition and Weight Management
- GCH 530 Nutrition: A Global Perspective
- GCH 583 Food and Culture: Biocultural Perspectives on Food and Nutrition

*GCH 466 may be substituted for either GCH 420 or 421.

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**GRADUATE PROGRAMS**

**Master of Science in MS-EBST Epidemiology and Biostatistics**

The program prepares participants to apply epidemiological and statistical principles to quantitative analysis of health care issues. It is aimed at health scientists and professionals in government agencies, such as the National Institutes of Health, pharmaceutical companies, research hospitals, public health agencies, and other medical research organizations with the need to design experiments for medical and health services research. Graduates are expected to analyze and interpret increasingly complex, nonexperimental health care data. The degree is taught jointly by faculty from the Department of Statistics in the Volgenau School of Information Technology and Engineering and the Department of Global and Community Health in CHHS.

**Admission Requirements**

Applicants must hold a baccalaureate degree in a discipline related to health science or statistics, with a GPA of 3.00 in the last 60 credits. Courses in calculus at the undergraduate level through multivariate calculus equivalent to Math 113, 114, and 213 with a grade of B or better are required for admission to the program. Applications to the degree program are made through CHHS. Admission decisions are made by a joint faculty committee from the Department of Statistics and the Department of Global and Community Health.

**Degree Requirements**

Students must complete 36 credits of graduate course work. A graduate course in which a grade of C or below is earned may be repeated only once. Graduate students may repeat no more than two courses in their stated program of study. Students must achieve a 3.00 GPA to graduate.

**Program of Study** .............................................. 9

Required Courses ................................................... 12

- GCH 712 Introduction to Epidemiology
- GCH 726 Advanced Seminar in Epidemiology
- STAT 554 Applied Statistics
- STAT 660 Biostatistical Methods

Epidemiology and Biostatistics Requirements .................. 9

Select a minimum of three courses from the following:

- GCH 605 Social Epidemiology
- GCH 680 International Research Ethics and Methods
- GCH 722 Infectious Disease Epidemiology
- GCH 732 Chronic Disease Epidemiology
- GCH 752 Nutritional Epidemiology
- GCH/NURS 804 Advanced Quantitative Data Analysis for Health Care Research I
- GCH/NURS 805 Advanced Quantitative Data Analysis for Health Care Research II
- GCH/NURS 807 Measurement Theories and Applications in Health Care Research

Statistics Requirements ........................................... 9

Select a minimum of three courses from the following:

- STAT 544 Applied Probability
- STAT 574 Survey Sampling
- STAT 652 Statistical Inference
- STAT 655 Analysis of Variance
- STAT 656 Regression Analysis
Health and Human Services

Global Health. Students will learn about the fundamentals of cultural and multidisciplinary environments inherent to learning, students will be prepared to work in the diverse health environment. Through course work and experiential skills to work and conduct research within the global health issues, and international health research. Options of practicum or thesis tracks allow students to explore in situ health issues, and international health research. Graduates of this program will be given the knowledge base to work, including either a practicum or a thesis track. A practicum or Thesis* ........................................................ 6

Practicum or Thesis*
- GCH 799 Practicum in Public Health II ........................3
- GCH 798 Practicum in Public Health I ..........................3

Thesis track:
- GCH 788 Public Health Research I ...............................3
- GCH 789 Public Health Research II ..............................3

Electives (select from the following) ................. 9
- ANTH 599 Anthropology of Health ............................3
- ANTH 631 Refugees in the Contemporary World ............3
- COMM 506 Communication in International Organizations ......................................................... 3
- COMM 656 Global Communication ...........................3
- EOS 704 Spatial Analysis and Models of Populations ....3
- GEOG 540 Medical Geography .................................3
- GCH 583 Food and Culture: Biocultural Perspectives on Food and Nutrition ................................. 3
- GCH 602 Global Health Issues Related to Violence ....3
- GCH 605 Social Epidemiology ................................. 3
- GCH 722 Infectious Disease Epidemiology ..................3
- GCH 726 Advanced Seminar in Epidemiology ............3
- GOVT 641 Seminar on Global Systems .....................3
- HAP 609 Comparative International Health Systems ....3
- PUAD 636 The NGO: Managing the International Nonprofit Organization ........................................... 3
- PUBP 757 Public Policy in Global Health and Medical Practice ....................................................... 3
- PUBP 758 Global Threats and Medical Policy ............3

*Students may register for the practicum or thesis only with approval from their advisor and after they have completed at least 27 credits of the program.

Practicum track
- For the practicum track, which entails the application of an idea or theory through fieldwork, students will be required to work a minimum of 112 hours per practicum in an international health agency under the guidance of a preceptor and their faculty advisor. Students will be encouraged to conduct one practicum abroad and one within the Washington, D.C., region. Students must attend two seminar courses, complete a project while working in each international health agency, and produce a formal report and presentation during each practicum.

Thesis track
- For the master’s thesis track, students are required to work with a committee of three faculty members. The faculty advisor must be within the Department of Global and Community Health and the two other faculty members may or may not need to be faculty within the department. For the thesis, students must conduct a research project that will result in a research thesis. Their research, which should be understood to entail an original design to test a theory, will complement one of the faculty expertise areas within the department, including epidemiology, biostatistics, rehabsilations science, chronic illness, mental health, social networks, gerontology, nutrition, and health behavior. Students must take two thesis classes while working on their thesis. Students must develop a proposal and have it approved by their committee before undergoing the
research project. The thesis must conform to the format stated within the University Libraries guidelines.

**Master of Science in MS-HSCI Health Science**

This interdisciplinary program prepares students to focus on social, economic, political, and physiological aspects of global and community health.

The concentration in international health prepares students to manage health care programs operating in third-world countries. Students learn about international issues related to management of health care, including demographic patterns, disease burdens, cultural basis of disease, international policies affecting health care, and political economy of health and development. Graduates of this concentration are expected to work in U.S. international organizations.

**Admission Requirements**

Applicants must hold a baccalaureate degree and have earned a 3.00 GPA on a 4.00 scale. They should submit a completed graduate application through CHHS. Students may be admitted provisionally if their GPA is less than 3.00, but they are also required to submit GRE or MAT scores. Students admitted provisionally must achieve a 3.00 GPA in the first 12 credits of graduate work. If they fail to do so, they will be dismissed from the program. Applicants to the international health concentration must have 6 credits (or the equivalent) of a foreign language.

**Degree Requirements**

Students must complete 36 credits of graduate course work. A graduate course in which a grade of C or below is earned may be repeated only once. Graduate students may repeat no more than two courses in their stated program of study. Students must achieve a 3.00 GPA to graduate.

**International Health Concentration (INTH)**

<table>
<thead>
<tr>
<th>Health Science Core</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCH 712 Introduction to Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>HAP 621 Management of Health Service Organizations</td>
<td>3</td>
</tr>
<tr>
<td>HHS 597 Approaches to Quantitative Data Analysis in Health Care Research</td>
<td>3</td>
</tr>
</tbody>
</table>

A course in international ethics or health care ethics........3

<table>
<thead>
<tr>
<th>International Health Concentration Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCH 530 Nutrition: A Global Perspective</td>
<td>3</td>
</tr>
<tr>
<td>GCH 543 Global Health: Trends and Policies</td>
<td>3</td>
</tr>
<tr>
<td>GCH 590 International Health Organizations</td>
<td>3</td>
</tr>
<tr>
<td>GCH 798 Practicum in International Health I</td>
<td>3</td>
</tr>
<tr>
<td>GCH 799 Practicum in International Health II</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electives</th>
<th>Credits</th>
</tr>
</thead>
</table>

Select three of the following:

- ANTH 631 Refugees in the Contemporary World........3
- COMM 506 Communication in International Organizations........3
- COMM 656 Global Communication.........................3
- GEOG 540 Medical Geography.............................3
- GCH 583 Food and Culture: Biocultural Perspectives on Food and Nutrition........3
- GCH 602 Global Issues in Violence and Health........3
- GCH 605 Social Epidemiology............................3

**Graduate Certificates in Global and Community Health**

**Certificate in Biostatistics CERG-BSTN**

This program prepares participants to apply statistical methods to quantitative analysis of health care issues. It is aimed at health scientists and professionals in government agencies, such as the National Institutes of Health. It is also aimed at professionals in pharmaceutical companies, research hospitals, public health agencies, and other medical research organizations who design medical experiments and analyze and interpret increasingly complex health care data. In addition, the program helps prepare students to begin careers in such organizations.

The certificate is a joint graduate certificate program from the Department of Statistics in the Volgenau School of Information Technology and Engineering and the Department of Global and Community Health in CHHS. Courses are taught by faculty members from both programs.

**Admission Requirements**

Applicants must hold a bachelor’s degree from a regionally accredited institution of higher education in a discipline related to health science or statistics, with a GPA of 3.00 in the last 60 credits. Such fields include medicine, biology, nursing, health science, biostatistics, statistics, mathematics, and psychology. A course in statistics and a course in college algebra with a grade of B or higher are required for admission to the program.

**Certificate Requirements**

Students must complete one course from each of the five groups. A minimum of 6 credits must be taken through the health science program.

- STAT 535 or STAT 554
- STAT 660
- GCH/NURS 804 or STAT 656 or STAT 668
- GCH/NURS 805 or STAT 662
- GCH 712

**Certificate in CERG-EPID Epidemiology**

Epidemiology is the study of the factors that influence the occurrence, distribution, prevention, and control of disease. This certificate prepares students to apply the principles and methods of epidemiology to health research. The program emphasizes the development of skills such as study design, data collection and management, data analysis and interpretation, and communication of research findings. All students in the certificate program must complete introductory courses in epidemiology and biostatistics and then choose four elective courses in areas such as infectious disease epidemiology, chronic disease epidemiology, social epidemiology, and advanced epidemiological methods.
Certificate Requirements

Students applying to the certificate must hold a bachelor’s degree. Application is made through the CHHS. Course work in statistics, health science, biological science, and the social sciences are beneficial in preparation for this certificate. A minimum GPA of 3.00 is required to earn the certificate.

Required Courses
- GCH 530 Nutrition: A Global Perspective ..................3
- GCH 566 Nutrition and Weight Management ...............3
- GCH 712 Introduction to Epidemiology .....................3
- GCH 751 Nutritional Assessment, Monitoring, and Surveillance .........................3

Electives (select four of the following) ..................12
- GCH 605 Social Epidemiology ................................3
- GCH 680 International Research Ethics and Methods ....3
- GCH 722 Infectious Disease Epidemiology ................3
- GCH 726 Advanced Seminar in Epidemiology ............3
- GCH 732 Chronic Disease Epidemiology ..................3
- GCH 752 Nutritional Epidemiology .........................3

Total ................................................................. 18

Other epidemiology-related course may count toward the certificate with prior approval of the program director.

For the Certificate in Gerontology (CErG-GERO), please see Catalog Addendum.

■ Certificate in Global Health

This program develops an understanding of global health through a practicum, as well as a sequence of courses that includes global health, epidemiology, nutrition, anthropology, international relations, communications, and geography.

Certificate Requirements

Applicants must hold a bachelor’s degree. Application is made through CHHS.

Required Courses
- GCH 530 Nutrition: A Global Perspective ..................3
- GCH 543 Global Health: Trends and Policies .............3
- GCH 590 International Health Organizations .............3
- GCH 798 Public Health Practicum I .........................3

Electives (select two of the following) ..................12
- ANTH 631; COMM 502, 637; GEOG 540, 581;
- HAP 609; HHS 597; PUAD 636

Total ................................................................. 18

■ Certificate in Nutrition

The graduate certificate in nutrition prepares students to apply the principles and latest scientific evidence and methods of nutrition to health practice and research among different populations. The program emphasizes understanding the role of nutrition in population health and well-being and the development of skills required in the practice, analysis, and interpretation of nutrition-related information and data among individuals and populations. Students will acquire competencies in the following areas: public health nutrition framework, assessment and monitoring; research design and methodology; and planning and evaluation of nutrition programs.

Certificate Requirements

Admission to this certificate requires a bachelor’s degree from an accredited institution of higher education with a minimum GPA of 3.00 in the last 60 credits. Application is made through the CHHS. Undergraduate courses in natural sciences, nursing, health science, and sociology are helpful. A minimum of 3 credits in equivalent course work taken at another college or university can be applied toward the certificate. A minimum GPA of 3.00 is required to earn the certificate.

Required Courses
- GCH 510 Scientific Basis for Pain, Fatigue, and Suffering in Chronic Illness and Disability .........................3
- GCH 550 Introduction to Rehabilitation Science ..........3
- GCH 551 Research Methods in Rehabilitation Science....3
- HHS 597 Approaches to Quantitative Data Analysis in Health Care Research ........................................3

Electives (select one of the following) ..................3
- GCH 506 Clinical Exercise Physiology ....................3
- GCH 620 Psychosocial Aspects of Rehabilitation ..........3
- GCH 637 Normal Aging and Health Deviations ...........3
- GCH 659 Health Care of Aging Persons with Chronic Illnesses ..........................................................3
- GCH 712 Introduction to Epidemiology .....................3
- GCH 732 Chronic Disease Epidemiology ..................3
The BS in health science prepares students to become managers and clinicians in a variety of settings, including hospitals; clinics; schools; community health, home care, long-term care, employee health, and managed care organizations; group medical practices; manufacturing, medical technology, and supply organizations; advocacy and associations; the insurance industry; and financial consultant services. Concentrations are offered in health systems management and in assisted living administration. An accelerated pathway in health systems management is offered to students who have an associate of science degree in social services or allied health.

The concentration in health systems management traditional and accelerated pathways prepare graduates to serve in entry-level administrative and support positions in a variety of health-related agencies and organizations. The concentration in assisted living administration provides graduates with the operational, marketing, resident care, and hospitality services skills required to become effective leaders and managers of assisted living and senior housing communities.

The program may be completed on a full- or part-time basis; the accelerated pathway for graduates of allied health or social services technical programs takes into account the needs of the adult learner. All pathways lead to completion of the objectives of the undergraduate BS program. A criminal background check is required of all students prior to beginning their internship. A minimum grade of C must be obtained in all required courses.

Students must check with their advisor to ensure that all university general education requirements were met prior to graduation. HAP 498 is a competitive internship elective offered in the student’s final semester as described below.

### Concentration in Health Systems Management:

#### Traditional Pathway (HMT)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 100</td>
<td>Composition (ENGL 101 and 302)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 103</td>
<td>Communication (COMM 100 or 101)</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 203</td>
<td>Information technology (IT 103)</td>
<td>3</td>
</tr>
<tr>
<td>MIS 102</td>
<td>Literature (at the 200 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 203</td>
<td>Western civilization (HIST 100 or 125)</td>
<td>3</td>
</tr>
<tr>
<td>BULE 302</td>
<td>Arts...</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 309</td>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 100</td>
<td>Sociology or anthropology (SOCl 101 or ANTH 114)</td>
<td>3</td>
</tr>
<tr>
<td>MSOM 303</td>
<td>Biology (BIOL 103 and 104)</td>
<td>3</td>
</tr>
<tr>
<td>BULE 302</td>
<td>Statistics (STAT 250)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total:** 36

### Electives:

Three courses must be taken from the CHHS course listings. Other electives at the student’s discretion.

The internship course (HAP 498) is a 6-credit pathway elective. Students must submit an application and be chosen by a panel of HAP Department faculty. The internship is designed to provide selected students with experience in a real world work environment. Students not choosing an internship may select alternative credits through electives approved by the program coordinator.

**Total:** 27

HHS 465 satisfies the university synthesis requirement.

### Concentration in Health Systems Management:

#### Accelerated Pathway for Students with an Associate’s Degree in Allied Health (HMA)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 100</td>
<td>Composition (ENGL 101 and 302)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 103</td>
<td>Communication (COMM 100 or 101)</td>
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<td>ACCT 203</td>
<td>Information technology (IT 103)</td>
<td>3</td>
</tr>
<tr>
<td>HHS 465</td>
<td>Literature (at the 200 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>MSOM 303</td>
<td>Western civilization (HIST 100 or 125)</td>
<td>3</td>
</tr>
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<td>Arts...</td>
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</tr>
<tr>
<td>PHIL 309</td>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 100</td>
<td>Sociology or anthropology (SOCl 101 or ANTH 114)</td>
<td>3</td>
</tr>
<tr>
<td>MSOM 303</td>
<td>Biology (BIOL 103 and 104)</td>
<td>3</td>
</tr>
<tr>
<td>BULE 302</td>
<td>Statistics (STAT 250)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total:** 39

### Electives:

The internship course (HAP 498) is a 6-credit pathway elective. Students must submit an application and be chosen by a panel of HAP department faculty. The internship is designed to provide selected students with experience in a real world work environment. Students not choosing an internship may select alternative credits through electives approved by the program coordinator.

**Total:** 120

HHS 465 satisfies the university synthesis requirement.
**Concentration in Assisted Living Administration (ALA)**

**General Education** .......................................................... 38
- Composition (ENGL 101 and 302) ......................................... 6
- Communication (COMM 100 or 101) ..................................... 3
- Information technology (IT 103) .......................................... 3
- Literature (at the 200 level or above) .................................. 3
- Western civilization (HIST 100 or 125) .............................. 3
- Arts ...................................................................................... 3
- Global understanding ....................................................... 3
- Sociology or anthropology (SOCI 101 or ANTH 114) ........... 3
- Biology (BIOL 103 and 104) ............................................. 8
- Statistics (STAT 250) ....................................................... 3

**Required Courses** ......................................................... 19
- PHIL 309 ........................................................................... 3
- PSYC 100 ......................................................................... 3
- ECON 103 ....................................................................... 3
- MIS 102 ........................................................................... 3
- ACCT 203 ....................................................................... 3
- MSOM 303 ....................................................................... 3
- BULE 302 ....................................................................... 3

**Assisted Living Concentration Courses** .............................. 51
- GCH 332, 440, 480
- HHS 465
- NURS 492 or GCH 585

**Electives** ............................................................................ 12
Electives must be taken from a list of electives approved by the department.

**Total** ................................................................................ 120

*The internship course (HAP 498) is a 6-credit requirement in assisted living and senior housing or hospitality services as approved by the program coordinator. This internship is designed to provide selected students with project-focused work experience in an assisted living or senior housing or hospitality enterprise under the direction of a preceptor.

HHS 465 satisfies the university synthesis requirement.

**GRADUATE PROGRAMS**

**Master of Science in Health Systems Management**

This program provides students with the skills and tools to work as leaders and executive-level managers in evolving health systems, health policy analysts, or consultants and managers of electronic commerce and technology products and enterprises in the health system. The curriculum was developed in response to the demand for advanced health management and policy preparation for a variety of health care and allied health professionals. Six concentrations are offered: executive management, health information systems, health care security and privacy, health policy analysis, assisted living/senior housing administration, and risk management and patient safety.

The program of study offers state-of-the-art technical and humanistic skills so that graduates may serve as leaders, managers, consultants, and health policy advisors and analysts in various settings. Graduates are prepared to work in public and private health care systems (including public health agencies); legislative arenas and policy-related professional and advocate organizations; and health accreditation and regulatory organizations. The curriculum integrates concepts from a variety of disciplines such as business management, economics, philosophy, organizational behavior, information technology, social psychology, public policy, law, and ethics as they uniquely apply to health systems and technology management, assisted living and senior housing services administration, and health policy formulation. For example, the concentration in assisted living/senior housing administration provides multidisciplinary education to support development and management and marketing of such services or entities, based on concepts of normal aging and integration and optimization with health-related services and systems to maximize and promote independence and quality of life for seniors.

The interdisciplinary curriculum is designed to prepare graduates with an understanding of the larger sociopolitical, global health, and economic contexts in which the U.S. health system operates. It provides working professionals with leadership knowledge and managerial skills and abilities that contribute to improving the efficiency and effectiveness of health systems and alignment of decisions and resources to optimize organizational and health-related public policy goals. Students examine social imperatives for access to health services and the feasibility, need, and mechanisms of market factors. They create links and alignment between public and private sectors and among voluntary, market, and regulatory forces in the context of a variety of public policy frameworks. Students explore the design and management of seamless systems of care, information technology, and services that support the providers of health-related care and services over the life span continuum, including assisted living and senior housing services. Using ethical principles, students explore approaches to improving access to care and services, the quality and safety of health systems and senior housing services and their integration to maximize quality of life and community health.

**Admission Procedures and Requirements**

Health care professionals with a baccalaureate degree and at least three years of recent leadership experience in a health or related management, public policy, or technology field are eligible to apply. Applicants must submit the following: transcripts from all previous college-level studies, a letter of interest specifying study goals, a curriculum vita, and a complete Mason graduate admissions form. GRE or GMAT scores may be requested if the applicant does not have a graduate degree or has an undergraduate GPA lower than a 3.00. Applicants are competitively selected. Admitted students begin study in January and August each year. Provisional admission can be made for students whose undergraduate GPA is lower than 3.00, but whose work since school indicates a high likelihood of success in graduate work. Students admitted provisionally with lower than a 3.00 GPA must achieve a 3.00 GPA in the first 12 credits of graduate work.

**Program Format and Curriculum Features**

The program schedule is geared toward working professionals. The usual schedule for students involves part-time study, comprising two classes (6 credits) per semester. Classes are held primarily in evenings, with some Saturday daytime classes. Selected courses also are available via the Internet.

Courses offer the following unique features:
• Content focuses on individual competencies in analytic decision making, and how services are provided across institutions and levels of care through integrated systems.
Services are analyzed according to their effect on individual health status and enrolled populations, and how individuals and groups affect the use of health services and outcomes. Business functions are taught in the context of integrated systems versus individual institutions. For example, financial management examines how risk is incurred and distributed across multiple institutions.

- Management skills are taught from the contexts of leadership in learning organizations and as team leaders managing self-directed professionals across functional and specialized service units. Business and clinical decisions are integrated with competencies in information systems and data management for effective administrative operations in health-related organizations, clinical decision support systems, quality and safety improvement efforts (including evaluation of clinical outcomes), and interorganizational relations and operations.
- Managerial competencies are also taught relating concepts of integrated services and managed care, based on optimization of the delivery of care and services to targeted populations in the community and market. The curriculum prepares graduates to assess health risks, understand consumer behavior, and structure community networks, specialty services, and integrated health systems.
- Health policy curriculum teaches applied public policy skills that support the development and analysis of health policy and the management of political, legislative, and regulatory processes involving the financing and service delivery in the health industry and health-related technology and information management, and governing health professionals practice.

**Degree Requirements**

The program of study comprises 39 credits (three concentrations): 24 credits from the common core of the degree and another 15 from one of the six concentrations.

**Required Courses**

- HAP 501 Business Statistics for Health Services Management ............................................ 3
- HAP 512 Introduction to Health Services Research ......................................................... 3
- HAP 586 Process Improvement in Health Services ......................................................... 3
- HAP 621 Management of Health Service Organizations ............................................. 3
- HAP 715 Health Economics ......................................................................................... 3
- HAP 740 Management of Health Information Systems ............................................ 3
- HHS 750 Legal Issues Relevant to Health Care Administration .................................. 3
- HAP 790 Health Management Practicum and Capstone Seminar ................................ 3

**Electives (select two of the following)**

- HAP 612 Maintaining Business Continuity in Health Care ............................................. 3
- HAP 735 Risk Analysis in Health and Biosciences ....................................................... 3
- HAP 745 Health Care Security Policy ........................................................................... 3
- HAP 746 Advanced Seminar on Security .................................................................... 3
- INF 565 Database and Distributed Systems Security Principles ..................................... 3

**Concentration in Health Information Systems (HISN)**

**Required Courses**

- HAP 601 Electronic Commerce and Online Marketing for Health Services .................. 3
- HAP 709 Health Care Databases ................................................................................... 3
- HAP 720 Health Data Integration .................................................................................. 3
- HAP 745 Health Care Security Policy ........................................................................... 3

**Concentration in Health Policy Analysis (HP)**

**Required Courses**

- HAP 542 Health Policy .................................................................................................. 3
- HAP 730 Health Care Decision Analysis .................................................................... 3
- HAP 866 Health Care Public Policy ............................................................................. 3

**Electives (select two of the following)**

- HAP 609 Comparative International Health Systems .................................................. 3
- HAP 703 Financial Management in Health Systems ...................................................... 3
- HAP 727 Program Evaluations in Health Care ................................................................ 3
- HAP 745 Health Care Security Policy ........................................................................... 3
- HAP 762 Cost-Effectiveness for Health Care Management and Policy Decisions ........ 3
- HAP 764 Health Policy and Government Payment Systems for Health Care Services ... 3
- HHS 855 Ethics in Health Care Administration ............................................................. 3
- PUAD 640 Public Policy Process ................................................................................... 3

**Concentration in Health Care Security and Privacy (HCSP)**

**Required Courses**

- HAP 612 Maintaining Business Continuity in Health Care ............................................. 3
- HAP 735 Risk Analysis in Health and Biosciences ....................................................... 3
- HAP 745 Health Care Security Policy ........................................................................... 3
- HAP 746 Advanced Seminar on Security .................................................................... 3
- INF 565 Database and Distributed Systems Security Principles ..................................... 3

**Concentration in Health Care Administration (ASHA)**

**Required Courses**

- HAP 650 Assisted Living Management and Operations ............................................. 3
- HAP 705 Strategic Management and Marketing in Health Care .................................... 3

**Electives (select three of the following)**

- GCH 585 Care and Management of Persons with Alzheimer’s Disease and Related Disorders 3
- GCH 637 Normal Aging and Health Deviations ............................................................ 3
- HAP 662 Aging and Health Care Policy ....................................................................... 3
- HAP 702 Health Accounting in Health Care ................................................................. 3
- HAP 703 Financial Management of Health Systems ..................................................... 3

**Concentration in Assisted Living/Senior Housing Administration (ASHA)**

**Required Courses**

- HAP 650 Assisted Living Management and Operations ............................................. 3
- HAP 705 Strategic Management and Marketing in Health Care .................................... 3

**Electives (select three of the following)**

- GCH 585 Care and Management of Persons with Alzheimer’s Disease and Related Disorders 9
- GCH 637 Normal Aging and Health Deviations ............................................................ 3
- HAP 662 Aging and Health Care Policy ....................................................................... 3
- HAP 702 Health Accounting in Health Care ................................................................. 3
- HAP 703 Financial Management of Health Systems ..................................................... 3

**Concentration in Risk Management and Patient Safety (RMPS)**

**Required Courses**

- HAP 690 Independent Study ......................................................................................... 3

(Students may also meet this requirement by taking courses in economics and law from the Law School or in the Administration of Justice Program within the Department of Public and International Affairs)

- HAP 730 Health Care Decision Analysis .................................................................... 3
- HAP 735 Risk Analysis in Health and Biosciences ....................................................... 3
Health and Human Services

Students accepted into the program but waiting for notification may take their initial course during Summer Term. Applicants must hold a bachelor’s degree. They must submit the Mason application and two letters of recommendation. Knowledge of the health care system and design of databases is not required, but students without this knowledge are required to take additional courses. Application is made through CHHS.

Certificate in Assisted Living/Senior Housing Administration
This 15- to 18-credit certificate is offered as part of the overall program in assisted living/senior housing administration within CHHS. It provides multidisciplinary education in assisted living and senior housing services management, including marketing, normal aging, and integration and optimization with health-related services and systems to maximize and promote quality of life for seniors. Courses enable students to evaluate, analyze, and synthesize information relative to the aging population, the evolution of assisted living and senior housing services within the U.S. health system, the application of business practices to these services, and current regulatory and policy issues. An additional focus is on biological, psychological, and social aspects of healthy aging, including those that support quality of life and independence for seniors with special needs (i.e., memory issues and dementias).

Certificate Requirements

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCH 585 Care and Management of Persons with Alzheimer’s Disease and Related Disorders</td>
<td>3</td>
</tr>
<tr>
<td>GCH 637 Normal Aging and Health Deviations</td>
<td>3</td>
</tr>
<tr>
<td>HAP 650 Assisted Living Management and Operations</td>
<td>3</td>
</tr>
<tr>
<td>HAP 678 Introduction to the U.S. Health System*</td>
<td>3</td>
</tr>
<tr>
<td>HAP 705 Strategic Management and Marketing in Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HAP 790 Health Management Practicum (optional)</td>
<td>3</td>
</tr>
</tbody>
</table>

*HAP 678 may be substituted for an additional HAP approved course if the student has three or more years of previous health care-related experience.

Additional Requirements

Applicants must hold a bachelor’s degree in a health-related field or business administration or management, or a nonhealth or business bachelor’s degree and a minimum of two years professional experience in the health care industry. Students must complete all courses with a 3.00 GPA to earn the certificate.

Certificate in Health Care Security and Privacy
The curriculum is expected to enhance the skills of directors responsible for information and physical security at area hospitals, nursing homes, public agencies, insurance companies, and other health care agencies. The curriculum improves the effectiveness of these directors in bringing about change within their own organization and coordinating activities with counterparts in public and private agencies.

Requirements

Applicants must hold a bachelor’s degree. They must submit the Mason application and two letters of recommendation.
Program of Study

Students are expected to have broad health care experience or complete HAP 678, and knowledge of health care databases or complete HAP 709 or INFS 601.

Required Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP 612 Maintaining Business Continuity in Health Care</td>
<td>3</td>
</tr>
<tr>
<td>HAP 735 Risk Analysis in Health and Biosciences</td>
<td>3</td>
</tr>
<tr>
<td>HAP 745 Health Care Security Policy</td>
<td>3</td>
</tr>
<tr>
<td>INFS 565 Database and Distributed Systems Security</td>
<td>3</td>
</tr>
<tr>
<td>Principles</td>
<td>3</td>
</tr>
<tr>
<td>Approved elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Courses can be taken in any sequence. The recommended sequence is in the order of course numbers.

■ Certificate in Health Information Systems

This certificate prepares clinicians and health care managers to develop and manage health information systems and electronic commerce services. Students learn the development and management of systems and service related to patient records, enterprise data management in health industry, and Telehealth. The certificate is ideal for people with technical and programming skills who have been promoted to new managerial positions in the health care industry and wish to enhance their understanding of health care issues and management techniques. It is also ideal for clinicians and managers with little background in database management who wish to gain more skills and understanding about organizing health databases.

Admission Requirements

Applicants must have a bachelor’s degree. No prior computer programming training is needed, although knowledge of HTML language is assumed. Application is made through CHHS.

Program of Study

The certificate is composed of 15 credits. If the student does not have recent, relevant experience in the U.S. health industry, HAP 678 Introduction to the U.S. Health System (3 credits) is required, thus bringing the number of required credits to 18.

Required Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP 586 Process Improvement in Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HAP 601 Electronic Commerce and Online Marketing for Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HAP 709 Health Care Databases</td>
<td>3</td>
</tr>
<tr>
<td>HAP 720 Health Data Integration</td>
<td>3</td>
</tr>
<tr>
<td>HAP 740 Management of Health Care Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

■ Certificate in Quality Improvement and Outcomes Management in Health Care Systems

This certificate prepares working clinicians and administrative support staff in health care organizations to implement quality-improvement initiatives and manage populations of patients to optimize efficiency and effectiveness of care and services. Participants acquire the knowledge and ability to work in interdisciplinary health care teams using the tools and techniques of statistical process control, and selected methods and tools from operations research and quality improvement. In addition, they use information management technology and qualitative decision-making applications to identify opportunities for clinical and administrative improvement, support decision-making optimization, and improve health-service outcomes for identified populations.

Certificate Requirements

Applicants must hold a bachelor’s degree. Application is made through CHHS.

Required Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP 547 Regulatory Requirements for Health Care Systems</td>
<td>3</td>
</tr>
<tr>
<td>HAP 586 Process Improvement in Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HAP 730 Health Care Decision Analysis</td>
<td>3</td>
</tr>
<tr>
<td>HAP 735 Risk Analysis in Health and Bioscience</td>
<td>3</td>
</tr>
<tr>
<td>HAP 762 Cost-Effectiveness for Health Care Management and Policy Decisions</td>
<td>3</td>
</tr>
<tr>
<td>HAP 601 Introduction to Biostatistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: A course in basic computer skills (credit or noncredit) and HAP 678 Introduction to the U.S. Health System (mandatory for students without recent working experience in the U.S. health system) are considered optional for students who already possess the requisite knowledge and skills. They are required of those who do not.

To earn the certificate, students must complete all courses with a 3.00 GPA.

■ Certificate in Risk Management and Patient Safety

This graduate certificate prepares individuals with advanced skills in health-related risk assessment, management, and safety improvement in health care organizations to gain in-depth knowledge to function effectively as health care risk managers.

Certificate Requirements

Applicants must have a bachelor’s of science degree from an accredited university, or its equivalent. Applicants must have a grade point average of 3.00 or better, submit two letters of reference, and complete an application to the certificate program. No GRE, GMAT, or other tests are necessary. Foreign students must provide a TOEFL score.

Required Courses

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP 547 Regulatory Requirements for Health Care Systems</td>
<td>3</td>
</tr>
<tr>
<td>HAP 586 Process Improvement in Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HAP 730 Health Care Decision Analysis</td>
<td>3</td>
</tr>
<tr>
<td>HAP 735 Risk Analysis in Health and Bioscience</td>
<td>3</td>
</tr>
<tr>
<td>HAP 762 Cost-Effectiveness for Health Care Management and Policy Decisions</td>
<td>3</td>
</tr>
<tr>
<td>HAP 690 Independent Study</td>
<td>3</td>
</tr>
</tbody>
</table>

Social Work

Phone: 703-993-2030 (Undergraduate programs)  
Phone: 703-993-4247 (Graduate programs)

UNDERGRADUATE PROGRAMS

■ Social Work, BS

This degree prepares students for beginning generalist professional practice in social work at the baccalaureate level and
has been granted full accreditation by the Council on Social Work Education. Students are expected to abide by the Code of Ethics of the National Association of Social Workers.

No academic credit toward field experience or course work is given based on life or previous work experience.

The social work program does not offer all required courses during evening hours. Students should meet with an advisor to develop a plan to complete course work for the degree.

SOCW 323 has been approved as a university synthesis course and is open to all majors.

### Admissions Requirements

To be admitted to the social work program, a student must have completed at least 45 credits with a GPA of 2.30; completed or be registered in BIOL 103, ENGL 101, SOCI 101, and PSYC 100; earned at least a C in SOCW 200, 301, 323, 351, and 357; satisfactorily completed at least 60 hours in one semester in a service learning agency in conjunction with SOCW 301; and submitted an application for the social work major to the director of social work admissions. Students should file this application during the junior year. The student’s application for admission to the social work major is reviewed for action by social work faculty members. A personal interview may be required.

There is no admission to the social work program in the summer. Students who have not met all criteria for admission to the major (including completion of service learning requirements) by May 30 will not be considered for admission until the fall semester.

### Degree Requirements

Students must successfully complete the following requirements:

<table>
<thead>
<tr>
<th>General Education and Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural sciences (BIOL 103 and one 3- or 4-credit science elective)</td>
<td>3–4</td>
</tr>
<tr>
<td>Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302)</td>
<td>7-8</td>
</tr>
<tr>
<td>Literature (at the 200 level or above; does not include ENGL 101 and 302)</td>
<td>3</td>
</tr>
<tr>
<td>Communication (COMM 100)</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>American government (GOVT 103)</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization (HIST 100)</td>
<td>3</td>
</tr>
<tr>
<td>Information technology</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (MATH 106 or higher)</td>
<td>3</td>
</tr>
<tr>
<td>Psychology (PSYC 100)</td>
<td>3</td>
</tr>
<tr>
<td>Economics (ECON 100)</td>
<td>3</td>
</tr>
<tr>
<td>Philosophy or religion</td>
<td>3</td>
</tr>
<tr>
<td>Sociology (SOCI 101)</td>
<td>3</td>
</tr>
<tr>
<td>Statistics (SOCI 313 or PSYC 300)</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Work Major</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCW 200, 301, 323, 324, 351, 352, 357, 358, 359, 417, 452, 453, 454, 456, 471</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electives</th>
<th>24–25</th>
</tr>
</thead>
</table>

Six credits must be in social work at the 400- or 500-level, not including courses listed above; SOCW 499 may be used to satisfy an additional 1 to 3 credits toward general electives.

**Total** 120

SOCW 110 Global Perspectives on Human Rights is open to social work and nonsocial work majors; it does not count toward the social work degree requirements.

The Social Work faculty evaluates student performance periodically and may require students to withdraw from the program when, in their judgment, performance is not satisfactory. The decision is based on the quality of academic and field performance, as well as on personal fitness for the profession of social work. Students have the right to appeal.

Class attendance is required in all Social Work courses.

SOCW 301 can only be taken in the fall semester and is a prerequisite to SOCW 359, SOCW 323, 351, and 357 are sequenced courses offered only during the fall semester. The second parts, SOCW 324, 352, and 358/359, are offered only during the spring semester and can only be taken on successful completion of the first parts (a grade of C or better). The sequencing requirement pertains only to social work majors. Graduation will be delayed if courses are not taken in proper sequence.

### Writing-Intensive Requirement

The university requires all students to complete at least one course designated “writing intensive” in the 300 level or above.

### Minor in Social Work

A minor in social work requires 19 credits as follows:

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCW 200 Introduction to Social Work</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 301 Laboratory in Interpersonal Communication</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 323 Human Behavior in the Social Environment I</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 351 Social Policy and Social Justice I</td>
<td>3</td>
</tr>
<tr>
<td>Social work electives</td>
<td>6</td>
</tr>
</tbody>
</table>

Minor courses must be completed with a minimum GPA of 2.00. SOCW 357, 358, 359, 452, 453, 454, and 456 are not open to minors. See an advisor in the social work program for more information.

### Immunization and Fees

All students who are enrolled in a course that requires a field placement (SOCW 301, 359, 453, and 456) must have an annual tuberculosis screening (PPD). In addition, students must complete the entire hepatitis B immunization series in accordance with current U.S. Public Health Service recommendations. The cost of immunizations is the responsibility of the student. The majority of agencies used for field placements require fingerprinting, a criminal background check (may be more extensive than the university requirement), and a child protective services check. Any cost related to these requirements are the responsibility of the student.

### Insurance Coverage

Students who participate in internships (SOCW 301, 359, 453, and 456) are covered for liability under Virginia’s Self-Insured General Liability Insurance Plan and for medical malpractice under the Medical Malpractice Insurance Plan established by the Department of General Services, Division of Risk Management. These plans cover activities that the instructor has determined to be part of the student’s course work. Activities that are not part of the course practicum are not covered. (Exclusions
in the plan are listed in Section VII.) A copy of the Self-Insured General Liability Insurance Plan for Virginia is available in the Office of the Director of Field Education.

Mason is an affirmative action institution, and the social work program is committed to the principle that access to study or employment opportunities afforded by the university and program, including all benefits and privileges, be accorded to each person—student, faculty, or staff—on the basis of individual merit and without regard to race, color, religion, ethnic or national origin, veteran status, disability, sexual or political orientation, sex, or age (except where sex or age is a bona fide occupational qualification).

GRADUATE PROGRAMS

Social Work, MSW  MSW-SOCW

The MSW Program prepares students for advanced practice in social work. Following completion of a foundation year of study, students complete specialized concentrations in social change or clinical practice. Students are expected to abide by the Code of Ethics of the National Association of Social Workers. No academic credit toward field experience or course work is granted based on life or previous work experience.

To accommodate working students, MSW courses are offered on the Arlington Campus during late afternoon and evening hours. Field placements, however, generally require availability during regular daytime hours.

Admission Requirements

Admission is for fall semester only. In addition to meeting the university’s graduate admission requirements, students must have a minimum of 30 undergraduate credits in the liberal arts, including at least 3 credits in each of the following: English composition, human biology, history or government, social sciences, and statistics.

Students may complete the MSW Program under a two-year or three-year plan. All courses are sequenced and must be taken in the order designated. Students should meet with their academic advisor to ensure timely completion of all degree requirements.

To remain in good standing, students must earn a B- or better in each required course and maintain a 3.00 GPA. A course in which the student earns a C may be repeated once. A prerequisite must be satisfied with a B- or better before registering for the next course in a sequence. No more than 8 total credits of C may be repeated overall. Two course grades of F or 9 credits of unsatisfactory grades (C or F) will result in dismissal from the program.

Social Work faculty members evaluate each student’s performance periodically and may require the student to withdraw from the program when, in their judgment, performance is not satisfactory. The decision is based on the quality of academic and field performance, as well as on personal fitness for the profession of social work. The student has the right to appeal.

Nondegree students must seek department approval before registering for courses.

Degree Requirements

Students must successfully complete the following:

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Courses</td>
<td>30</td>
</tr>
<tr>
<td>SOCW 623 Human Behavior and Social Systems I</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 624 Human Behavior and Social Systems II</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 651 Social Policies, Programs, and Services</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 652 Influencing Social Policy</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 654 Research Methods for Social Work Practice</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 657 Directed Social Work Practice I</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 658 Directed Social Work Practice II</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 660 Communication and Technology for Social Work Practice</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 671 Research Methods for Social Workers</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 672 Foundation Field Practicum and Seminar I</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 673 Foundation Field Practicum and Seminar II</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 684 Social Work and the Law</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 685 Organizational Leadership for Social Workers</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 687 Empowering Communities for Change</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 688 Advanced Research in Social Work</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 690 Social Change Field Practicum</td>
<td>6</td>
</tr>
<tr>
<td>SOCW 691 Social Change Field Seminar</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 697 Thesis Project Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

Social Change Concentration (SOCC)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCW 676 Selected Topics in Social Work and Social Change</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 684 Social Work and the Law</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 685 Organizational Leadership for Social Workers</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 687 Empowering Communities for Change</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 688 Advanced Research in Social Work</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 690 Social Change Field Practicum</td>
<td>6</td>
</tr>
<tr>
<td>SOCW 691 Social Change Field Seminar</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 697 Thesis Project Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

Clinical Practice Concentration (CLNP)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCW 676 Selected Topics in Social Work</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 684 Social Work and the Law</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 685 Organizational Leadership for Social Workers</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 687 Empowering Communities for Change</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 688 Advanced Research in Social Work</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 690 Social Change Field Practicum</td>
<td>6</td>
</tr>
<tr>
<td>SOCW 691 Social Change Field Seminar</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 697 Thesis Project Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

Total | 60

Additional Requirements

- Successful completion of 1,050 hours of supervised field practicum in agencies approved by the director of field education: 600 hours in conjunction with SOCW 672 and 673, and 450 hours in conjunction with SOCW 690
- Successful completion of a culminating thesis project

Advanced Standing

Students with a BSW degree who demonstrate superior academic achievement and excellence in social work practice will be considered for advanced standing. Advanced standing students begin the MSW Program in the summer and then move directly into the concentration year.

Minimum admission requirements include a BSW degree earned within the past five years from a program accredited by the Council on Social Work Education; a GPA of 3.20 for the last 60 credits; and 30 credits of undergraduate liberal arts courses, including a minimum of 3 credits in each of the following subjects: statistics, human biology, English composition, history or government, and social science. To receive an MSW, advanced standing students must successfully complete the following:

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCW 670 Communication and Technology for Social Work Practice</td>
<td>3</td>
</tr>
</tbody>
</table>

College of Health and Human Services  139

Health and Human Services
Conflict Analysis and Resolution.

Admissions information for both CHHS and Institute for MSW and MS programs. If accepted into both programs, students applying for the dual MSW and MS in conflict analysis and resolution program of its kind.

The Department of Social Work is partnering with Mason’s nationally recognized Institute for Conflict Analysis and Resolution to offer a three-year dual-degree program. Students can earn both an MSW and an MS in conflict analysis and resolution while taking advantage of the diversity of the Washington, D.C., metropolitan area and the university’s proximity to the nation’s capital. This is the only dual-degree program of its kind.

Admissions Requirements

Students applying for the dual MSW and MS in conflict analysis and resolution must apply separately to both the MSW and MS programs. If accepted into both programs, students request permission to pursue the dual degree. See admissions information for both CHHS and Institute for Conflict Analysis and Resolution.

Degree Requirements

Students must successfully complete the following:

**Social Work Courses**

- SOCW 623 Human Behavior and Social Systems I ...........................................3
- SOCW 624 Human Behavior and Social Systems II ...........................................3
- SOCW 651 Social Policies, Programs, and Services ...........................................3
- SOCW 652 Influencing Social Policy ....................................................................3
- SOCW 657 Directed Social Work Practice I .......................................................3
- SOCW 658 Directed Social Work Practice II ......................................................3
- SOCW 670 Communication and Technology for Social Work Practice .........3
- SOCW 672 Foundation Field Practicum and Seminar I ................................3
- SOCW 673 Foundation Field Practicum and Seminar II ................................3
- SOCW 684 Social Work and the Law .................................................................4
- SOCW 685 Organizational Leadership for Social Workers ..............................4
- SOCW 687 Empowering Communities for Change ...........................................4
- SOCW 688 Advanced Research in Social Work .................................................3
- SOCW 690 Social Change Field Practicum .......................................................6
- SOCW 691 Social Change Field Seminar ..........................................................3
- SOCW 697 Thesis Project Seminar ....................................................................3

**Conflict Analysis and Resolution Courses**

- CONF 601 Theories of Sources of Conflict and Multiparty Conflicts .........3
- CONF 610 Philosophy and Methods of Conflict Research ...............................3
- CONF 642 Integration of Theory and Practice .................................................3
- CONF 694 Internship .......................................................................................3
- CONF 713 Reflective Practice in Interpersonal-Multiparty Conflicts ............3
- CONF 795 Professional Development Seminar ..........................................5
- CONF Electives (selected with approval from ICAR) ...................................12

**Total** ..............................................................................................................86

**Insurance Coverage**

Students engaged in internships are covered for liability under the Commonwealth of Virginia’s Self-Insured Liability Insurance Plan and covered for medical malpractice under the Medical Malpractice Insurance Plan, as established by the Department of General Services, Division of Risk Management. Only practicum activities that have been determined by the field instructor to be part of the course are covered. Students are encouraged to obtain professional liability coverage through the National Association of Social Workers, although this additional coverage is optional.

**Immunizations**

All students who are enrolled in a course that requires a field placement (SOCW 672, 673, 690) must have an annual tuberculosis screening (PPD). In addition, students must complete the entire Hepatitis B immunization series in accordance with current U.S. Public Health Service recommendations. Any cost related to these requirements is the responsibility of the student. Students can register for classes prior to the completion of the immunizations. Immunizations are program requirements and must be completed by the student even if they are not required by the agency. Documentation must be submitted to the MSW Program administrative assistant.
The College of Humanities and Social Sciences (CHSS) is composed of 11 departments in the humanities and social sciences and 11 major interdisciplinary programs. The college is also home to New Century College, an innovative interdisciplinary first-year experience and degree program; Mason Topics, a unique first-year experience; and Technology Across the Curriculum, a program that promotes the use of technology to enhance learning in all courses and disciplines. Students are encouraged to explore interdisciplinary approaches to course work, taking advantage of the diverse academic learning community and access to faculty members who are leading scholars in their fields. Special opportunities for students include the Honors Program in General Education, honors programs within selected majors, first-year experience programs, internships, study abroad, and research experiences.

Our degrees give students a strong foundation of knowledge grounded in theory and research that is designed to address the complexity of real world issues. Undergraduate students in CHSS attain breadth through a broad distribution of courses in general education and depth through a major field of study. After building strengths in such areas as communication, ethics, leadership, and knowledge of global issues, students transition easily into positions that allow them to apply their knowledge to society. Undergraduates go on to graduate or professional schools, or they pursue a range of careers in public service, nonprofit organizations, and the private sector. Graduate students engage in specialized study at the master’s and doctoral levels, which allows them to seek first or second careers, job advancement, or personal enrichment.

The college has a distinguished faculty of more than 400, including one Nobel laureate and recipients of the Pulitzer Prize and the MacArthur and Guggenheim awards. They strive to make students rigorous thinkers and clear communicators, while encouraging experimentation with new approaches and ideas that are grounded in scholarship and research. Students are thus prepared for their role as informed citizens in a complex global society, able to adapt to an ever-changing world.

**Administration**
Jack R. Censer, Dean
Dee Ann Holisky, Senior Associate Dean
Doris A. Bitler, Associate Dean for Undergraduate Academic Affairs
Jamie S. Cooper, Associate Dean for Graduate Academic Affairs
Nance Lucas, Associate Dean for New Century College
Matthew Zingraff, Associate Dean for Research
Walter Rankin, Deputy Associate Dean for Undergraduate Academic Affairs
Donna Fox, Assistant Dean for Undergraduate Academic Affairs
Evan Baum, Director of Undergraduate Academic Programs
Heidi Bruce, Director of Development
Daniel Collier, Director of Information Technology
Leslie Dyre, Director of Finance and Human Resources
Glenda Morgan, Director of Technology and Learning Initiatives
Susan Swett, Director of CHSS Graduate Admissions

**GRADUATE PROGRAMS AND POLICIES**
The college offers 16 master’s degrees, including a master of public administration and a master of fine arts in creative writing, and 10 doctoral degrees. The requirements for each...
degree are described in the sections below. In addition to the policies stated in the first chapters of this catalog, the following policies and procedures apply to all graduate students in the college.

All correspondence from the department, program, college, and university administration is sent to the student's official Mason e-mail account. Students should use their Mason e-mail account to communicate with their department and other administrative units.

Rescinding an Offer of Graduate Admission

If an applicant is offered graduate admission, the college reserves the right to withdraw that offer of admission if:

1. During his or her academic studies, the admitted applicant has a significant drop in academic performance or fails to graduate with a degree prior to the first day of classes for the term admitted.
2. There has been a misrepresentation in the application process.
3. Prior to the first day of classes for the term admitted, the college learns that the admitted applicant has engaged in behavior that indicates a serious lack of judgment or integrity, irrespective of the outcome of any disciplinary process related to such behavior.

The university further reserves the right to require the applicant to provide additional information (and/or authorization for the release of information) about any such matter.

Academic Load

Graduate students can enroll in up to 12 credits of course work each semester. Nondegree students can enroll in up to 10 credits of course work each semester.

Non-degree Enrollment

Graduate non-degree students may enroll in 500-, 600-, and 700-level courses. In exceptional cases graduate non-degree students in the College of Humanities and Social Sciences may request to enroll in an 800-level course if they have an appropriate academic or professional background, and have written permission of the course instructor, director of the graduate program offering the course, and the graduate dean.

Consortium of Universities Registration

Students are limited to one consortium course per semester, with a career maximum of 6 credits. To register for a consortium course, students must have an overall GPA of at least 3.00 and be in good academic standing. Students with grades of IN on their record or who earned grades of C or F in the most recent semester are not eligible to register for a consortium course. Students who have received a grade less than 3.00 in a consortium course are not permitted to enroll in additional consortium courses. Newly admitted graduate students are not permitted to enroll in consortium courses during their first semester of graduate study. Students who wish to enroll in consortium courses during their second semester of study must wait until the grades for the previous semester have been posted. More information about the Consortium of Universities can be found in the Academic Policies chapter.

Transfer of Credit

To be eligible for transfer, credits must have been earned at an accredited graduate degree-granting institution (and applicable to a graduate degree at that institution) or at Mason while in nondegree status. Courses accepted for transfer credit must have been completed within six years of the admission term and with a grade of B or better (3.00 or higher). Courses with grades of P or S are not accepted for transfer unless the official transcript indicates that the grade is equivalent to a B (3.00) or better. Some programs have more stringent standards on transfer of credit; students should contact their graduate program for specific information.

Credit from Other Institutions

Students must obtain all approvals, including course equivalencies, prior to enrolling in any course work at another institution. All appropriate paperwork must be submitted to the Registrar’s Office by the last day to add during the academic term the course meets. Students enrolling in courses at other institutions with different drop/add timetables must still abide by Mason’s drop/add deadlines in terms of acquiring necessary approvals.

Provisional Admission

Students provisionally admitted to their graduate degree program are not eligible to enroll in consortium course work or study at another institution until the conditions of the provisional contract have been met. Provisionally admitted students are also not eligible to participate in any study abroad programs until the provisional qualifier has been removed. Transfer of credit requests for course work taken in nondegree status at Mason or from another institution prior to admission will not be considered until the provisional contract has been fulfilled.

Dissertation Committee Criteria

All dissertation committees must consist of at least three members of the graduate faculty, two of whom have a full-time appointment at Mason. At least one member must be a tenured or tenure-track faculty member in the College of Humanities and Social Sciences, and at least one member must be from outside the student’s academic unit. Additional members may be appointed who are not members of the graduate faculty or who are not full-time employees of the university. Individual departments and programs may set additional requirements for committee membership. The graduate program director recommends appointment of the dissertation committee to the dean. Though the dean appoints the committee it is the responsibility of the student to find qualified faculty who are willing and able to supervise the dissertation.

Dissertation (999) Registration

Doctoral students must be advanced to candidacy before they may enroll in 999. Students must register for 999 before the add deadline published each semester in the Schedule of Classes. Once doctoral students begin registering for 999, they must enroll in at least 3 credits of 999 each semester (excluding summers) until they have completed the total number of dissertation credits required on their individual program of study. Once enrolled in 999, all doctoral students must maintain continuous enrollment in 999 until they deposit their approved dissertation in the University Library. If they have completed the number of dissertation credits required on their program.
of study, they may maintain continuous enrollment by registering for only 1 credit of 999. See detailed information in the Academic Policies chapter of this catalog.

Graduate Appeals of Dismissal or Termination
All graduate students should be familiar with the university polices on dismissal and termination as stated in the Academic Policies chapter. Students who meet the criteria for dismissal or termination may submit a written appeal to the Office of Graduate Academic Affairs. Appeals should include all relevant information on the basis for appeal, as well as any appropriate documentation. Appeals of termination and dismissal are reviewed at the beginning of each semester by a faculty committee. The ruling of that committee represents the final decision of the college.

Grievances
Grievances should be directed in writing to the senior associate dean. The CHSS Graduate Academic Affairs Office may also provide guidance to students on how to resolve their concerns.

UNDERGRADUATE PROGRAMS AND POLICIES
The baccalaureate degree is designed to provide a broad knowledge of the world, develop in students the ability to think conceptually and critically, acquaint them with many different methods of inquiry, and provide skills to continue intellectual growth throughout life. Because these goals can be achieved in many ways, students may select from a range of courses for completing them. The selection of courses should not only deepen knowledge in areas of interest, but also expand the range of those interests. The courses enable students to link the present to the past, their culture to other cultures, and what is to what could be. Learning to make these connections increases the ability to understand and enjoy the world in ways not yet imagined.

CHSS offers 16 bachelor of arts (BA) degrees, 6 bachelor of science (BS) degrees, and a bachelor of individualized study (BIS) degree. The undergraduate degree consists of course work in four areas: university-wide general education, college-level requirements, a major area of study, and electives. All students must complete 120 credits, of which at least 45 must be in upper-level courses (numbered 300 and above). At least one course at the 300 or 400 level must be designated “writing intensive.” All entering students who have not yet satisfied the university-wide general education requirement in quantitative reasoning are required to take the math placement test prior to enrollment.

CHSS cooperates with the Institute for Conflict Analysis and Resolution (ICAR) to provide courses from various disciplines in the college toward a BA, BS, and minor in conflict analysis and resolution (CAR). More information about CAR undergraduate degree programs can be found in the Institute for Conflict Analysis and Resolution chapter.

Students should consult the University General Education chapter for information concerning university-wide general education requirements for undergraduate degrees. All students are responsible for reviewing their transcripts and degree audits regularly to ensure that they are correct and meet all their requirements. Transfer students are encouraged to meet with their academic advisor prior to registering for classes to review their transcripts and course equivalencies. In some cases, students may need to earn more than 120 credits to complete all of their requirements.

Excluded Courses
Military Science (MLSC), Physical Education (PHED), and Parks, Recreation, and Leisure Studies (PRLS) activity courses cannot be counted toward credits required for a degree in CHSS. Students may use nonactivity PHED and PRLS courses for elective credit for CHSS degrees.

Accommodations for Disabled Students
Students with documented disabilities should contact the Office of Disability Services (Student Union I, Room 222; 703-993-2474) to open a file and learn more about accommodations that may be available to them.

Exceptions to Academic Policies
Students with questions regarding exceptions to academic policies and college-level requirements should consult with the CHSS Undergraduate Academic Affairs Office (Enterprise Hall, Suite 316; 703-993-8725; chssdean@gmu.edu). Policy information and forms are available online at www.gmu.edu/student/academicaffairs.

Grievances
Grievances should be directed in writing to the senior associate dean. The CHSS Undergraduate Academic Affairs Office may also provide guidance to students on how to resolve their concerns.

College-Level Requirements
Bachelor of Arts
The BA degree provides students with a breadth of knowledge as well as the necessary skills to make in-depth study of a major truly meaningful. In addition to the university-wide general education program, students pursuing a BA degree must complete the course work below. Except where expressly prohibited, a course used to fulfill a college-level requirement may also be used simultaneously to satisfy other requirements (university-wide general education requirements, college-level requirements, or requirements for the major).

- Philosophy or religious studies: 3 credits fulfilled by any course in philosophy or religious studies (PHIL, RELI)
- Social and behavioral science: 3 credits in addition to the university-wide requirement in social and behavioral science for a total of 6 credits. The two courses used to fulfill the combined college and university requirements must be from different disciplines in the social and behavioral sciences. This requirement may be fulfilled by completing any course in ADJ, ANTH, ECON, GEOG (except GEOG 102 or 309), GOVT, HIST (except 100 or 125), LING, PSYC, or SOCI.
- Natural science: 1 credit in addition to the university-wide requirement for a total of 8 credits. This requirement can be fulfilled by completing two of any approved natural science courses that include a laboratory experience. This requirement may not be fulfilled by BIOL 124 or 125.
- Foreign language: intermediate-level proficiency in one foreign language. This requirement may be fulfilled by...
Minors
Students may elect to take a minor in addition to their major field of study. For policies governing all minors, see the Academic Policies chapter of this catalog. Students interested in earning a minor should complete the appropriate section of the Change/Declaration of Academic Program form and submit it to the Office of the Registrar.

Administration of Justice

Phone: 703-993-8315
Web: adj.gmu.edu

Faculty
Professors: Mastrofski (chair), Taxman, Zingraff
Research professors: Gantley, Patten, Turner, Waddington
Associate professors: Gallagher, Gould, Wilson
Assistant professors: Agha, Johnson, Lum, Merola, Portillo, Rudes, Willis
Term instructors: Newmark, Sizemore, Wheeldon
Affiliate faculty: Uchida

Course Work
The Administration of Justice Department offers all course work designated ADJ and JLCP in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAM

**Administration of Justice, BS  BS-ADJ**

This program provides a sound foundation in the liberal arts and a focused study of the justice system and social, human, and moral problems raised in the administration of justice. The course of study prepares students for careers in law enforcement, corrections, the courts, investigations, juvenile justice, private and homeland security, and related social and human services. The program also provides a strong background for law school and graduate study in criminal justice or law and society.

Students may use up to 18 credits of approved ADJ courses taken at Northern Virginia Community College (NVCC) or another community college to fulfill the requirements detailed below. Once a student matriculates at Mason, no courses may be taken at another institution without prior written approval from the program and the dean.

**Degree Requirements**

In addition to satisfying the university general education requirements, students pursuing this degree must complete 67 credits with a minimum GPA of 2.00 distributed as follows:

- Five core courses (16 credits): ADJ 100, 300, 303, 306, 424
- 36 credits of approved elective courses chosen from the following, including at least 24 credits of ADJ courses: ADJ 301, 302, 304, 305, 307, 308, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 422, 423, 425, 460, 461, 462, 471, 475, 490, 491, 492, 499; GOVT 101, 103, 320, 420, 421, 452; PHIL 151, 311, 326; PSYC 100, 211, 231, 314, 325, 326; SOCI 101, 301, 308, 310, 315, 352, 401, 475; SOCW 400, 410, 423, 430; CONF 300, 302, 320, 330, 393

**Bachelor of Science**

The BS degree provides students with a more intensive approach to the core technical questions of their majors. This curriculum has a reduced number of courses in humanities and social sciences in comparison with the BA degree to allow students to achieve greater depth in their majors. CHSS students pursuing a BS must complete the university-wide general education program plus 1 additional credit of natural science (for a total of 8 credits), which must be fulfilled by an approved two-semester laboratory science sequence in a single science. This may not be fulfilled by BIOL 124 and 125. Requirements for each major are listed in the departmental sections that follow.

**Teacher Licensure**

Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter of this catalog and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmis@gmu.edu, or go to gse.gmu.edu.
• 15 credits of skills for the justice professional chosen from the following: ADJ 479/480; foreign language courses that develop or require foreign language skills and are taught in the language; GEOG 311; GOVT 305, 309, 351, 355, 356, 357, 359, 364, 366, 376, 400, 416, 459, 464; PSYC 260; SOCI 405, 410; STAT 362, 455, 463, 474; SOCW 200, 301, 323, 324, 351, 352, 425, 430; any CS course; any IT course

ADJ majors have the option of obtaining a concentration by completing 15 of their 36 elective credits within one of the following areas.

▲ Concentration in Criminal Justice (CJUS)
15 credits chosen from ADJ 302, 304, 305, 307, 400, 401, 402, 403, 404, 408, 409, 425, 471

▲ Concentration in Law and Society (LAWS)
15 credits chosen from ADJ 301, 308, 405, 406, 407, 408, 422, 423, 460; GOVT 452

Credits earned in ADJ 490, 491, 492, and 499, when relevant, may be applied to a concentration with prior written approval of the director of the BS in Administration of Justice Program.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in administration of justice fulfill this requirement by successfully completing ADJ 303. Students should complete ENGL 302 before taking the writing-intensive course in the major or take the two courses simultaneously.

Honors Program
Qualified students may pursue advanced work leading to graduation with honors. Those highly qualified students selected for the honors program participate in a two-course sequence, ADJ 491 and 492. To graduate with honors in ADJ, students must complete these courses with a minimum GPA of 3.50.

Minor in Administration of Justice
This minor develops knowledge of the principles, institutions, and practices for systems of administering justice. It provides a solid foundation for students seeking to supplement their major area of study, develop knowledge and skills needed for justice-related occupations, or lay the foundation for possible graduate study in the justice field. Students first obtain an overview of the justice system, learn legal or ethical standards by which to judge the behavior of justice practitioners, and then develop advanced knowledge of selected features of the justice system.

Students pursuing this minor must complete 15 credits distributed as follows:
• One required course (3 credits): ADJ 100
• Four courses (12 credits) of upper-level ADJ courses (excluding ADJ 479 and ADJ 480)

Students should plan their course of study with an Administration of Justice faculty advisor who will be assigned by the program. The minor must be approved by the Administration of Justice Program before graduation. At least 9 credits must be completed at Mason. For policies governing all minors, see the Academic Policies chapter of this catalog. In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

GRADUATE PROGRAMS

- Justice, Law, and Crime Policy, MA

The master’s degree in justice, law, and crime policy (JLCP) prepares graduate students for doctoral study or employment in academia or relevant policy or practitioner communities.

The program draws from a multidisciplinary faculty in the Administration of Justice Program for required core courses and electives. It also makes available a wide range of other electives from many different university programs, including those in computational social science, conflict analysis and resolution, economics, government, law, philosophy, psychology, public administration, sociology, and statistics.

The program takes advantage of the university’s proximity to many justice organizations at the federal, state, and local levels in the capital region. The curriculum is structured to give students the skills to do policy-relevant research and work with justice and security agencies in the region to exercise those skills and serve the needs of those agencies.

Application Requirements
See the Application for Graduate Study for admissions deadlines. Late applications will be considered on a space-available basis. There is no required background or preferred experience, but students should demonstrate interest in and aptitude for graduate study in justice, law, and crime policy. In addition to meeting all requirements for graduate study, applicants should submit three letters of recommendation from faculty members or individuals with first-hand knowledge of academic or professional capabilities; a statement of purpose of study no longer than 500 words; official verbal, quantitative, and analytical GRE scores on tests taken within five years of application submission; and a writing sample of a recent sole-authored work of at least 2,500 words. An interview may be required.

Satisfactory Progress
Each new student is assigned a faculty advisor who helps develop a program of study. The advisor and JLCP faculty assess the progress of all students annually. Students who fail to make satisfactory progress may be terminated from the program. Satisfactory progress in the JLCP Program is defined as maintaining a GPA of at least 3.00 and all course work must result in grades of B- or above. An academic warning will be issued at the first grade below B-, and dismissal will be initiated at the second grade below B-.

Degree Requirements
Students pursuing this degree must complete 30 credits distributed as follows:
• Four core courses (12 credits) in three fields:
  • Justice and law: JLCP 700, 720
  • Justice organizations, administration, and leadership: JLCP 740
  • Crime and crime policy: JLCP 760
• 9 credits of analytic methods: JLCP 780; 782, 783
Students must show satisfactory progress in the degree program.

Financial Assistance

The program offers financial assistance on a competitive basis through graduate assistantships and fellowships. Students on financial assistance must show satisfactory progress in the degree program.

Reduction of Credit

Students entering the doctoral program with a master’s degree in a related discipline, including law degrees, may request that the required credits for the doctoral degree be reduced by a maximum of 24 credits with approval of the program director and dean and in accordance with university policy. Students who have prior graduate course work that has not been applied to another degree may request to have a maximum of 12 of these graduate credits transferred to their JLCP degree program, with approval of the program coordinator and dean and in accordance with university policy.

Satisfactory Progress

Each new student is assigned an advisor who helps develop a program of study. The program of study must be submitted by the end of the first year. On advancing to candidacy, the chair of the dissertation committee becomes the advisor. The advisor and JLCP faculty assess the progress of all students annually. Students who fail to make satisfactory progress may be terminated from the program or dismissed from the university. Satisfactory progress in the JLCP program is defined as maintaining a GPA of at least 3.00 and all course work must result in grades of B- or above. An academic warning will be issued at the first grade below B-, and dismissal will be initiated at the second grade below B-.

Degree Requirements

In addition to satisfying the requirements for all doctoral degrees, students must successfully complete required course work, pass two qualifying exams, and form a dissertation committee, after which they are advanced to candidacy. The final requirements are the dissertation proposal defense and a dissertation of original research representing a significant contribution to the field, which should be publishable in a refereed journal or a quality press.

The 72 credits of course work are distributed as follows:

- Four core substantive courses (12 credits): JLCP 700, 720, 740, 760
- Four analytical methods courses (12 credits): JLCP 780, 782, 783; and one elective course chosen from analytic methods courses listed below
- Six elective substantive courses (18 credits): Three courses (9 credits) in each of two substantive fields of study listed below
- At least one elective course (3 credits) relevant to JLCP
- 3 to 6 credits of dissertation proposal JLCP 998
- 12 to 21 credits of dissertation JLCP 999

Once enrolled in 998, a student must maintain continuous registration in 998 or 999 each semester until the dissertation is submitted to and accepted by the University Library.

Qualifying Exams

Students must pass written qualifying exams in two core substantive fields of the student’s choosing, selected from the three fields below. Students may take a single qualifying exam at each sitting. All three qualifying exams will be offered at each sitting.

Students are not eligible to take the qualifying exams until they have successfully completed the required course work, as well as course work in the substantive area in which they intend to sit for the qualifying exam. Students earning the master’s in JLCP must have completed the master’s thesis (799).
Students have one opportunity across both exam areas to retake a failed exam.

**Advancement to Candidacy**
To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete and pass two qualifying exams. In addition, students must have a dissertation committee appointed by the Dean’s Office.

**Dissertation Committee**
The student’s committee is composed of at least three faculty members and a chair, at least two of whom must be full-time JLCP faculty and one, a member of the graduate faculty outside JLCP. The chair must be a full-time JLCP faculty member.

**Substantive Fields of Study**
In addition to the required analytical methods and substantive core courses, the curriculum offers three substantive fields. Doctoral students must select two substantive areas and complete three courses within each area. Master’s students may take any of the elective courses. Elective courses in each of these areas of study are listed below. Students may take one non-JLCP elective course in each area.

**Justice and Law**
Justice-related electives: JLCP 702, 703; GOVT 520, 725, 631; SOCI 611, 612, 619, 640; CONF 501, 701, 720, 721, 723, 724, 726, 747, 802, 803; PHIL 656; ECON 611, 852, 854

Law-related electives: JLCP 721, 722, 723, 730; SOCI 503; PHIL 611; CONF 733; ECON 895 (when topic is law and economics); selected LAW courses*

*Successful completion of JLCP 720 and 721 is a prerequisite for enrollment in LAW courses, which also requires preapproval from the JLCP coordinator, law school instructor, and associate dean for student academic affairs of the Law School.

**Justice Organizations, Administration, and Leadership**
JLCP 741, 742, 743, 749, 509, 510, 691; PUAD 502, 620, 621, 622, 640, 661, 671, 680, 700, 727, 781; CONF 731, 741, 742, 743; PSYC 532, 631, 639; SOCI 505, 523, 525, 692

**Crime and Crime Policy**
JLCP 761; SOCI 607; GOVT 745; PUAD 640, 644, 741; CONF 734; PSYC 616, 617

Elector courses under the analytical methods requirement JLCP 781; SOCI 631, 632, 634; STAT 574, 658, 662, 665, 673, 674; PSYC 633, 640; PUAD 643; CSS 600, 610

Students may use other courses offered by JLCP or other programs as elective credit for a substantive field with prior written approval of the student’s advisor, director of the JLCP program, and sponsoring program.

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**Communication**

**Communication, BA**

**Communication, BA-IOC**

Study in communication prepares students for graduate study or entry-level positions in such fields as interpersonal and organizational communication, journalism, media production and criticism, persuasive and political communication, and public relations.

**Degree Requirements**
In addition to satisfying the university-wide general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete 36 credits distributed as follows:

- Six required courses (18 credits): COMM 200, 300, 301, 302, 305, 400 (Students must complete COMM 200 with a grade of C (2.00) or better before enrolling in COMM 300, 301, 302, or 305.)
- Two courses (6 credits) of electives in communication
- Four courses (12 credits) in an approved concentration. Students must declare a concentration before they earn more than 75 credits. Transfer students with 60 or more credits are encouraged to declare a concentration by the end of their first semester. Specific sections of COMM 399 Special Topics in Communication may be applied toward a concentration with prior written approval of the undergraduate director.

**Concentration in Interpersonal and Organizational Communication (IOC)**

Four courses (12 credits) chosen from COMM 201, 230, 320, 332, 335, 344 (1), 349 (1), 401, 430, 434, 465

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**Faculty**

**Professors:**
- Bolteau, Botan, Decker, Friedley, Kreps
- (Eileen P. and Steve A. Mandell Term Professor of Health Communication; chair), Lichter, Lont, Maibach, McAuley, Rowan (associate chair)
- Emeritus professors: Looney, Manchester, Taylor
- Associate professors: Gibson, Muir, Nicotera, Villagran
- Assistant professors: Cai, Farnsworth, Hopson, Muthuswamy, Zhao

**Term full professor:** Pober
**Term associate professor:** Finn
**Term assistant professors:** Bedore, Powell, Wright
**Term research assistant professor:** Roser-Renouf
**Term instructors:** Anderson, M. Dickerson, Haynes, Klein, R. Smith, Talkington, Tomasic, Warren
**Term research instructor:** McCutcheon

**Adjuncts:** Ahmad, Akyeampong, Atwell, Aw, Barber, Beck, Biedrzycki, Chaaban, Chilcote, Clark, Cordero, Dance, Dickerhoof, N. Dickerson, Dillon, Doyle, Effros, Feigenbaum, Fisher, Garifo, Gauthier, Gladis, Greiner, Hadji, Hansche, Harzold, Holsonbake, Kahn, Kehoe, Kohlmann, Kraus, Kubiske, Ledford, Lehman, LeValley, Long, Mangus, Mattox, Moss, Outlaw, Payne, Peck, Plaag, Schmeidler, Simpson, Slagle, Stumpo, Suarez, Trowbridge, Van Zummeren, Walsch, Walter, Wilson, Wolyn, R. Wood

**Affiliate:** J. R. Censer (professor)
▲ Concentration in Journalism (JNL)
One required course (3 credits): COMM 303
Three courses (9 credits) chosen from COMM 145 (1), 203, 210, 330, 345 (1), 351, 352, 353, 356, 361, 362, 370, 391, 412, 431, 434, 435, 454, 455, 475

▲ Concentration in Media Production and Criticism (MPC)

▲ Concentration in Persuasive and Political Communication (PPC)
Four courses (12 credits) chosen from COMM 140 (1), 141 (1), 142 (1), 143 (1), 230, 260, 261, 320, 326, 340 (1), 341 (1), 342 (1), 343 (1), 362, 380, 412, 430, 431, 432, 454, 465

▲ Concentration in Public Relations (PR)
Four courses (12 credits) chosen from COMM 202, 230, 260, 261, 303, 320, 330, 335, 351, 362, 375, 389, 390, 391, 430, 454

▲ Individualized Concentration (IC)
With the approval of their advisor and associate chair, students may construct an individualized concentration.

Of the 21 credits in the second and third categories above, at least 12 must be at the 300-400 level. The 21 credits may include no more than 10 credits from the following courses: COMM 140, 141, 142, 143, 145, 148, 157, 340, 341, 342, 343, 345, 346, 348, 349, 450, 451, 452, 499; and no more than 6 credits of COMM 450 (internship). No more than 9 credits of internship (COMM 450 or GOVT 450) in total may be applied to the 120 credits required for a degree.

Communication majors must earn a C (2.00) or better in all required or elective communication courses applied to the major. Students declaring the major in fall 2005 and thereafter must meet this requirement.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated as writing intensive in their majors at the 300 level or above. Students majoring in communication fulfill this requirement by successfully completing COMM 300.

Presentation-Intensive Requirement
All communication majors are required to take at least one of the following courses to fulfill a presentation-intensive requirement: COMM 100, 210, 260, 310, 320, 356, or 399 (when the topic is special occasion speaking).

Communication Student Activities and Organizations
All students are encouraged to participate in one of the communication activities: Broadcast, debate, forensics, GMView, Mason Cable Network, PRSSA, or WGMU. Many students include an internship during their senior year as a way of gaining practical experience with national and international businesses, associations, or government agencies.

Honors Program in Communication
Communication majors who have completed 80 credits with an overall minimum GPA of 3.50 and a minimum GPA of 3.50 in communication courses are eligible to apply to the departmental honors program. Candidates for the honors program must have satisfactorily completed or be enrolled in COMM 200, 300, 301, 302, 305, and 400 before applying to be in COMM 425. Students who meet the criteria for admission are invited to submit a proposal for an honors thesis. If the proposal is approved, they are admitted to the honors program. To graduate with honors in communication, students must complete COMM 425 Honors Seminar in Communication, maintaining a minimum GPA of 3.50 in this course and an overall minimum GPA of 3.50. For more information, contact the director of the honors program in communication.

Minors
Students may choose to minor in any discipline that offers an undergraduate minor program (refer to this course catalog for descriptions of all university minors). The Communication Department houses two minors: communication and electronic journalism (see below). It also participates in several minors, including film and media studies, multimedia, and women and gender studies. For a description of these minors, see the Interdisciplinary Minors section of this chapter. In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Minor in Communication
The Department of Communication offers a minor to students who major in any other discipline.

Students pursuing the minor must complete 18 credits in communication beyond the 3 credits used to satisfy the university general education requirement distributed as follows:

- One required course (3 credits): COMM 200
- Two courses (6 credits) chosen from COMM 300, 301, 302, 305
- One course (3 credits) that is public presentation intensive (PPI) chosen from COMM 100, 210, 310, 320, or 356.
  (COMM 399, when it is PPI, may be applied to this requirement with prior approval of the director of the minor.)
- 6 additional credits of COMM courses

Students must earn a C or better in all courses applied to the minor.

Minor in Electronic Journalism
Electronic journalism provides a foundation in journalism with a focus on the writing style and research techniques unique to broadcast, online, and computer-assisted reporting.

Students pursuing this minor must complete 18 credits with a minimum GPA of 2.00 distributed as follows:

- Four required courses (12 credits): COMM 303, 351, 361, 475
- Two electives (6 credits) chosen from COMM 203, 352, 353, 370, 399*, 435, 450**, 454
  * All 399 courses must be approved by the director of the minor.
  ** If topic or internship is approved by the director of the minor.

This minor is not available to communication majors pursuing a concentration in journalism. For policies governing all minors, see the Academic Policies chapter of this catalog.
Teacher Licensure
Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

GRADUATE PROGRAM

Communication, MA

The master of arts (MA) degree in communication at Mason examines the powerful role played by communication practices in contemporary society. The program has two major areas of emphasis: health and strategic communication.

Our strategic communication faculty members teach courses on planning, developing, executing, and evaluating public communication campaigns based on their expertise in public relations theory and research. Our health communication faculty members explore the relationship between communication practices and the health and well-being of individuals and communities, including everything from how to improve cooperation and coordination between health care providers and patients to how to develop more effective health promotion campaigns. The program is committed to providing students with a strong foundation in communication theory and research while at the same time encouraging students to apply their skills in the public, private, and non-profit sectors.

Assistantships
The department offers a limited number of merit-based teaching assistantships to students taking at least 6 graduate credits each semester. Other sources of support, such as research assistantships, are available as funding permits.

Application Requirements
Students must meet the admission standards and application requirements of the university. See the Graduate Admission Policies section of the catalog. In addition to fulfilling the university application requirements, applicants must submit

- Three letters of recommendation
- Evidence of GRE taken within the past five years
- 500-word essay addressing the communication area in which the applicant is interested

Review of applications is ongoing. Late applications will be considered on a space-available basis. Because the number of students admitted is limited, meeting the minimum requirements does not guarantee admission.

Degree Requirements
Student pursuing the degree must complete 33 credits of graduate course work distributed as follows:

- Five core courses (15 credits) COMM 600, 650, 798 and two theory courses (6 credits) chosen from COMM 602, 605, 620, 630, 634, or 635
- One practicum course (3 credits) chosen from COMM 604, 621, 653, 655, 694, 697, 721, 820 (Other courses including independent study courses can be used to fulfill this requirement with the prior approval of the director of graduate studies.)

- 12 to 15 credits of electives chosen from graduate communication courses, including those listed above under theory or practicum. Students may take up to 6 credits of course work outside the department with prior approval of the director of graduate studies.
- 3 credits of thesis (optional)

Students electing the thesis option should consult the section on Master’s Thesis in the Academic Policies section of this catalog.

Communication, PhD

The doctor of philosophy (PhD) degree in communication at Mason examines the powerful roles performed by communication in contemporary society. The program has two major areas of emphasis: health and strategic communication.

Degree Requirements
To receive the PhD in communication, students must complete a minimum of 60 credits beyond the master’s degree, including core courses in theory and research methods, course work in a concentration, and a research practicum. Following completion of all required course work, students must pass a written qualifying examination and an oral defense of it, after which they are advanced to candidacy by the dean and complete a dissertation, an original and independent research project.

- Four courses (12 credits) of theory: COMM 600 and 9 credits chosen from COMM 602, 605, 634, 635
- Three courses (9 credits) of research methods (at least 6 at the 700 level): COMM 650 and 6 credits chosen from COMM 725, 750, or other courses with approval of the director.
- Six courses (18 credits) in one of the following substantive fields of study:
  - Health communication: 9 credits chosen from COMM 620, 705, 720, 820, and 9 credits of relevant course work with approval of the advisor and director
  - Strategic communication: 9 credits chosen from COMM 630, 705, 706, 735, and 9 credits of relevant course work with approval of the advisor and director
- 3 credits of a research practicum: COMM 604, 890 or 896 depending on the nature of the research being conducted
- 18 credits of dissertation proposal and research: 3 credits of COMM 998 and 15 credits of COMM 999

Once enrolled in 998, students must maintain continuous registration for at least 1 credit; once enrolled in 999, students must follow the university continuous registration policy. A maximum of 3 credits of COMM 998 and 15 credits of COMM 999 may be applied toward the 60 credits required for the degree, although because of continuous registration policy, students may be required to register for additional credits of these courses.

If specific requirements are waived by the director because of previous course work or experience, students must complete additional electives as approved by the department and recorded on their program of study.

Advancement to Candidacy
To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete and pass a written qualifying exam and an oral qualifying exam. In addition, students must
have a dissertation committee appointed by the Dean’s Office as well as an approved proposal. Evidence of the approved proposal must be on file in the Dean’s Office before a student can advance to candidacy.

Cultural Studies
Phone: 703-993-2851
Web: culturalstudies.gmu.edu

Faculty
Albanese, Amireh, Bergoffen, Best, Bickford, Bockman, Brown, Burr, Censer, Chang, Copelman, Dshmukh, Fiolliott, Foreman, Foster, Froman, Fuchs, Gibson, Gilbert, Greet, Guagnano, Gusterson, Hanrahan, Hodges, Holt, Horton, Jacobs, Jann, Johnsen-Neshati, Kaplan, Karush, Kaufmann, Lancaster (director), Landsberg, Leeman, Lont, Mandaville, Matz, Miller, O’Connor, O’Malley, Palkovich, Rabin, Ricouart, Rosenblum, Sample, Scarletta, Seligman, Shituka, P. Smith, S. Smith, Sockett, Stewart, Todd, Trafton, Travis, Vallas, Yadav, Yocom, Zagurri

Course Work
The Cultural Studies Program offers all course work designated CULT in the Course Descriptions chapter of this catalog.

GRADUATE PROGRAM

Cultural Studies, PhD
This doctoral program, the first of its kind in the United States, unites selected faculty members from programs across the university to serve students contemplating careers in scholarship and practice. Cultural studies is an emerging field of interdisciplinary inquiry, arising in response to dramatic historical and social changes. As the focus on cultural process transforms an entire range of disciplines in the humanities and social sciences, scholars are embracing new conceptions of culture and new methods for its study.

This program is distinctive in several respects. Similar programs at other universities are usually departmentally based (English, history, sociology, or communication), emphasizing either the humanities or the social sciences. By contrast, the Cultural Studies Program at Mason explicitly seeks to link the social sciences and the humanities, combining methods of interpretation and explanation to explore the production, distribution, and consumption of cultural objects in their social contexts. With particular focus on theory and method, the program engages contemporary issues of nationality, class, race, and gender while opening its scope to all forms of culture, past, and present.

Application Requirements
Students who already have an MA in a relevant field are eligible to apply to the program. Students with only a bachelor’s degree should apply to a master’s program in a department that has an established feeder program in cultural studies: English, History and Art History, Modern and Classical Languages, Philosophy, Religious Studies, or Sociology and Anthropology. These feeder programs culminate in a capstone seminar, CULT 802. Students may, if they choose, apply simultaneously to the PhD in cultural studies so that faculty members may review their academic promise and suitability of their interests to the program. Especially strong candidates with bachelor’s degrees may be admitted into the doctoral program on a conditional basis, depending on their performance in the MA program, particularly in CULT 802.

Students who wish to apply for an MA and the cultural studies PhD simultaneously must submit two separate applications, one for each program.

In addition to materials required of all applicants for graduate study at Mason, applicants to cultural studies should submit the following:
• Scores on the GRE (general test is required; subject tests are optional)
• Three letters of recommendation from individuals who can judge the applicant’s scholarly potential
• Statement of purpose
• Writing sample demonstrating scholarly potential

Degree Requirements
As with all doctoral programs, the emphasis in this program is on the development of intellectual mastery and professional competence. The most important requirements are comprehensive exams and completion of a doctoral thesis reflecting the student’s ability to do original interdisciplinary work that meets professional standards. Students are required to demonstrate proficiency in at least one foreign language before being permitted to defend the doctoral dissertation proposal.

Students pursuing this degree must complete 48 credits beyond the MA degree distributed as follows:
• Three core courses (9 credits): CULT 802, 806, 808
• One course (3 credits) in theory chosen from CULT 810, 814, 820
• One course (3 credits) in a topic chosen from CULT 812, 816, 818
• One course (3 credits) in methodology. Students choose a course in a relevant methodology in which they are not already trained from departmental graduate offerings (600 level or above) under the guidance of faculty advisory committees.
• A minimum of 3 courses (9 credits) in each of two fields (see below)
• Oral defense of two written field statements (see below)
• Proficiency in a foreign language
• Dissertation research (12 credits; 998, 999)

Students are required to register for a minimum of 3 credits of 998 or 999 each semester until they have completed the minimum number of credits of 998 and 999 required on their program of study. Once enrolled in 998, a student must maintain continuous registration in 998 or 999 each semester until the dissertation is submitted to and accepted by the University Library.

Field Requirement
Under the guidance of faculty advisory committees, students select two fields that point topically and theoretically toward teaching interests, dissertation research, and related forms of professional development. Students select relevant courses from theory or topic courses not used to fulfill the requirements above, departmental graduate offerings (600 level or above), independent study courses, and special topics courses. As part of the minimum 9-credit field requirement, students must take a 3-credit directed readings course, CULT 870, in each field with that field’s primary advisor. Students
demonstrate competence in each field by producing and orally defending a field statement that consists of a comprehensive, critical literature review.

Advancement to Candidacy
To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete two written field statements and pass an oral comprehensive exam based on them.

Economics

Phone: 703-993-1130
Web: economics.gmu.edu

Faculty
Distinguished professor emeriti: Buchanan, Smith
Professors: Bennett, Boettke, Boudreaux (chair), Congleton, Cowen, Crain, Heiner, House, Iannaccone, Klein, Levy, McCabe, Nye, Richardson, Roberts, Rowley, Stratman, Troesken, Tullock, Wagner, Williams
Associate professors: Caplan, Hanson, Meyer, Ramirez, Reid, Tabarrok, Thorbecke, Wiest
Assistant professors: Al-Ubaydli, Jones, Leeson
Instructor: Rustici
Professors emeriti: Chung (emeritus), Phillips (emeritus), Snively (emeritus), Vaughn (emerita)

Course Work
The Economics Department offers all course work designated ECON in the Course Description chapter of the catalog.

UNDERGRADUATE PROGRAMS

■ Economics, BA  BA-ECON
This program is designed primarily for students with a stronger interest in the liberal arts. It is appropriate for those who prefer a less quantitative degree program and may be especially appropriate for students planning to attend law school or graduate programs in business or public administration.

Degree Requirements
In addition to satisfying the university-wide general education requirements and the requirements for a BA degree in CHSS, students pursuing the degree must complete the course work distributed as follows:

• Four required courses (12 credits): ECON 103, 104, 306, and 311
• Eight elective courses (24 credits) in economics at the 300 and 400 level
• OM 210, or STAT 250 and 350
• MATH 108
• IT 103
Students must earn a GPA of at least 2.00 in ECON courses.

Some economics courses may fulfill the university-wide general education requirement in global understanding or the CHSS requirement in non-Western culture. Check with the departmental advising office for more information. Economics majors can fulfill the university-wide general education synthesis requirement with ECON 309.

■ Economics, BS  BS-ECON
The BS degree program is designed for students who desire a more technical program with a stronger emphasis on economic and quantitative analysis. It is especially appropriate for students who anticipate a career as an economic analyst in government, consulting, trade associations, or other privatesector positions that emphasize economic research and analysis. The requirements are also appropriate for students planning postgraduate education in economics or more quantitative business administration programs.

Degree Requirements
In addition to satisfying the university-wide general education requirements, students pursuing the degree must complete the course work distributed as follows:

• Five required courses (15 credits): ECON 103, 104, 306, 311, and 345
• Eight elective courses (24 credits) in economics at the 300 and 400 level
• STAT 362, ACCT 203, or MSOM 300
• OM 210, or STAT 250 and 350
• MATH 113 and 114
• IT 103
• 8 credits of a laboratory science sequence

Students must earn a GPA of at least 2.00 in ECON courses. IF ECON 340 Mathematical Economics is chosen as an elective, students need not take MATH 114; however, MATH 114 is strongly recommended for students considering graduate school in economics and is required for admission to most graduate programs. An additional calculus course beyond MATH 114 is also advisable for students considering graduate study in economics.

Some economics courses may fulfill the university-wide general education requirement in global understanding. Check with the departmental advising office for more information. Economics majors can fulfill the university-wide general education synthesis requirement with ECON 309.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in economics fulfill this requirement by successfully completing ECON 320, 345, 350, 360, or 365.

Minor in Economics
Students pursuing this minor must complete 21 credits in economics with a minimum GPA of 2.00 distributed as follows:

• Three required courses (9 credits): ECON 103, 104, and 306
• Four elective courses (12 credits) in economics at the 300 or 400 level

A minimum of 9 credits of upper-level economics course work must be taken at Mason. With permission of the department chair or undergraduate director, a course in a closely related field may be substituted for 3 credits of economics electives. A course in statistics is highly recommended: OM 210, or STAT 250 or 344 may substitute for up to 3 credits of economics electives.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill
requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Minor in Economic Systems Design

The design of processes that efficiently allocate resources and foster exchange are crucial in society, organizations, personal interactions, and individual decision making. Economic systems design is the scientific study of the design, development, testing, and understanding of economic institutions. Economic systems design explores problems in the design of allocation systems and provides a method to develop and test the properties of such systems. A minor in economic systems design prepares students to undertake the scientific process of understanding and developing systems of exchange and their incentives. The skills offered through this minor can be of use to e-commerce designers, policy analysts, systems designers, engineers, and computer scientists.

Students pursuing the minor must complete 15 credits distributed as follows:

- Three required courses (9 credits): ECON 440, 441, 442
- Two electives courses (6 credits) chosen in consultation with an advisor in the minor. Typical courses include MIS 491, MATH 441, SYST 420 and 470, CS 480 and 483, and ECON 335 and 415.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Teacher Licensure

Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter of this catalog and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Bachelor’s/Accelerated Master’s Program in Economics

Highly qualified Mason undergraduates may apply to the accelerated master’s degree program and obtain both bachelor’s and master’s degrees in economics after satisfactory completion of 144 credits. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Admitted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferral of the undergraduate degree with satisfactory performance (3.00 in each course, grade of B or better) in graduate courses, students are given advanced standing in the master’s program. All other master’s degree requirements must be met. Graduates are exceptionally well-prepared for a professional school or a PhD program in economics or a related discipline. Interested students should contact the department for details about the application process.

GRADUATE PROGRAMS

■ Economics, MA

The MA in economics strengthens students’ knowledge of economic theory and improves their skills in applying the theory to economic problems. Graduates are qualified to read and judge other research and conduct their own research, either individually or as members of government or business teams. They are also prepared to write policy analysis articles. Students who plan to pursue a PhD in economics should apply directly to the doctoral program.

Application Requirements

Applicants should hold an undergraduate degree, which does not have to be in economics, from an accredited institution. They should have satisfactorily completed intermediate microeconomics and macroeconomics and MATH 108 or equivalent, and at least one semester of calculus before enrolling in any graduate courses. Students entering the master’s program should be familiar with basic statistics as well. Students also should have earned a 3.00 GPA in the last two years of undergraduate work and in all economics courses, as well as satisfactory scores on the GRE (subject exam is optional).

All applicants must submit two letters of recommendation and a brief personal statement explaining their interest in the program.

Degree Requirements

Students pursuing this degree must complete 30 graduate credits distributed as follows:

- Three required courses (9 credits): ECON 611, 612, and 615
- Seven elective courses (21 credits) in economics chosen from any of the fields offered by the department. ECON 630 Mathematical Economics and ECON 535 Survey of Applied Economics are strongly recommended.
- Students may receive departmental permission to substitute up to 6 credits of electives taken outside economics in closely related fields. Students may also elect the thesis option, which offers 6 credits for independent research and writing under the supervision of a faculty member in lieu of 6 credits of electives.
- Passing grades on comprehensive exams in micro- and macroeconomics (Exams are offered twice each year.)

Although the department does not guarantee availability of courses every semester, a typical first-year sequence includes ECON 611 and 630, and an elective in the fall, and ECON 612 and 615, and an elective in the spring. If possible, part-time students should arrange their work schedules to take two courses per semester in the first year. Master’s degree students must enroll at the Arlington Campus for core theory courses. A cumulative GPA of 3.00 is required, and no more than two courses with a grade of C may be applied toward the degree.

■ Certificate in Economic CERG-ECSD Systems Design

This certificate provides graduate students with a program of courses and laboratory experience. Course work for the graduate certificate can be used for credit toward the MA and PhD in economics. The primary purpose is to provide a well-defined target for students who want to advance or update their knowledge in this fast-moving field.

Graduate students in economics, computer science, mathematics, systems engineering, and informatics find this certificate a strong complement to their major area of study. The courses and project work provide skills that can be used in
A cumulative GPA of 3.00 is required, and no more than one course with a grade of C may be applied toward the certificate.

■ Economics, PhD  PHD-ECON

This program prepares students for careers in academia, business, and government. Core courses train students in modern theory and quantitative techniques, while field courses stress the application of theory to relevant economic problems. Dissertation work requires students to master and apply the skills of original research. The department emphasizes publishing; many students have had articles accepted for publication in professional journals while in the graduate program. Research in the Department of Economics covers a broad spectrum, from problems of immediate policy importance to fundamental questions of economic and social organization.

Application Requirements

Applicants should hold an undergraduate degree, which does not have to be in economics, from an accredited institution and have satisfactorily completed intermediate microeconomics and macroeconomics. They also should have one year of calculus, one year of statistics, and one semester each of matrix algebra and econometrics. Applicants should have earned a 3.00 GPA in the last two years of undergraduate work and in all economics courses, as well as received satisfactory scores on the GRE (subject exam is optional).

Applicants must submit two letters of recommendation and a brief personal statement explaining their interest in the program. The department accepts doctoral students only for the fall semester.

Reduction of Credit

Students who enter with a master’s degree in economics may have their credit requirement reduced by up to 30 credits at the discretion of the department with approval of the dean. Credit is not given for comprehensive and field exams from other universities.

Degree Requirements

In addition to satisfying the university requirements for all doctoral degrees, students must successfully complete 72 credits of course work plus exams distributed as follows:

- Six required core courses (18 credits): ECON 630, 637, 715, 811, 812, 816
- Two required courses in each of two fields listed below (12 credits) in preparation for field exams
  - Field exams in two fields of study
  - Comprehensive exams in microeconomics and macroeconomics
  - Six to 10 elective courses (18 to 30 credits)
  - 12 to 24 credits of dissertation (998, 999)

A cumulative GPA of 3.00 is required, and no more than two courses with a grade of C may be applied toward the degree. Once enrolled in 998, a student must maintain continuous registration in 998 or 999 each semester until the dissertation is submitted to and accepted by the University Library.

Subject to course availability, the department offers exams in the following fields of study. Consult the department for the required courses for each field.

- Austrian economics
- Constitutional economics
- Economic history
- Economics and religion
- Experimental economics
- Industrial organization
- Law and economics
- Monetary theory
- Public choice
- Public finance

Advancement to Candidacy

To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete and pass comprehensive exams in microeconomics and macroeconomics, as well as field exams in two knowledge areas. In addition, students must have a dissertation committee appointed by the Dean’s Office as well as an approved proposal. Evidence of the approved proposal must be on file in the Dean’s Office before a student can advance to candidacy.

Law and Economics, Joint Degree Programs

Four degree programs are offered jointly with George Mason University’s School of Law: JD/PhD, LLM PhD, JD/MA, and LLM/MA. Details are available at www.law.gmu.edu/econ/jointdegrees.html.

English

Phone: 703-993-1160
Web: english.gmu.edu

Faculty

Professors: L. Brown, Cheuse, D’Andrea (Robinson Professor), Foster, Goodwin, Hodges, Jann, Lathbury, Lowry, Nadeau, Pankey

Associate professors: Albanese, Amireh, Anderson, Atkinson, Burr, Clark, Foreman, Fuchs, Gallehr, Hawk, Holisky, Jones, Kaplan (chair), Kaufmann, Keaney, Kuebrich, Lattanzi Shatika, Matz, Rutledge, Tichy, Trafton, Weinberger, Yadav, Yocom

Assistant professors: Eisner, Eyman, Habila, Harvey, Keith, Lin, Marcatonio, McCarthy, Ngalabak, Reid, Sample, Widerhold, Zawacki
Term associate professors: Koch, Michals, Miller, Samuelian, Scott, Taciuch, Taylor, Thompson
Term instructors: Beach, Hoy, Raffel, Scolaro
Adjunct assistant professors: Burnham, DeFazio, Dreisonstok, Fowler, Humbertson, Jacobs, Kuhta, Moody, Pabich, Redondo
Adjunct instructors: Cooper, Grogan-Barone, Gulshan, Holcomb, Johnston, McKinney

Course Work
The English Department offers all course work designated CL, ENGL, LING, and NAIS in the Course Descriptions chapter of this catalog.

Related Courses
Courses offered by other departments are occasionally cross-listed with English and given the ENGL course designator; such courses may be counted toward the English major.

UNDERGRADUATE PROGRAMS

■ English, BA

Degree Requirements
In addition to university-wide general education requirements and college-level requirements for the BA degree in CHSS, students pursuing this degree must complete 30 credits (nine courses) in English beyond ENGL 302 with a minimum GPA of 2.00 distributed as follows:

• One required course (6 credits): ENGL 325, with a minimum grade of C (2.00)
• Four core courses (12 credits) distributed as follows:
  One course (3 credits) in literature before 1800 (may simultaneously satisfy a concentration), chosen from ENGL 335, 336, 400, 401, 402, 404, 405, 431, 440, 443, 450, 471, 472, and 474, and by special topics courses as approved by the department
  One course (3 credits) in literature before 1915 (may simultaneously satisfy a concentration), chosen from courses listed above and ENGL 368, 370, 406, 407, 423, 425, 436, 452, and 453; and by special topics courses as approved by the department
  One course (3 credits) in minority, folkloric, or popular literary and cultural traditions (may simultaneously satisfy a concentration), chosen from ENGL 333, 334, 349, 350, 368, 369, 370, 371, 372, 375, 439, 460, 479, 491, 492, and 493, and by special topics courses as approved by the department
  One course (3 credits) of an elective above ENGL 302
• Four courses (12 credits) in one of the following concentrations:

▲ Concentration in American Literature (ALIT)
Four courses (12 credits) chosen from ENGL 333, 368, 370, 371, 372, 375, 380, 390, 423, 425, 447, 452, 454, 463, 478, or from special topics courses when designated by department

▲ Concentration in Creative Writing (CW)
Four courses (12 credits) chosen from ENGL 344, 397, 398, 399, 458, 464 or 497

▲ Concentration in Cultural Studies (CULT)
Four courses (12 credits) chosen from ENGL 327, 330, 332, 333, 334, 338, 349, 368, 369, 370, 371, 372, 460, 479, 491, 493, or from special topics courses when designated by department. Up to one course (3 credits) may be from outside the English Department from COMM 465; CULT 320; PSYC 362; SOCI 315; WMST 300, 330.

▲ Concentration in Drama (DRA)
Four courses (12 credits) chosen from ENGL 335, 336, 440, 443, 445, 447, 448, 449 or from special topics courses when designated by department. A maximum of one course (3 credits) may be from courses on Shakespeare. Up to one course (3 credits) may be from outside the English Department from FREN 413, 442; RUSS 407; SPAN 565; THR 350, 351, 352, 380, 381

▲ Concentration in Fiction (FIC)
Four courses (12 credits) chosen from ENGL 380, 398, 463, 437, 450, 452, 453, 454, 456, 459, 460, 492 or from special topics courses when designated by department

At least one of the four courses (3 credits) must be in fiction before 1915 chosen from ENGL 436, 450, 452, 453, or from special topics courses when designated by department

▲ Concentration in Film and Media Studies (FILM)
Four courses (12 credits) chosen from ENGL 327, 332, 343, 421, 422, 490 or from special topics courses when designated by department. Up to one course (3 credits) may be from outside the English Department from ARTH 362, 373, 374; COMM 380, 465; MUSI 301; RUSS 470

▲ Concentration in Folklore and Mythology (FML)
At least two courses (6 credits) in folklore and mythology chosen from ENGL 311, 333, 337, 491, 498, 591 or from special topics courses when designated by department. Up to one course (3 credits) may be from outside the English Department from ANTH 450 or CLAS 340

Up to two courses (6 credits) related to folklore and mythology chosen from ENGL 327, 335, 336, 349, 368, 370, 371, 372, 400, 445, 471, 472, 474. One course (3 credits) may be from outside the English Department from ANTH 301, 302, 303, 304, 306, 307, 308, 311, 313, 332; ARTH 319, 321, 322, 340, 342, 345, 382, 383, 384, 385; RELI 351

▲ Concentration in Linguistics (LING)
One required course (3 credits): LING 326
Three courses (9 credits) chosen from LING 322, 326, 450, 485, 486, 490, 499, 507, 521, 522, 523, 581, 582

▲ Concentration in Medieval and Renaissance Literature (MRL)
Four courses (12 credits) chosen from ENGL 355, 336, 400, 401, 402, 431, 440, 471, 472, 473, 474 or from special topics courses when designated by department. Up to one course (3 credits) may be from outside the English Department from ARTH 334, 340, 341, 342, 344, 345; HIST 304, 305, 306, 321; PHIIL 302; RELI 371

▲ Concentration in Modern British Literature (MBL)
Four courses (12 credits) chosen from ENGL 404, 405, 406, 407, 443, 445, 450, 453, 456, 462 or from special topics courses when designated by department
A Concentration in Nonfiction Writing and Rhetoric (NWR)
Four courses (12 credits) chosen from 309, 311, 342, 343, 392, 399, 410, 489, 496, 498, 503, 504, 505 or from special topics courses when designated by department

A Concentration in Poetry (POE)
Four courses (12 credits) chosen from ENGL 335, 336, 390, 397, 400, 401, 402, 404, 406, 407, 462, 463, 468, 471 or from special topics courses when designated by department

A Concentration in World Literature (WLIT)
At least two courses (6 credits) chosen from ENGL 349, 350, 436, 437, 439, 448 or from special topics courses when designated by department

Up to one course (3 credits) chosen from courses from the concentrations in Medieval and Renaissance Literature, American Literature, or Modern British Literature

Up to one course (3 credits) in a relevant course from these approved courses: ANTH 300; CULT 320; HIST 308, 309, 387; CHIN 310, 311, 325, 328; FRLN 330; FREN 325, 329; GERM 325; JAPA 320; RUSS 325, 326, 327; SPAN 325, 329

Students should consult with an English Department advisor to learn ways in which the university-wide general education requirements can also satisfy college-level requirements or the English major. Graduating majors participate in assessment of the degree by preparing a dossier of writing completed in their upper-level courses.

Comparative Literature Emphasis
The English Department and the Modern and Classical Languages Department offer a BA in English with an emphasis in comparative literature. This program combines the study of literature in English with the study of one or more foreign literatures and with cross-cultural literary study. It requires 10 courses above ENGL 302, distributed as follows:

1. One introductory course in literary criticism, as appropriate for the student’s focus: ENGL 325, FREN 381, or SPAN 311
2. CL 300 (if offered) or an approved alternative
3. Two courses in English or American literature
4. Two courses in a literature other than English or American, either in translation or, for those pursuing foreign language study, with selected readings in the original language
5. Three courses designated as comparative or world literature courses by the comparative literature committee and generally selected in consultation with the advisor every semester (Examples are ENGL 350, 431, 436, 437, and 439; various 300-level CLAS courses; FRLN 330 courses; and appropriate special topics courses in ENGL, FREN, GERM, RUSS, SPAN, or other language.)
6. CL 514

Students should consult with their advisor to design a program of study that best suits their particular interests and goals.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in English fulfill this requirement by successfully completing ENGL 325.

English in a Double Major
Students interested in designing a double major are encouraged to discuss their plans with their English advisor and the director of undergraduate programs in English.

Honors Program in English
To qualify for graduation with honors, students must complete the honors course sequence and receive a 3.50 GPA in all courses counted toward the major and, separately, a minimum 3.50 GPA in their honors courses. Honors courses may simultaneously satisfy concentration and distribution requirements in the major.

Students may satisfy the honors course sequence in several ways:

- Students may take two sections of ENGL 414 Honors Seminar.
- Students may take one section of ENGL 414 Honors Seminar and ENGL 415 Honors Thesis Writing Seminar in conjunction with another advanced literature or cultural studies course.
- Students in the creative writing concentration may take one section of ENGL 414 Honors Seminar and write a creative honors thesis in ENGL 416 Honors Independent Study.
- Students in the nonfiction concentration may take ENGL 416 Honors Independent Study in conjunction with an advanced course in nonfiction writing and complete a nonfiction thesis as part of ENGL 415 Honors Thesis Writing Seminar.

See the English Department for application procedures and other information.

Minor in English
A minor in English provides students with a sound introduction to the field of literary studies and allows them to select a set of courses to suit their individual interests. Prerequisites for the minor in English are the 3-credit university-wide general education requirement in literature.

Students pursuing this minor must complete 18 credits above ENGL 302 with a minimum 2.00 GPA distributed as follows:

- One required course (6 credits): ENGL 325
- Three courses in a concentration listed under the English major or three courses that satisfy the core requirements for the major (9 credits)
- One elective course (3 credits)

The minor must be approved by the English Department undergraduate advisor before graduation. In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Minor in Teaching English as a Second Language
The minor in teaching English as a second language (TESL) helps prepare undergraduate students to teach nonnative speakers of English in the United States or abroad. This course of study combines linguistic theory, second language acquisition theory, and ESL teaching methodology.
The minor in TESL may be pursued concurrently with any undergraduate major. English majors concentrating in linguistics can apply up to 9 credits in LING used for the major to the TESL minor. Students in the TESL minor must have approval from the director to register for the 500-level courses in the TESL program.

Students pursuing this minor complete 18 credits distributed as follows:

- Five required courses (15 credits): LING 322, 326, 521, 523, and 582
- One elective course (3 credits) chosen from ANTH 114; COMM 305; ENGL 327; LING 450, 485, 486, 490, 499, 525; or any course (3 credits) in a foreign language beyond the college requirement for the BA degree

Other suitable elective courses may be applied to the minor with the prior approval of the director. In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Interdisciplinary Minors

The department coordinates or co-coordinates the interdisciplinary minors in film and media studies, folklore and mythology, and linguistics. See the Interdisciplinary Minors section of this chapter for more information.

Undergraduates in Graduate Courses

The English Department permits qualified undergraduates to enroll in its graduate courses numbered 500 through 599, either for undergraduate or reserve graduate credit. See the department for details on how to enroll.

Teacher Licensure

Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Writing Center

The Writing Center offers one-on-one conferencing during all stages of the writing process. Conferences are free to all Mason students, faculty, staff, and alumni. Writing Center tutors, who are graduate teaching assistants in the English Department, have been trained in current methods of composition instruction. They can help clients overcome writing anxiety, develop organizational and revision skills, and learn useful strategies for editing their own work. Appointments should be made by calling 703-993-1200 or stopping by the center in Robinson Hall A, Room 116, to schedule a session.

Northern Virginia Writing Project

The Northern Virginia Writing Project (NVWP) is an in-service organization dedicated to improving the writing of Northern Virginia students, kindergarten through university level. Each summer, selected teachers attend an intensive five-week institute where they demonstrate successful teaching techniques, study research on the teaching of writing, and write. After the summer institute, participants return to their schools, colleges, and universities to lead workshops and in-service seminars for other teachers. NVWP is an affiliate of the National Writing Project and one of the seven sites of the Virginia Writing Project.

Bachelor’s/Accelerated Master’s Program in Linguistics

Highly qualified Mason undergraduates may apply to the accelerated master’s degree program and obtain both a BA in English and an MA in English with a concentration in linguistics after satisfactory completion of 144 credits. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Satisfactory performance in LING 326 is a prerequisite for admission. Admitted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferral of the undergraduate degree with satisfactory performance (3.00 in each course, grade of B or better) in graduate courses, students are given advanced standing in the master’s program. All other master’s degree requirements must be met. Interested students should contact the director of linguistics for details about the application process.

GRADUATE PROGRAMS

The English Department offers graduate programs in the study and practice of literature and writing, as well as course work in related fields such as folklore, film, and cultural studies. The MA in English (30 credits) provides concentrations in literature, cultural studies, professional writing and rhetoric, the teaching of writing and literature, and linguistics. The department also offers a terminal degree, the MFA in creative writing (48 credits), with concentrations in fiction, poetry, and nonfiction. In addition, the department offers a certificate in teaching English as a second language (TESL, 18 credits), a certificate in professional writing and rhetoric (18 credits), and courses as part of the PhD in education.

■ English, MA

Application Requirements

In addition to fulfilling admission requirements for graduate study, applicants must submit one copy of a 1,000-word analytical writing sample and two letters of recommendation. For those applying in cultural studies, literature, professional writing and rhetoric, and the teaching of writing and literature, the writing sample should be an interpretive paper on a literary text. In addition to the writing sample, applicants must submit a goals statement of no more than 750 words. Applicants for the concentration in professional writing and rhetoric must also submit two copies of a 10- to 15-page portfolio of their nonfiction work such as a technical or business report, essay, term paper, editing project, or any other material reflecting interests and skills in nonfiction writing. Applicants may submit scores from the GRE when they believe those scores will lead to a clearer representation of their qualifications. Those with undergraduate majors in disciplines other than English are encouraged to apply, but they may be required to make up deficiencies before entering the program.

Degree Requirements

Students pursuing this degree must successfully complete 30 credits in graduate English courses in one of the following concentrations. Students must also demonstrate foreign language proficiency by course work equivalent to Mason’s
foreign language 210 or by passing a translation test administered by the department.

▲ Concentration in Cultural Studies (CULT)
- Two required course (6 credits): ENGL 701 (usually in the first semester of study) and 676
- Two courses (6 credits) chosen from ENGL 551, 555, 665, 670, 675, 685, 705, 740 (each of the latter three may be repeated once with permission of the director of graduate studies)
- One course (3 credits): CULT 802 (may not be taken before ENGL 676; completion of at least 24 credits of the degree required)
- Five courses (15 credits) of literature
- Thesis option: 6 credits of ENGL 799 (substitutes for 6 credits of literature)
- Foreign language proficiency as described above

▲ Concentration in Linguistics (LING)
The linguistics concentration of the MA in English combines courses in linguistics with courses in some related area of language study, such as teaching English as a second language, bilingual education, or foreign language teaching. The course of study is designed to prepare students for teaching in one of these fields or for doctoral work. The certificate in teaching English as a second language can be earned concurrently. Students pursuing the linguistics concentration must successfully complete 30 graduate credits, distributed as follows, and demonstrate foreign language proficiency (see above).
- Six core courses (18 credits): LING 690, 691, 692, 785, 786, 787
- Four elective courses (12 credits), chosen in consultation with an advisor, which reflect one or more areas of language study (Electives can be in such areas as linguistics, the teaching of reading or writing, literary criticism, bilingual education, or a foreign language, and may include 6 credits of thesis.)

▲ Concentration in Literature (LIT)
- One required course (3 credits): ENGL 701 (usually in the first semester of study)
- One course (3 credits) in critical theory, chosen from ENGL 514, 551, 675, 676, or 705
- Eight courses (24 credits) of literature
- Thesis option: 6 credits of ENGL 799 thesis may substitute for 6 credits of literature
- A maximum of 6 credits of related study outside the department may substitute for the equivalent number of literature credits, with permission of the graduate director
- Foreign language proficiency as described above

▲ Concentration in Professional Writing and Rhetoric (PWR)
- Two required courses (6 credits): ENGL 501 (usually in the first semester of study) and 502
- Two courses (6 credits) in professional writing and rhetoric
- Two courses (6 credits) in writing or nonfiction
- Three courses (9 credits) chosen from designated courses in rhetorical studies, literature and literary theory, linguistics, cultural studies, film and media studies, and folklore
- 3 credits in ENGL 797
- Foreign language proficiency as described above

▲ Concentration in the Teaching of Writing and Literature (TWL)
- One required course (3 credits): ENGL 701 (usually in the first semester of study)
- Two courses (6 credits) in writing
- Two courses (6 credits) of literature
- One course (3 credits) in linguistics, usually LING 522
- Two courses (6 credits) in the teaching of writing and in the teaching of literature, usually ENGL 615 and ENGL 610
- One course (3 credits) in composition theory: either ENGL 697 or an appropriate section of ENGL 611
- One elective course (3 credits) in literature or writing
- Thesis option: A thesis may be arranged through the advisor and director of graduate studies in English; this option requires 6 credits and expands the degree program from 30 to 33 credits.
- Foreign language proficiency as described above

Creative Writing, MFA (MFA-CW)
The MFA program has three concentrations: poetry, fiction, and nonfiction. Students should apply to only one concentration, although a student turned down by one concentration may subsequently apply to another or to that same concentration in a subsequent year.

Students interested in taking individual courses or in applying in the future to the MFA program are welcome to apply to take classes as nondegree students; however, such enrollments are allowed only with the instructor’s permission. Regular applicants to the MFA program who are denied admission may not take courses as nondegree students. Students interested in taking a course as nondegree should submit a brief letter of introduction and a writing sample to the professor at least one week before the start of classes.

Admission Requirements
In addition to fulfilling admission requirements for graduate study, applicants must submit two letters of recommendation, one copy of a 1,000-word analytical writing sample, and a portfolio of original work. The analytical writing sample may be a paper written for an undergraduate class or any other work that gives evidence of advanced writing skills. For those applying to the MFA concentration in fiction, the portfolio should consist of up to 50 pages of fiction; at least two complete short stories are preferred. For those applying to the poetry concentration, the portfolio should consist of up to 20 pages of poetry. For those applying to the nonfiction concentration, the portfolio should consist of up to 50 pages of creative nonfiction.

Degree Requirements
Students pursuing this degree must successfully complete 48 graduate credits, distributed as follows:
- Two to four courses (6 to 12 credits) in literature
- Four to six courses (12 to 18 credits) of writing workshops in one of the following concentrations:
  ▲ Concentration in Fiction (FIC)
  - One course (3 credits) in the form: ENGL 566
  - 9 credits in writing workshops: ENGL 618, 751
  ▲ Concentration in Nonfiction (NFW)
  - One required course: ENGL 506 (Students should enroll the first semester it is offered after they enter the program.)
• One course (3 credits) in the form: ENGL 565
• 9 credits in writing workshops: ENGL 616, 752

▲ Concentration in Poetry (POE)
• One course (3 credits) in the form: ENGL 564
• 9 credits in writing workshops: ENGL 617, 750
• At least one course (3 credits) in another genre, which may be ENGL 608
• 6 credits in thesis (may be taken in the summer term only with permission of the thesis committee)
• 6 to 12 credits in ENGL 608, with a minimum of 6 credits in student’s chosen genre
• Up to five courses (15 credits) of electives chosen in consultation with the writing program faculty
• 1 credit of ENGL 699

With the approval of the MFA faculty, the program director, and the dean, the number of credits required for an MFA may be reduced by a maximum of 20 credits on the basis of graduate course work before admission.

Students in poetry must pass a written MFA exam based on the authors they have chosen. The authors are selected in collaboration with the writing faculty any time after completing 12 credits of course work and before completing 32 credits. The exam must be completed at least one semester before the student registers for the final 3 credits of thesis.

Students in fiction and nonfiction must pass an MFA exam or complete an MFA project. Students who elect to take the MFA exam select, after the completion of 18 credits and with the approval of their faculty advisors, a list of authors and an area of emphasis (for example, the European novel). Students who elect to complete an MFA project (such as editing an anthology) must carry out the project under the direction of a faculty member and may register for ENGL 798 to fulfill this requirement. ENGL 798 may not be used to fulfill the literature requirement or as thesis preparation. The exam or project must be completed at least one semester before the student registers for the final 3 credits of thesis.

Students who have not completed the equivalent of Mason’s foreign language 210 must do so or demonstrate proficiency by passing a translation test administered by the English Department.

■ Certificate in Folklore CERG-FLK

The certificate in folklore enables students to explore the processes of tradition that move through multiple expressive forms, such as folktales, folk beliefs, folk medicine, folk art, folksong, and literature. A discipline based on ethnographic fieldwork, folklore offers students a chance to work in communities and collect living traditional materials that are critical to human identity and values. Interdisciplinary by nature, folklore thrives on local particularities as well as compelling global connections. This certificate prepares students for careers in cultural agencies, governmental organizations, and teaching institutions, and advanced study in the humanities.

Certificate Requirements
Students pursuing this certificate must complete 18 credits distributed as follows:
• Five required courses (15 credits):
  ENGL 529, 591 (6 credits), 798; ANTH 750
• One research course (3 credits) chosen from ENGL 701, HIST 610, SOCI 634

■ Certificate in Teaching CERG-TESL

English as a Second Language

The Teaching English as a Second Language (TESL) certificate prepares students to teach non-native speakers of English in the United States or abroad. Certificate courses fulfill, in part, requirements for an endorsement in English as a second language to the Virginia state teaching credential. Students who want to earn this endorsement should consult with an advisor.

Application Requirements
Applicants must be admitted to graduate study or approved for graduate course enrollment as nondegree students. Students who initially enroll in the certificate program as nondegree must apply for admission to the graduate program no later than the second semester of study. When formal admission to graduate study is sought, applicants must submit one copy of an analytical writing sample of approximately 1,000 words, a goals statement, and two letters of recommendation.

The certificate may be pursued concurrently with any of several degree programs offered through the Graduate School of Education, the English Department, and the Modern and Classical Languages Department. Part of the course work toward the certificate may be applied toward degrees in those departments. Students enrolled in another graduate degree program who want to work for the certificate must apply to the English Department for admission into the certificate program.

Certificate Requirements
Students pursuing this certificate must complete 18 credits, earning a grade of 3.00 or better, distributed as follows:
• Six required courses (18 credits): LING 520, 521, 522, 523, 525, and 582

■ Certificate in Professional CERG-PWE Writing and Editing

This certificate provides graduate students with course work in nonfiction writing in specific genres, current writing practices and theories of writing in organizational settings, research methods in professional writing, and nonfiction literature.

Admission Requirements
Applicants must submit an analytical writing sample of at least 1,000 words, a goals statement, two letters of recommendation, and a portfolio of writing or editing. Applicants must be currently admitted to a graduate degree program or approved for enrollment as nondegree students. Because only 6 credits earned as a nondegree student may be applied to the certificate, students who initially take courses as nondegree should apply for admission before completing 6 credits of course work. Completion of course work is not in itself a guarantee of admission to the certificate program.

The certificate may be pursued concurrently with any of several degree programs in English and elsewhere in CHSS. Part of the course work toward the certificate may be applied to those degrees.

Certificate Requirements
Students pursuing this certificate must complete 18 credits of English graduate courses, earning a grade of B or better in each, distributed as follows:
Global Affairs

Phone: 703-993-9185
Web: globalaffairs.gmu.edu

Faculty
Bockman, Breglia (assistant director), Copelman, Fyfe, Habila, Harbour, Hirsch, Jones, Mandaville, Mc Dow, McGlinchey, Paczynska, Samara, Smith, Wan (director)

Course Work
The Global Affairs Program offers all course work designated GLOA in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Global Affairs, BA

Global affairs is an interdisciplinary major that introduces students to the global processes affecting all societies. Drawing on the broad international expertise of Mason faculty, the BA in global affairs incorporates courses from across the university. Global affairs majors examine transnational and international processes in a wide range of areas, including politics, economics, culture, peace and conflict, and the environment. Majors also study specific regions and languages and investigate the ways particular parts of the world experience and influence global processes. Study abroad and internships are strongly encouraged. Students can complement their major with a second major or a minor.

Degree Requirements
In addition to satisfying the university-wide general education requirements and requirements for the BA degree in CHSS, student pursuing this degree must complete 36 credits distributed as follows:

• Six core courses (18 credits): GLOA 101 or SOCI 120, CONF 340, CULT 320, ECON 385, EVPP 337, and GOVT 322
• Four courses (12 credits) in an approved concentration (see below)
• 9 credits of language courses beyond 210 or 6 credits beyond 202. Students must have a minimum grade of C (2.0) in each of the core courses and a minimum grade of C- in each of the courses used to fulfill the concentration and global affairs language requirement. Students must achieve a cumulative GPA of 2.0 or higher in all course work to receive a baccalaureate degree. Students who major in global affairs are not eligible to earn the global systems minor or receive credit for ECON 390.

Concentrations
Courses applied to a global affairs concentration must come from at least two different departments or programs and cannot be applied to any other major, minor, concentration, or certificate. In addition to the courses listed below, other relevant courses, including special topics courses, study abroad, and internships, may be applied to a concentration with prior written approval from the director. (Registration in courses at the 500 level requires approval of the department offering the course.)

By Global Topic

 ▲ The Environment (EVT)
 BIOC 301, 371; EVPP 110, 336, 377; GEOG 303, 311; GEOL 309; TOUR 312, 340

 ▲ Global Communications and Technology (GCT)

 ▲ Global Economy and Management (GEM)
 ECON 360, 361, 380; FNAN 440; GOVT 343; MSOM 303, 305; NCLC 423 (6 credits); BULE 302, 402 (BULE courses require the approval of the director.)

 ▲ Global Governance (GLGV)
 ADJ 405, 475; ANTH 312; COMM 305; GEOG 301; GOVT 342, 343, 344, 347, 445, 446, 447, 448; HIST 345; NCLC 305 (6 credits), 422, 424; PHIL 429; SOCI 340

 ▲ Global Inequalities and Responses (GIR)
 ADJ 405; ANTH 365, 488; ECON 321; GEOG 301, 318, 414, 446, 448; HIST 366; NCLC 304, 424; SOCI 307, 308, 315, 401, 475; WMST 100

 ▲ International Development (IDEV)
 ANTH 331, 333; ECON 360, 361, 362; GEOG 303; GOVT 434, 445, 446; HSCI 150; HEALTH 350; NCLC 401; PHIL 429; SOCI 350; SOCW 351; TOUR 340

 ▲ World Arts (WA)
 ARTH 203, 362, 380, 382, 383, 384, 385, 394; AVT 372; CHIN 311, 320; CL 300, 514; DANC 391, 418 (1 to 3 credits); ENGL 333, 349, 350, 380, 439; FREN 325, 378, 451, 452, 470; FRLN 330; GERM 325, 340, 451; JAPA 320; RUSS 325, 327, 470; SPAN 321, 325; THR 359

By World Region

 ▲ Africa (AFR)
 ARTH 380; FREN 451; GOVT 432; HIST 261, 262, 335, 336, 466, 565

 ▲ Asia (ASA)
 ANTH 304, 306, 309, 311; ARTH 203, 382, 383, 384, 385; CHIN 311, 320; GOVT 333, 341, 433; HIST 252, 354, 357, 555; JAPA 320; RELI 212

 ▲ Europe (EU)
 ARTH 362; FREN 325, 378, 470; GEOG 320; GERM 325, 340, 451; GOVT 334, 337; HIST 309, 314, 322, 436, 524; PHIL 450; SPAN 321, 325
Latin America (LA)
ANTH 302, 385; ECON 361; GEOG 316; GOVT 331; HIST 271, 272, 364, 365, 525

Middle East and North Africa (MNA)
ARTH 319, 320; FREN 453; GEOG 325; GOVT 332; HIST 282, 461, 465, 585; RELI 211

North America (NA)
ANTH 301; ENGL 380, 390; FREN 452; GEOG 315; GOVT 301, 307, 308, 335, 337; HIST 330, 416, 418; USST 401

Russia and Central Asia (RCA)
GEOG 330; GOVT 328, 340, 447; HIST 329; RUSS 325, 327, 354, 470

Individualized Concentration (IST)
Students may construct an individualized concentration with the director’s help and written approval.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated as “writing intensive” in their major at the 300 level or above. Students majoring in global affairs should consult the program advisor for courses that can be used to fulfill this requirement.

Global Affairs in a Double Major
Students interested in designing a double major are encouraged to discuss their plans with an advisor in their major and the advisor for global affairs.

Minor in Global Affairs
The minor in global affairs provides students with a global perspective that can enhance many different majors. The minor is not available to students majoring in global affairs or minoring in global systems.

Students pursuing this minor must complete 15 credits distributed as follows:
- Five courses (15 credits) chosen from GLOA 101 or SOCI 120, CULT 320, ECON 385, GOVT 322, CONF 340 or EVPP 337

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

GRADUATE PROGRAMS

MAIS Concentration in MAIS-ISIN (CCT) Community College Teaching
See the Interdisciplinary Studies (MAIS) chapter for information. The concentration qualifies students to teach entry-level courses in growing fields at the community college.

MAIS Concentration MAIS-ISIN (HEDU) in Higher Education
See the Interdisciplinary Studies (MAIS) chapter for information. This concentration prepares individuals for administrative and leadership positions in two-year colleges or four-year colleges and universities. Students may focus on administration or student services.

Community College DA-EDCC Education, DA
The doctor of arts in community college education (DACCE) prepares students to be leaders in undergraduate education. In addition to expertise in a selected disciplinary or interdisciplinary knowledge area, graduates are proficient in four core areas related to undergraduate education: scholarly activity related to teaching and learning; effective integration of technology in the teaching and learning process; pedagogy appropriate to the discipline; and program and curriculum design, development, and assessment. With this background and the guided practical experience provided by internships, students are prepared to lead their institutions to respond to the changing needs of 21st-century students.

Application Requirements
Students are accepted for the fall semester only. Applications submitted after the posted deadline will be considered on a space-available basis. In addition to meeting admission requirements for graduate study at Mason, applicants should have a master’s degree, and submit a writing sample, a statement of purpose, three letters of recommendation, GRE scores, and a résumé.

Degree Requirements
Students pursuing this degree must complete a minimum of 60 credits beyond the master’s degree, distributed as follows:
- Eight courses (24 credits) in a knowledge area, including 3 credits of methodology
- Six courses (18 credits) in the education core: CTCH 601, 602, 603, 604, 605, and 3 credits from approved electives
- 6 credits of internships (CTCH 885)
- 12 credits of dissertation (CTCH 998, 999)

Once enrolled in 998, students must maintain continuous registration in 998 or 999 each semester until graduation, excluding summers. Students who defend in the summer must be registered for at least 1 credit of 999 in the summer.

Within the 60 credits, a minimum of 6 credits must be in courses with a technology focus. These include the required CTCH 603, courses in the knowledge area, or electives in the education core, as approved by the program director.
Knowledge Area
Substantial work in a knowledge area is essential to the leadership in curriculum expected of students. Given the dynamic nature of the community college and growth of programs in nontraditional fields, the choice of a knowledge area and relevant course work should be guided by the student’s developing interests and a vision of the student’s role as a community college educator. While many DACCE students take their 24 knowledge area credits exclusively in one discipline or department, they are encouraged to think broadly and in terms of multiple disciplines and work with their advisor to choose appropriate courses from more than one discipline or department.

Education Core
The 18-credit core of education courses is designed to develop leaders in undergraduate education. The program emphasizes a broad knowledge base in teaching and course work in the history and philosophy of the community college and instructional technology. These courses concentrate on scholarship and practice in teaching and learning, instructional technology, and program and curriculum design and assessment. All courses emphasize leadership, ethics, and diversity in higher education.

Internships
Students participate in two 3-credit internships to learn skills applicable to college-based teaching and higher education administration or policy. Internships provide an important educational experience that complements classroom-based course work. Students doing an internship should have completed 18 credits of education core requirements, 6 credits in the knowledge area, and an approved program of study. Internships, which must be approved by the advisor and internship coordinator, require a minimum of 180 hours of work for 3 credits and participation in an internship seminar.

Program of Study
Working with an advisor, students develop a program of study that outlines courses that will be used to fulfill degree requirements. The program of study is approved by the advisor and director; any modifications require the student to file a revised program of study.

Candidacy Exams
Students must pass candidacy exams to demonstrate breadth and depth of knowledge in both the knowledge area and education core. To be eligible to take a candidacy exam, students need to have completed all course work in the specific area, be in good standing (minimum cumulative GPA of 3.00), and be registered for at least 1 credit. The competency exam for the education core is a written exam administered by the Higher Education Program. The knowledge area exams are administered by the liaison in the knowledge area; each area has its own exam guidelines.

Students who do not pass a candidacy exam in either area have until the last day of the next semester (published in the Schedule of Classes) to retake it. (For students who take exams in the summer months, this will be the published date for the fall semester.) Students who do not retake the exam by this deadline or do not successfully complete the candidacy exam the second time will be terminated from the program.

Advancement to Candidacy
To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete and pass comprehensive exams on the education core and the major knowledge area. In addition, students must have a dissertation committee appointed by the Dean’s Office as well as an approved proposal. Evidence of the approved proposal must be on file in the Dean’s Office before a student can be advanced to candidacy.

Dissertation
In the dissertation, students demonstrate an ability to conduct original research that contributes new knowledge or a reinterpretation of existing knowledge to the area of investigation. Students who focus their dissertation in the knowledge area must connect their research to higher education. Dissertations may be practice-oriented, focusing on new and replicable ways of teaching within the knowledge area.

To register for dissertation proposal (998), students need to have an approved program of study and must have completed the two internships, all other course work, and candidacy exams in the education core and the knowledge area. To register for dissertation research (999), students must be advanced to candidacy. Students enrolled in 999 are required to submit evidence of progress to the dissertation advisor and the program by the last day of classes each semester (as published in the Schedule of Classes), such as a draft of a chapter or a brief, descriptive report of research activities. Students showing successful progress will receive a grade of IP. Those who do not will receive an IN.

Students are required to take at least 3 credits of proposal research (998) and 9 of research writing (999), and no more than 12 credits of 998 and 999 combined may be applied to the doctoral degree.

Certificate in College Teaching
The certificate is designed for graduate students who are planning a career in undergraduate education. The program offers courses that enhance pedagogical skills, explore pedagogical scholarship and the use of technology in instruction, and explain the history and philosophy of the two-year college.

Students must apply for admission to the certificate program and meet the admission standards and application requirements for all graduate students as stated in the Graduate Admissions Policies section.

Students pursuing this certificate must complete 18 credits distributed as follows:

- Three required courses (9 credits): CTCH 602, 603, and either 604 or 605; or equivalents with a specific disciplinary focus
- Two elective courses (6 credits), chosen in consultation with an advisor and with approval of the director
- 3 credits of practicum: CTCH 685

Certificate in Higher Education Administration
The certificate in higher education administration is designed for individuals who are planning or enhancing a career in a broad range of administrative positions in higher education institutions. The certificate will provide core knowledge for
administrative processes in the context of higher education institutions.

Students must apply for admission to the certificate program and meet the admission standards and application requirements for all graduate students as stated in the Graduate Admissions Policies section.

Students pursuing this certificate must complete 18 credits distributed as follows:

- Three required courses (9 credits): CTCH 621, 622, 624
- One course (3 credits) chosen from CTCH 603, 606, 626, or 645. Special topics courses, when relevant, may be used to fulfill elective credits with the prior approval of the coordinator.
- Two elective courses (6 credits), chosen in consultation with an advisor

**History and Art History**

Phone: 703-993-1250
Web: historyarthistory.gmu.edu

**Faculty**

- Mathy Professor: Mattusch (art history)
- Robinson Professor: Bakhash (history)
- Professors: J. R. Censer (dean), J. T. Censer, Holt, Kierner, Petrik, Sherwin, Stearns (provost), Stewart, Wade, Zagarri (history)
- Associate professors: Bristol, Carton, Chang, Copelman, Deshmukh, Hamdani, Karush, Kelly, Landsberg, Lytton, O’Malley, Platt (chair), Smith (history); Butler, DeCaroli (director), Todd (art history)
- Assistant professors: Barnes, Bottoms, Bristol, Cohen, Collins, Hamner, Kelly, Lair, Manuel-Scott, McDow, Schrag, Scully, Verhoeven (history); Greet (art history)
- Term faculty: Leon, McCord, Orens, Scheinfeldt, Schram, Walmsley (history); Gregg, Richardson (art history)
- Postdoctoral teaching fellows: Arthurs, Hudgins, Olsen, Rushford, Scales, Szelenyi

**Course Work**

This department offers all course work designated HIST and ARTH in the Course Descriptions chapter of this catalog.

**UNDERGRADUATE PROGRAMS**

| History, BA | BA-HIST |

**Degree Requirements**

In addition to satisfying university general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete 36 credits of history, with at least 18 credits at the 300 and 400 levels. Additional credits of history in excess of 36 may be presented as elective credits to be counted toward graduation. The 36 credits must have a minimum GPA of 2.00 and be distributed as follows:

- Two courses (6 credits) of U.S. history
- Two courses (6 credits) of European history (3 credits fulfilled by the university-wide requirement HIST 100)
- Two courses (6 credits) of global, Latin American, African, Asian, or Middle Eastern history (Six credits will be met if approved history courses are used to fulfill the university general education requirement in global understanding and the college-level requirement in non-Western culture.)
- One methods course (3 credits): HIST 300 (with a minimum grade of 2.00)
- One course (3 credits) of HIST 499 (fulfills university synthesis requirement)
- Four courses (12 credits) of history electives (at the 300 or 400 levels if necessary to complete the 18-credit, upper-level history requirement)

HIST 300 and 499 may not be used to satisfy requirements in the first three bullets. Before registering, students should see an advisor to help plan their history program to meet university general education and college-level requirements. The advisor also can help students choose electives or a minor.

**Writing-Intensive Requirement**

The university requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in history may fulfill this requirement by successfully completing HIST 300 and 499.

**Honors Program in History**

History majors who have completed 75 credits (a minimum of 15 in history, 6 of which must have been taken at Mason) with a 3.50 overall GPA and a 3.50 GPA in history are eligible to apply to the history honors program. Candidates must have completed or be enrolled in HIST 300 at the time of application. The statement of application should include two Mason history faculty members as references. If a major part of the student’s work includes transfer credit, transcripts may be required. Not all applicants who meet the minimum requirements are guaranteed acceptance into the program.

To graduate with honors in history, students must complete HIST 490 and 491, which are linked individualized courses usually given by the same instructor. Students must have completed at least one course in the field (or with the professor) chosen for these honors courses. HIST 490 should be taken before 491, although they may be taken concurrently. Either course may be taken concurrently with HIST 499 Senior Seminar in History. These 6 credits must be passed with a minimum 3.50 GPA, and the overall history GPA presented for graduation must be a minimum of 3.50. These 6 credits may be counted toward the 36-credit major requirement in history, but they do not replace HIST 499.

**Minor in History**

The program must be approved by the undergraduate director before graduation.

Students pursuing this minor must complete 18 credits in history with a minimum 2.00 GPA.

- Four courses (12 credits) at the 300 and 400 levels
- Three courses (9 credits) concentrated in a region or topic related, if possible, to the student’s major

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.
Interdisciplinary Minor

The department collaborates with various interdisciplinary minors including African American studies, ancient Mediterranean art and archaeology, Asia Pacific studies, Islamic studies, and Latin American studies. Students can earn credits toward these minors by taking selected history and art history courses. See the Interdisciplinary Minors section of this chapter for a description.

Advising

The undergraduate director advises majors and minors. History majors are urged to discuss their programs periodically with the director.

Teacher Licensure

Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

■ Art History, BA  

As a liberal arts discipline, art history emphasizes the analysis of visual data in a historical context. The major program prepares students for graduate study in art history as well as for professional work.

Degree Requirements

In addition to satisfying university-wide general education requirements and requirements for a BA degree in CHSS, students pursuing this degree must complete 33 to 34 credits with a minimum GPA of 2.00 distributed as follows:

• 3 to 6 credits in ARTH at the 100 or 200 level, including 3 credits from ARTH 200, 201, 203, or 204
• One course (3 credits): ARTH 394 (fulfills university synthesis requirement)
• 15 to 18 additional credits of ARTH at the 300 level
• Two courses (6 credits) of ARTH at the 400 level or above, including 3 credits from ARTH 400, 420, 430, 440, 460, 471, 472, or 482
• 3 to 4 credits in AVT 103, 104, 222, 232, 243, 252, 253, 262

All art history majors are encouraged to pursue internships in art history (ARTH 393 or, with permission, ARTH 593) in their junior or senior year. Up to 6 credits in art history internships may be applied toward ARTH requirements for the major, with permission of the art history undergraduate director.

Students are strongly recommended to participate in a study abroad program. Students contemplating graduate study in art history should acquire a reading knowledge of French, German, or other appropriate research languages in consultation with an advisor.

Writing-Intensive Requirement

The university requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in art history fulfill the university’s writing-intensive requirement by successfully completing any 400-level ARTH course.

Honors Program in Art History

Majors who have completed 75 credits (a minimum of 15 credits in art history, with 6 credits taken at Mason) with a 3.50 overall GPA and a 3.80 GPA in art history are eligible to apply to the art history honors program. Eligible students should apply to the undergraduate director by November 15 or April 15 with a statement of application, which includes the names of two Mason art history faculty members to serve as references. Transfer students may also submit transcripts. Not all applicants who meet the minimum requirements may be accepted into the program.

To graduate with honors in art history, students must complete ARTH 492 and 493, which are linked individualized courses that culminate in a research paper. Students must have completed at least one course in the field (or with the professor) chosen for these honors courses. ARTH 492 should be taken before 493, but they may be taken concurrently. These 6 credits must be passed with a minimum 3.50 GPA, and the overall art history GPA presented for graduation must be a minimum of 3.50. These 6 credits may be counted toward the 33- to 34-credit major requirement in art history, but they do not replace the 6 required credits in ARTH 400, 420, 430, 440, 460, 471, 472, or 482.

Minor in Art History

The minor covers a broad spectrum of periods, cultures, and themes, with an emphasis on historical context.

Students pursuing this minor must complete 18 credits with a minimum GPA of 2.00 distributed as follows:

• 3 to 6 credits of 100- or 200-level art history courses
• 12 to 15 credits of 300- or 400-level art history courses

ARTH 394 is not required for the minor but is strongly encouraged.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Interdisciplinary Minor

The Art History Program coordinates the interdisciplinary minor in ancient Mediterranean art and archaeology. See the Interdisciplinary Minors section of this chapter for a description of the minor.

GRADUATE PROGRAMS

■ History, MA  

The Department of History and Art History provides graduate training in historical methods and analysis for students with widely varying goals. The MA concentrations that follow are designed to meet those goals.

Admission Requirements

Applicants must fulfill admission requirements for graduate study and the Department of History and Art History. These requirements include satisfactory scores on the GRE and two letters of recommendation from history professors with whom the applicant has studied or others directly familiar with the applicant’s professional competence and interests.
The GRE requirement is waived for students who received their undergraduate degrees 10 or more years ago or hold another graduate degree.

**Degree Requirements**

Students pursuing this degree must complete the requirements for one of the concentrations described below. The concentrations require 30 credits of course work along with a specialization in U.S. history (AH), modern European history (EH), or world history (WH). The concentration in teaching requires 36 credits.

To remedy deficiencies in their undergraduate preparation, students may be required to take up to 12 additional credits of foundation courses, which cover broad thematic areas (HIST 601, 602, 605, 606). If required as foundational, these credits cannot be applied toward the credits required for the degree. If foundation courses are not required at admission, students in the concentrations in enrichment and teaching may apply one of the themes courses toward their degree. Students in the other concentrations may not apply these courses toward their degree.

**Concentrations in Predoctoral History (AH1, EH1, WH1)**

These concentrations are for students planning to continue to doctoral studies.

- One required course (3 credits): HIST 610 taken within the first 9 credits
- Five courses (15 credits) in an area of specialization listed below, including 3 credits of a research seminar (HIST 711, 731, or 751) and 3 credits of a comprehensive reading course (HIST 790, 791, or 792) designed by the student and a professor and taken during the last semester of course work. (The comprehensive readings course generally requires reading beyond what is required in the other concentrations. This course is used to round out general historical knowledge and prepare students for the comprehensive exam.)
  - Specialization in U.S. history (at least 3 credits from each group): Origins to 1861, 1861–1914, 1914 World War I to the present
  - Specialization in European history (at least 3 credits from each group): Ancient, medieval, and early modern to 1789; 1789–1914; 1914 to the present
  - Specialization in world history (at least 3 credits from two regions): Africa, Asia, Middle East, Latin America
- Two courses (6 credits) of electives in history
- Written comprehensive exam (Students who do not pass are given the option of a second written exam following the original procedures. The second exam must be taken within a calendar year.)
- 3 credits in HIST 798 (HIST 798 requires the completion of a major paper on a topic in cultural history that is a substantial and original contribution to historical knowledge on the model of an article in a scholarly journal.)
- Reading proficiency in a modern foreign language, as demonstrated by course work or an exam

**Concentrations in Predoctoral History with an Emphasis in Cultural History (AH5, EH5, WH5)**

This emphasis is for students with a particular interest in cultural history and students considering future work in the cultural studies doctoral program. Completion of this emphasis does not guarantee admission into the doctoral program; those interested in enrolling in that program should contact the Cultural Studies Program.

- One required course (3 credits): HIST 610 taken within the first 9 credits
- Five courses (15 credits) in an area of specialization listed below, including 3 credits of a research seminar (HIST 711, 731, or 751) and 3 credits of a comprehensive reading course (HIST 790, 791, or 792) designed by the student and a professor and taken during the last semester of course work. (The comprehensive readings course generally requires reading beyond what is required in the other concentrations. This course is used to round out general historical knowledge and prepare students for the comprehensive exam.)
  - Specialization in U.S. history (at least 3 credits from each group): Origins to 1861, 1861–1914, 1914 World War I to the present
  - Specialization in European history (at least 3 credits from each group): Ancient, medieval, early modern to 1789; 1789–1914; 1914 to the present
  - Specialization in world history (at least 3 credits from two regions): Africa, Asia, Middle East, Latin America
- One course (3 credits): CULT 802
- One course (3 credits) of approaches to cultural history
- One course (3 credits) from outside the area of specialization, containing a significant cultural history component as defined by the instructor
- Written comprehensive exam (Students who do not pass are given the option of a second written exam following the original procedures. The second exam must be taken within a calendar year.)
- 3 credits in HIST 798 (HIST 798 requires the completion of a major paper on a topic in cultural history that is a substantial and original contribution to historical knowledge on the model of an article in a scholarly journal.)
- Reading proficiency in a modern foreign language, as demonstrated by course work or an exam

**Concentrations in Applied History (AH2, EH2, WH2)**

This concentration is for students seeking expertise in applied history fields, such as archival management, museum studies, historic preservation, and historical editing. It is also suitable for professionally employed historians who desire to further their careers.

- One required course (3 credits): HIST 610 taken within the first 9 credits
- Five courses (15 credits) in an area of specialization listed below, including 3 credits of a research seminar (HIST 711, 731, or 751)
  - Specialization in U.S. history (at least 3 credits from each group): Origins to 1861, 1861–1914, 1914 World War I to the present
  - Specialization in European history (at least 3 credits from each group): Ancient, medieval, early modern to 1789; 1789–1914; 1914 to the present
  - Specialization in world history (at least 3 credits from two regions): Africa, Asia, Middle East, Latin America
- 6 credits of applied history courses (historic preservation, museum studies, archives, historical editing, or new media and information technology)
• 3 or 6 credits of internship (if a 3-credit internship is selected, the other 3 credits are taken in applied history course work)
• Proficiency in a relevant research tool (computers, statistics, or a modern foreign language), as demonstrated by course work or exam

▲ Concentrations in Applied History with New Media and Information Technology Emphasis (AH4, EH4, WH4)
• One required course (3 credits): HIST 610 taken within the first 9 credits
• Five courses (15 credits) in an area of specialization listed, below including 3 credits of research seminar (HIST 711, 731, or 751)
  • Specialization in U.S. history (at least 3 credits from each group): Origins to 1861, 1861–1914, 1914 World War I to the present
  • Specialization in European history (at least 3 credits from each group): Ancient, medieval, early modern to 1789; 1789–1914; 1914 to the present
  • Specialization in world history (at least 3 credits from two regions): Africa, Asia, Middle East, Latin America
• Two courses (6 credits) in new media and information technology course work
• 3 or 6 credits of internship in information technology (If a 3-credit internship is selected, the other 3 credits are taken in applied history course work.)
• Proficiency in a relevant research tool (computer science, statistics, information technology, or a modern foreign language), as demonstrated by course work or exam

▲ Concentrations in Enrichment (AH3, EH3, WH3)
This concentration is for students who want to study history for intellectual self-fulfillment or vocational reasons. It allows more flexibility in the selection of courses and does not have a foreign language requirement.
• One required course (3 credits): HIST 610 taken within the first 9 credits
• Five courses (15 credits) in an area of specialization listed below, including 3 credits of a research seminar (HIST 711, 731, or 751)
  • Specialization in U.S. history (at least 3 credits from each group): Origins to 1861, 1861–1914, 1914 World War I to the present
  • Specialization in European history (at least 3 credits from each group): Ancient, medieval, early modern to 1789; 1789–1914; 1914 to the present
  • Specialization in world history (at least 3 credits from two regions): Africa, Asia, Middle East, Latin America
• One course (3 credits) of research seminar: HIST 711, 731, or 751
• Four courses (12 credits) of electives

Six credits of thesis work HIST 799 are optional. If a thesis is elected, students must complete only 6 credits of electives. 

▲ Concentration in Teaching (IS4)
This concentration is intended for students already licensed for teaching or seeking licensure. Although it includes course work in history and education, completion of this concentration alone is not sufficient to qualify for licensure. A licensure program is offered by the College of Education and Human Development (CEHD), and admission is limited. Students are advised to consult with CEHD for specific requirements regarding licensure.
• One required course (3 credits): HIST 610 taken within the first 9 credits
• Six courses (18 credits) in history at least 3 credits each from U.S., European, and world history
• One course (3 credits) of research seminar: HIST 711, 731, or 751
• Four courses (12 credits) in graduate education courses, including EDCI 567

■ Art History, MA
MA-AH
This program offers a unique master’s degree based on departmental strengths in traditional research, the application of new media, and the vast cultural resources of the Washington, D.C., area. Students study a broad range of art-historical periods, theory, and research methods. In addition, the program emphasizes new media skills, museum studies, and pre-professional internship training. Graduates are well-prepared for art museum and gallery professional work, where an MA degree is now routinely required, or further study in PhD programs.

Application Requirements
In addition to meeting requirements for graduate study at Mason, applicants should hold a BA in art history or a minor in art history that includes two courses at the 400 level, or have an equivalent background. Candidates without the requisite background may be admitted provisionally. In addition to the application materials required for graduate study, applicants should submit the following:
• Résumé that clearly describes student’s background in art history or related fields
• Goals statement that explains student’s interest in art history graduate study
• Satisfactory scores on GRE (This requirement is waived for students who received their undergraduate degree 10 or more years ago, or hold another graduate degree.)
• Writing sample
• Two letters of recommendation from art history professors or others closely associated with the candidate’s preprofessional activities

Degree Requirements
Students pursuing this degree must complete 30 graduate credits distributed as follows:
• One required course (3 credits): ARTH 600
• Five courses (15 credits) of electives in ARTH and HIST (electives from AVT, ANTH, or CULT may be used, with prior written permission of the graduate director)
• One course (3 credits) of applied preprofessional learning: ARTH 593 or 594
• One course (3 credits) of technology and new media chosen from HIST 696 or 697; ARTH 699 (3 credits), ARTH 696 (3 credits) in preparation for the comprehensive exam
• Demonstration of reading ability in one relevant research language, to be approved by the graduate director
• Written comprehensive exam (Students may retake the exam once, following the original procedures; the second exam must be taken within one calendar year.)
History, PhD  
PHE-HIST

The PhD in history prepares students for careers in college teaching, digital media, publishing, educational administration, public history, and historical research. Students gain expertise in conventional historical methods and web-based technologies. Major fields include U.S. history, European history, and world history; minor fields are chosen by the student and may include such areas as public history, constitutional studies, and new media and information technology. Depending on career goals and interests, students can also focus their degrees in one of four areas:

**College and university teaching:** This emphasis is for students who are seeking a career in teaching or research at the community college, college, or university level.

**New media and information technology:** Although all students in the program take some courses in new media, students in this emphasis seek careers specifically in new media (publishing, education, or a college or university history department where they would serve as the department’s lead person in new media and information technology). This emphasis requires more advanced work in new media than any other.

**Public and applied history:** This emphasis prepares students for work in applied areas of history, such as museums, archives, federal government work, preservation, and editing, or helps students already working in those areas to advance. In some cases, students will do advanced course work in their field of work; in other cases, they will acquire knowledge or skills that will foster their professional work (such as nonprofit management).

**Professional development:** This emphasis responds to the needs of students who have already launched a career and want a doctoral degree to further career goals or fulfill personal intellectual goals. Candidates who need flexible scheduling will be advised on a case-by-case basis.

**Application Requirements**

In addition to meeting all admission requirements for graduate study, applicants should submit the following:

- Three letters of recommendation from professional colleagues or academic mentors
- GRE score
- Goals statement that explains the applicant’s academic credentials, professional background, intellectual interest in the doctoral program in history, and ultimate career goals
- Writing sample consisting of a history essay, research paper, or professional paper

Admission decisions are usually sent in early March.

**Financial Assistance**

The department offers several research and teaching assistantships to highly qualified applicants. Other aid is available in the form of work study and federal student loans.

**Reduction of Credit**

For students entering the doctoral program with a master’s degree, the number of required credits may be reduced by a maximum of 30 credits, subject to approval of the program faculty and the dean. Requests for reduction of credit are reviewed only after acceptance to the doctoral program.

**Degree Requirements**

Students pursuing this degree must complete a minimum of 72 graduate credits. In addition to core courses, students must complete course work in a major field of study and two minor fields: pass a comprehensive exam; and complete a dissertation. The dissertation demonstrates mastery of the subject matter, methodologies, and conceptual foundations in the chosen field of study. This requirement is generally achieved through consideration of a problem on the boundaries of knowledge in the discipline. The credits are distributed as follows:

- Six core courses (21 credits): HIST 610 (3 credits), HIST 696 (3 credits), HIST 697 (3 credits), HIST 711/713/751 (3 credits), HIST 810 (1 credit per semester for 6 credits), and HIST 811 (3 credits)
- Major field: 15 credits chosen from U.S. history, European history, comparative world history
- Minor fields: 18 credits in two minor fields (9 credits each)
- Doctoral research skills: Students must demonstrate basic competency in computers. Students whose research requires knowledge of a foreign language must also demonstrate a reading knowledge of one foreign language. The department sets specific research skills requirements for students, depending on their field of study.
- Comprehensive exam: Students need to pass a comprehensive exam that consists of a written field statement for each minor field and an oral exam for the major field.
- Dissertation: HIST 998 (3 credits minimum; 6 credits maximum) and HIST 999 (15 credits)

Once enrolled in 998, students must maintain continuous registration in 998 or 999 each semester until the dissertation is submitted to and accepted by University Libraries.

Students will be terminated from the program if they receive more than one unsatisfactory grade (C or F).

**Advancement to Candidacy**

To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete and pass an oral comprehensive exam in a major field and written field statements in two minor fields. In addition, students must have a dissertation committee appointed by the Dean’s Office as well as an approved proposal. Evidence of the approved proposal must be on file in the Dean’s Office before a student can be advance to candidacy.

**Honors Program in General Education**

Phone: 703-993-1110  
Web: honors.gmu.edu

**Faculty**

Albanese, Alligood (associate director), Bakhash, Bergoffen, Bristol, Burr (director), Burt, Butler, Carboneau, Carton, J. R. Censer, Cherubin, Constantine, Dakake, D’Andrea, DeCaroli, Deshmukh, Diecchio, Fox, Geller, Gifford, Gould, Granfield, Haines, Harbour, Hecló, Hodges, M. Holt, Jacobs, Jann, Johnsen-Neshati, Jones, Karush, Koch, Kulesza, Lee, man, Maloney, Mandaville, Mandes, Mattusch, McFerson, Metcalf, L. Miller, Nadeau, Nichols, J. Paden, Palkovich, Ramos-Pellucia, Roan, Roman-Mendoza, Reid, Rutledge, Sachs, Sample, Samuelian, Seligmann, Shutika, V. Smith, C.  
Snyder, Stearns, Taciuch, Tangney, Taylor, Todd, Trefil, Wilkins, T. Williams, B. Wilson, Yadav, Zaccaro, Zagarri

**Course Work**

The program offers all course work designated HNRS in the Course Descriptions chapter of this catalog.

**Honors Program**

The Honors Program offers a unique selection of integrated, interdisciplinary courses designed for highly motivated students and taught by Mason’s most experienced teachers and accomplished scholars. Taken together, these courses satisfy the general education requirements in social sciences and humanities for all colleges and majors in the university. Because most honors classes have fewer than 25 students, honors students have the opportunity to be known and mentored by distinguished faculty during their first years on campus. The science, technology, engineering, economics, and mathematics track offers honors sections of first-year courses in these disciplines, as well. The Honors Program also offers students special access to the technical, intellectual, and artistic resources of the university and the national capital region, and seeks to develop among its students a sense of intellectual community and a commitment to lifelong learning.

**Admission**

Admission is limited and competitive. If your application meets the criteria for admission to the Honors Program, the applicant will receive an invitation to the program shortly after receiving the acceptance letter to the university. Candidates applying to Mason who also want to be considered for the Honors Program do not submit a separate application. Applicants are evaluated on the strength of their entire academic record, including the rigor of the high school curriculum, GPA, and standardized test scores. Students who do not submit standardized test scores with their application will not be considered for the Honors Program. Students are allowed to use AP, IB, and dual-enrollment credit taken before admission to Mason to substitute for certain HNRS courses, excluding HNRS 110 and HNRS 353.

**Requirements**

The core of the honors curriculum is designed to satisfy the university general education requirements through a small number of interdisciplinary courses, allowing students increased opportunities to pursue minors or other individual interests. Students then have a choice of two tracks, determined by their majors and degrees. The STEM track is designed for students pursuing a bachelor of science degree in a science, technology, engineering, economics, or mathematics major. Those pursuing a bachelor of arts degree have further college general education requirements that are satisfied through the Liberal Arts and Social Sciences (LASS) track.

To receive honors recognition on their transcript, students must earn a minimum GPA of 3.00 in HNRS courses and supporting courses required for their approved honors program. Students whose cumulative GPA falls below 3.00 may complete the program but will not receive honors recognition on their transcripts.

**Continuation in Honors**

Students in the program who are placed on academic warning because their GPA falls below 2.00 (1.80 in the first or second semester) may be ineligible to continue in the program. Honors students are expected to maintain high standards of academic integrity and personal conduct. Students may be asked to withdraw from the program for a violation of the University Honor Code or any other conduct that reflects adversely on the Honors Program.

Students who leave the program before completion must meet university general education requirements and college-level requirements of their particular degree programs. On leaving the program and before registering for general education courses, students should be advised on equivalencies between the honors courses they have completed and general education requirements.

**Transfers**

*Within George Mason:* Because of the sequential and integrated nature of the program, honors courses may not correspond exactly to other courses used to fulfill general education requirements. A list of equivalencies is available in the Honors Program Office and on the web site.

*Outside George Mason:* Course work in the Honors Program may meet the general education requirements of other universities. As in all transfer situations, general education requirements of one institution may not precisely match those of another.

**Individualized Study**

Phone: 703-993-4556
Web: bis.gmu.edu

**Administration**

Jeannie Brown Leonard (Director)

**Bachelor of Individualized BIS-INDV Study**

The bachelor of individualized study (BIS) degree provides an alternative to the traditional baccalaureate, offering students a distinctive educational opportunity that allows them to integrate previous experiences into university course work. Recognizing that college-level learning may be acquired through varied professional, military, and personal experience, the BIS provides mechanisms for translating experiential learning into academic credit. The BIS Program accepts transfer credits from traditional institutions of higher education, as well as credits earned through other appropriate means (see Credit for Nontraditional Modes of Learning below).

There are two pathways for obtaining the BIS. Students can pursue a BIS standardized concentration or design their own individualized interdisciplinary program of study. These alternatives require different course work, prerequisites, and eligibility requirements.

**BIS Eligibility Requirements**

Applicants must have completed high school at least seven years prior to admission to the program (except the BIS in early childhood education studies degree) and have accumu-
lated at least 30 college-level credits, 15 of which must have been earned through conventional classroom instruction.

Application and Acceptance

Students interested in the program must attend a BIS information session and submit a separate application to the BIS Program. The BIS application and information schedule are available online at www.bis.gmu.edu. Admission is selective and based on a minimum GPA of 2.50 on previous course work. Students must also submit an undergraduate admissions application to the university.

University Requirements

BIS students must complete a minimum of 120 credits of course work. At least 45 credits must be upper-level courses (300 level or above) and at least 30 credits must be taken at Mason. All BIS students must complete basic general education requirements, including 6 credits in English composition (ENG 101 and ENG 302), 3 credits in synthesis (BIS 490), and 9 credits each in humanities, social sciences, and science/quantitative reasoning/information technology. To fulfill the latter, students must complete 3 credits in MATH or STAT (MATH 106 or STAT 250), 3 credits in IT-designated course work, and 3 credits in a nonlab science.

BIS Standardized Concentrations

In standardized concentrations, BIS students complete designated interdisciplinary programs of study. In a standardized concentration, students must complete 34 credits with a minimum GPA of 2.00. At least 25 credits of the concentration must be at the 300 level or above, and 25 credits of the concentration must be completed at Mason. No more than 6 credits of C- or D grades may be applied to the concentration.

▲ BIS Concentration in Business Communications (BCO)

This concentration provides an interdisciplinary foundation for students who want to pursue a variety of business and/or communication-related careers. Drawing from course work in management, psychology, communication, and English, students learn about communication in the workplace from multiple perspectives.

Concentration Requirements

In addition to the university requirements for BIS students given above, students pursuing this degree must complete 34 credits distributed as follows:

• Two required courses (4 credits): UNIV 300 (1 credit) and BIS 490 (classroom-based synthesis course)
• 30 credits of interdisciplinary course work, including COMM 305 or 332, 320, 330 or 389, 335, 401 or 434; MSOM 301, 302, 303; ENG 410; PSYC 467; SOCI 304

▲ BIS Concentration in Educational Psychology (EDP)

This concentration provides an interdisciplinary foundation for students who want to go into educational careers, including administrative, instructional, and counseling roles across the K–12 spectrum. Drawing from psychology and education course work, students in this concentration learn about the psychology of learning, including cognitive processes across developmental stages and educational strategies through which individuals better comprehend and internalize knowledge.

Concentration Requirements

In addition to the university requirements for BIS students given above, students pursuing this concentration must complete 34 credits, distributed as follows:

• Two required courses (4 credits): UNIV 300 (1 credit) and BIS 490 (classroom-based synthesis course)
• 30 credits of interdisciplinary course work, including EDUC 301, 302, 422 or 472; EDUT 411, 413 or 414; PSYC 211, 213, 309 or 317, 314 or NCLC 312 and PSYC 321 or 325

▲ BIS Concentration in Early Childhood Education Studies (ECES)

This concentration offers students holding a Northern Virginia Community College associate’s degree in applied science degree in early childhood development the opportunity to obtain a BIS in early childhood education studies and a minor in management. This concentration does not lead to teacher licensure in early childhood education.

Admission Requirements

Admission to this concentration requires a separate application to the program after admission to the university. Students are guaranteed admission to Mason and the BIS program if they have achieved the GPA stipulated in the Mason/NVCC general articulation agreement (currently 2.75) and completed all requirements for an associate’s degree in applied science in early childhood development. Unlike the individualized program, there is no restriction regarding years since high school graduation for admission into the BIS in early childhood education.

Concentration Requirements

In addition to fulfilling the all university general education requirements, students pursuing this concentration must complete the following:

• Three courses (7 credits): BIS 390, 490, and 491 (1 credit; taken concurrently with BIS 490)
• 27 credits of interdisciplinary course work, including ENGL 302, EDUC 302, SOCI 303 or GOVT 300, NCLC 312, PSYC 313, EDUT 413 or 414, EDUT 423 or 424
• 15 credits leading to a minor in business: MSOM 300, 301, 303, 304, 305

▲ BIS Concentration in Human Resources and Organizational Studies (HROS)

This concentration provides an interdisciplinary foundation for students who want to pursue careers in employee relations, human resources management, and organizational development. Drawing from course work in sociology, management, psychology, and communication, students learn theories on employee and organizational behavior from multiple perspectives as well as ethical and best practices in the field.

Concentration Requirements

In addition to the university requirements for BIS students given above, students pursuing this concentration must complete:

• Two required courses (4 credits): UNIV 300 (1 credit) and BIS 490 (classroom-based synthesis course)
• 33 credits of interdisciplinary course work, including MGMT 301, 321, 413 or 414, 421, 431; PSYC 320, 330, 333 or 435; SOCI 304; COMM 320 or 335; NCLC 305; SOM 301 or ENG 410
 ▲ BIS Individualized Concentrations (IND)

Working with BIS staff and a faculty mentor, BIS students develop an interdisciplinary concentration to meet their academic needs and interests. Students may incorporate into their individualized concentrations up to 9 credits of previously earned college course work and nontraditional credit from other institutions. The concentration is 34 to 46 credits, completed with a minimum GPA of 2.00. At least 25 credits applied to the concentration must be at the 300 level or above and 25 credits of the concentration must be completed at Mason. No more than 6 credits of C- or D grades may be applied to the concentration.

Concentration Requirements

In addition to the university requirements for BIS students given above, students pursuing an individualized concentration must complete 34 to 46 credits distributed as follows:

• Four courses (10 credits) of BIS course work: BIS 300, 390, 490, and 491 (1 credit taken concurrently with BIS 490). Students are encouraged to include BIS 489 Directed Readings in the concentration before their senior capstone project. The BIS course work is not transferable to other degree programs at Mason.

• 24 to 36 credits drawing from a minimum of two disciplines

BIS 390 is designated “writing intensive” and a grade of 2.00 or better is required as is the case for ENGL 302, which must be completed before enrolling in BIS 390. BIS 490 is a student’s senior capstone project and varies according to the individual program of study. It may be a research or creative project, and it must be appropriate to the student’s concentration. BIS 490 requires a significant written component and fulfills the synthesis requirement. Students must receive a grade of 2.00 or better in BIS 490. The project is evaluated by a committee consisting of the student’s faculty mentor and at least one other faculty member or qualified professional. BIS 490 and BIS 491 are taken when no more than 6 credits remain in the concentration.

Courses in the concentration may not be counted toward requirements for general education. Students are encouraged to pursue a minor, but 15 credits of the minor must be applied only to the minor and not to the BIS concentration.

Credit for Nontraditional Modes of Learning

The BIS program allows students to receive college credit for learning acquired through a variety of nontraditional methods indicated below. The maximum allowable credits are indicated for each category.

Nationally recognized exam programs such as the College Level Examination Program (CLEP) when the particular exam has been approved for Mason credit. For an approved list, go to admissions.gmu.edu/exams/ExamCLEP.asp (45 maximum credits).

Certain university approved industry, government, or military training credits if such credits are indexed and recommended as college-level credit by the American Council on Education (ACE). To be eligible for Mason credit, training and course specifics must exactly match what is in the ACE guide (45 maximum credits) and be approved for Mason credit. The specific credits must also be approved by the program director and the dean. Note: Total combined credit for exams and ACE-approved training cannot exceed 60 credits. For ex- ample, if 45 credits are accepted by ACE-approved training, a maximum of 15 credits can be accepted for the exam.

Experiential learning demonstrated by portfolios subject to approval by the program director and the dean (30 maximum credits)

College-level credit earned at institutions accredited by bodies other than recognized regional accrediting organizations subject to approval by the program director and the dean. These credits can only be considered if the institution is listed in Accredited Institutions of Postsecondary Education published by ACE (30 maximum credits).

Students may not pursue credit for options 1, 2, and 4 once they have matriculated at Mason. They must complete the third option within their first 30 credits after matriculation. Although the types of credit noted above may be applied to a BIS degree, not all university and program requirements can be fulfilled in these ways. All students are required to complete specific courses at Mason to earn the BIS degree regardless of the numbers of credits they transfer to Mason.

Bachelor’s/Accelerated Master’s Program in Telecommunications

Students in the BIS program may apply for admission to an accelerated MS in telecommunications while they are undergraduate students. For more information, see the BS/Accelerated MS in Telecommunications Program in the Volgenau School of Information Technology and Engineering chapter.

Interdisciplinary Minors

In addition to department-based minors, CHSS offers many minors in interdisciplinary areas of study. These minors require course work from two or more disciplines and are administered by interdepartmental faculty groups. In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of the catalog.

Minor in African American Studies

Phone: 703-993-1201

Faculty
Brigety, Carbonneau, Carton, Cherubin, Clark, Dennis, Fauntroy, Fuchs, Haley, Horton, Johnson, Lepore, Levine, Manuel-Scott, Miller, Paden, Richards Jordan, Smith, Stewart, Trafton, Travis (director), Weatherspoon, Wilkins

The African American Studies Program offers all course work designated AFAM in the Course Descriptions chapter of this catalog.

The African American Studies Program is an interdisciplinary program that examines the cultural, historical, economic, and political dimensions and experiences of people of African descent in America, the Caribbean, Africa, and throughout the Diaspora. It introduces students to theories and methodologies that examine the complex dynamics of race, class, gender, and ethnicity in America. The program enables students to develop critical and analytical approaches to societal issues because such issues are addressed and delineated in a variety of academic disciplines and programs.
Students pursuing this minor must complete a minimum of 15 credits of related course work with a minimum GPA of 2.00 distributed as follows:

- One required course (3 credits): AFAM 200
- Four elective courses (12 credits) chosen from AFAM 490, 499; DANC 118; ENGL 368, 370, 371, 372; FREN 451, 454; GEOG 325; GOVT 464; HIST 130, 261, 262, 335, 336, 340, 466; SOCI 308, 332

Other electives may be approved in advance by the director.

**Minor in Ancient Mediterranean Art and Archaeology**

Phone: 703-993-3770

**Faculty**

Butler (coordinator), Cherubin, Lytton, Mattusch, Winkler

This interdisciplinary minor is for students with diverse interests in the material culture of the ancient world. Course work combines the study of archaeology, literature, art, history, philosophy, myth, and religion. The minor’s scope is not limited to Greece and Rome, but touches on all the ancient civilizations of the Mediterranean and the heirs of late antiquity such as Byzantium and early Islam.

The program represents foundation work crucial to graduate study in traditional departments of classical, near Eastern, or Mediterranean art and archaeology. Through this minor, students are given credit for acquiring practical linguistic skills and archaeological field experience as well as scholarly background. Students should consult with the coordinator in designing a program. At least 3 credits must be taken in ARTH, and at least 9 credits must be taken outside of ARTH.

Students pursuing this minor must complete 18 credits distributed as follows:

- Preparatory work: at least 3 credits of Greek, Latin, or a modern research language in addition to the basic two-year introductory language sequence; or GREE 150, 160; or 3 credits of course work in ancient literature chosen from ARTH 102; CLAS 250, 260; RELI 211
- 6 to 9 credits of electives from ANTH 324; ARTH 319, 320, 321, 322, 324, 333, 399 (with approval of the coordinator); CLAS 340, 350, 360, 370, 380, 390; HIST 301, 302, 480; PHIL 301; RELI 351, 352, 381; other courses pertaining to the region and period, with approval of the coordinator
- 3 credits of seminar: ARTH 420 or 430 (if topic is appropriate)
- 3 to 6 credits of practicum: a museum course (ARTH 394/594); ANTH 322, 325, 420, 430; or archaeological field work done for credit or an appropriate ARTH 393 internship (with prior, written approval of the coordinator)

**Minor in Asia-Pacific Studies**

Phone: 703-993-2957

**Faculty**

Butler, Chang, Cuong, DeCaroli, Hinton, H. Nguyen (coordinator), Lin, Paden, Platt, Ro, Wan, Zhang

The interdisciplinary minor in Asia-Pacific studies is for students whose interests focus on the humanities and social sciences and Asia’s role in global systems and the cultural mosaic of human experience. In particular, a new type of transregionalism is explored: the links between Asia and North America.

Students pursuing this minor must complete a minimum of 18 credits distributed as follows:

- Two required courses (6 credits) chosen from ARTH 203; GOVT 333; HIST 251, 252; RELI 212; any single 200-level or higher course in an Asian language
- Four elective courses (12 credits), chosen from ANTH 306, 311, 315, 387, 434, 435, 436, 437; GOVT 433; HIST 353, 354, 356, 357; RELI 314, 315, 337; or any course from the list of required course options not used to fulfill the requirement

Other electives are possible, including approved study abroad or internships, when relevant, are possible with prior approval of the coordinator. Language courses in Chinese, Korean, or Japanese are strongly recommended.

**Minor in Film and Media Studies**

Phone: 703-993-2768

**Faculty**

Christensen, Fuchs (director), T. Gibson, A. Landsberg, Lont, Ricouart, Roan, Sample, Scarcleta, Winkler

The Film and Media Studies (FAMS) interdisciplinary minor explores mass culture in its visual manifestations and helps students develop an informed awareness of culture and media, ideological tendencies, and effects on daily experience. Committed to interdisciplinarity, the program addresses the increasing complexity and multiplicity of visual cultures and offers students the tools with which to read a variety of texts, including film, television, video, and new media.

Most course work is offered through the Departments of Communication and English, with other courses available through the Department of Modern and Classical Languages and the Program in Film and Video Studies. The two required courses provide an introduction to the languages of film and popular media and modes of analysis appropriate to each. They are prerequisites for all advanced work in the minor. Students select four additional courses designed to introduce a more specialized level of study. Students may decide to focus on film, television, or the study of mass culture, or they may choose some mix of courses that suits their interests.

Communication majors must choose at least 6 credits outside of communication for their FAMS elective courses.

Students pursuing this minor must complete 18 credits distributed as follows:

- Two required courses (6 credits): ENGL 332 and COMM 380

* Requires prior written approval of FAMS coordinator
** May be repeated if topic is different
*** With permission of instructor and approval of FAMS coordinator
Minor in Folklore and Mythology
Phone: 703-993-1172

Faculty
Burns, Decaroli, ffolliott, Fuchs, Johnsen-Neshati, Mattusch (cocoordinator), Owens, Rutledge, Shiner, Shutika, Todd, Winkler, Yocom (co-coordinator)

Stories told in both sacred and secular contexts, along with festivals, foods, music, material objects, and other traditional art forms, continue to influence our lives. This interdisciplinary minor offers students tools to explore the compelling meanings within these seemingly simple, everyday cultural texts, and helps them become more aware of the ways these texts are used by individuals and institutions for various goals. Students study folklore and mythology by juxtaposing the multiple viewpoints of anthropology, art history, classical studies, literary studies, and religious studies.

Students pursuing this minor must complete 18 credits chosen from three groupings given below with a minimum GPA of 2.00. If one of these courses is used to fulfill the 3 credits of literature required for general education, it may not be used to fulfill a requirement for the minor.

• One course from Group 1 (3 credits): ARTH 102; CLAS 250; RELI 100, 211, 212 (Students may take only one Group 1 course from a department for credit toward the minor.)
• Four or five courses from Group 2 (12 to 15 credits): ANTH 418, 427, 450; ARTH 319, 321, 322, 382, 383, 384, 385; CLAS 340, 350; ENGL 311, 333, 337, 491, 498, 591; RELI 351, 401, 408
• Up to one course from Group 3 (0 to 3 credits) Independent study and internships: ANTH 299, 495; ARTH 393, 490, 491; ENGL 498, 499; summer field work schools offered by the American Folklife Center at the Library of Congress and other institutions approved by faculty

To avoid duplication of courses, English majors who choose the folklore and mythology interdisciplinary minor may not select the English Department’s folklore, mythology, and literature concentration.

Minor in Global Systems
Phone: 703-993-1400

Faculty
Harbour (coordinator)

The minor consists of 18 credits of non-region-specific courses that deal with global connections or transactions. It is ideal for majors in business disciplines, economics, languages, geography, government and international politics, history, and other disciplines that take a global view. At least 9 credits must be at the 300 level or above.

Other globally oriented courses may also fulfill or substitute for the requirements of this program with written permission of the coordinator prior to registration.

Students pursuing this minor must complete a minimum of 18 credits distributed as follows:

• One required course (3 credits): GLOA 101, GOVT 132, or HIST 130
• Five elective courses (15 credits) chosen from at least two of the following fields:

• Field A: Government, geography, and administration of justice
  ADJ 405; GEOG 101, 301, 303, 304, 305; GOVT 132, 348, 349, 444
• Field B: Economics, anthropology, marketing, history, and sociology
  ANTH 300, 312, 331, 333, 375; ECON 360, 361, 380, 390; HIST 125, 130, 387; MKTG 407; SOCI 332
• Field C: Environmental science, global health, systems engineering, urban and suburban studies, civil and infrastructure engineering
  BIOL 307, 377; CEIE 100, 450, 455, 456; EVSC 206; GCH 543; SYST 201; USST 301
• Field D: Modes of communication
  COMM 305, 456, 656; DANC 118; MUSI 103, 431; THR 359

Minor in Immigration Studies
Phone: 703-993-1178

Faculty
Cleaveland, Haines, Ibara, Leeman, Maloney, Rabin, Ritchie, Seligmann, Shutika (coordinator)

The minor in immigration studies combines perspectives from the humanities and social sciences to provide an interdisciplinary and comparative understanding of the immigrant experience, ethnic identity, assimilation, ethnic exclusion and conflict, and refugee situations.

Students pursuing this minor must take 15 credits with a minimum GPA of 2.00, distributed as follows:

• One required course (3 credits): ANTH 340
• One course (3 credits) focused on ethnicity in the United States chosen from SOCI 308; HIST 418; ENGL 375, 479
• One course (3 credits) focused on global perspectives on migration and ethnicity chosen from ANTH 331, GOVT 445, CONF 302
• Two elective courses (6 credits) chosen from FRLN 385; NCLC 361; SOCI 332; SPAN 430; ENGL 420

Minor in Islamic Studies
Phone: 703-993-1261

Faculty: Amireh, Bakhsh, Butler, Dakake, Decaroli, Hamdani (coordinator), Hilmi, Katz, Lukacs, Mandaville, Paden, Sheers

The minor in Islamic Studies is designed for students interested in the societies, culture, history, and politics of the Islamic world. It is available to currently enrolled undergraduates.

Students pursuing this minor complete 21 credits distributed as follows:

• Three core courses (9 credits): GOVT 345, HIST 281, RELI 272
• Three elective courses (9 credits) chosen from ANTH 309, 311; ARTH 320, 382; FREN 453; GEOG 325, 330; GOVT 328, 332; HIST 282, 462, 465; RELI 374, 375
• One course (3 credits) in a foreign language of any country with a significant Muslim population. While Arabic may be used to fulfill this requirement, other languages can be substituted with prior approval of the coordinator. Students may have this requirement waived by demonstrating proficiency in a relevant foreign language.

Field A: Government, geography, and administration of justice
ADJ 405; GEOG 101, 301, 303, 304, 305; GOVT 132, 348, 349, 444
Field B: Economics, anthropology, marketing, history, and sociology
ANTH 300, 312, 331, 333, 375; ECON 360, 361, 380, 390; HIST 125, 130, 387; MKTG 407; SOCI 332
Field C: Environmental science, global health, systems engineering, urban and suburban studies, civil and infrastructure engineering
BIOL 307, 377; CEIE 100, 450, 455, 456; EVSC 206; GCH 543; SYST 201; USST 301
Field D: Modes of communication
COMM 305, 456, 656; DANC 118; MUSI 103, 431; THR 359

Minor in Immigration Studies
Phone: 703-993-1178

Faculty
Cleaveland, Haines, Ibara, Leeman, Maloney, Rabin, Ritchie, Seligmann, Shutika (coordinator)

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Minor in Islamic Studies
Phone: 703-993-1261

Faculty: Amireh, Bakhsh, Butler, Dakake, Decaroli, Hamdani (coordinator), Hilmi, Katz, Lukacs, Mandaville, Paden, Sheers

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• Three core courses (9 credits): GOVT 345, HIST 281, RELI 272
• Three elective courses (9 credits) chosen from ANTH 309, 311; ARTH 320, 382; FREN 453; GEOG 325, 330; GOVT 328, 332; HIST 282, 462, 465; RELI 374, 375
• One course (3 credits) in a foreign language of any country with a significant Muslim population. While Arabic may be used to fulfill this requirement, other languages can be substituted with prior approval of the coordinator. Students may have this requirement waived by demonstrating proficiency in a relevant foreign language.
language as determined by the Department of Modern and Classical Languages. Such students will have 3 additional elective credits. Courses in another language of the Islamic world can also be applied toward elective credits. Special topics courses, when relevant, may be used to fulfill elective credits for the minor with prior written approval of the coordinator.

- Three core courses (9 credits): GOVT 345, HIST 281, RELI 272
- Three elective courses (9 credits) chosen from ANTH 309, 311; ARTH 320, 382, FREN 453, GEOG 325, 330; GOVT 328, 332; HIST 282, 462, 465; RELI 374, 375
- One course (3 credits) in a foreign language of any country with a significant Muslim population. While Arabic maybe used to fulfill this requirement, other languages can be substituted with prior approval of the coordinator.

Students may have the foreign language requirement waived by demonstrating proficiency in a relevant foreign language as determined by the Department of Modern and Classical Languages. Such students will have 3 additional elective credits. Courses in another language of the Islamic world can also be applied toward elective credits.

Special topics courses, when relevant, may be used to fulfill elective credits for the minor with prior written approval of the coordinator.

Minor in Latin American Studies
See the Latin American Studies section of this chapter for a description of the minor.

Minor in Linguistics
Phone: 703-993-1188

Faculty
Chamberlain, Goldin, Holisky, Jones, Leeman, Levine, McCarthy, Ramos-Pellicia, Roman-Mendoza, Weinberger (coordinator), Wulf

Linguistics is the scientific study of language. Language is studied descriptively, theoretically, computationally, and psychologically, and as a social phenomenon. The field of linguistics thus informs and is informed by many other areas of study, including philosophy, psychology, sociology, computer science, the study of individual languages and literatures, literary studies, and education.

The interdisciplinary minor in linguistics may be combined with a major in one of the areas listed above or in any other field. This minor introduces the fundamental concepts of modern linguistic theory and explores how these concepts relate to various other disciplines.

Students pursuing this minor must complete 15 credits distributed as follows:
- 3 credits in general linguistics
- 3 credits from syntactic theory, phonological theory, or linguistic semantics
- 9 credits of electives, chosen in consultation with the linguistics director

Minor in Middle East Studies
Phone: 703-993-2926

Faculty
Amireh, Bakhash, Bryant, Butler, Gopin, Haddad (director), Hamdani, Hilmi, Katz, Lukacs, Mandaville, Massi-Dakake, Paczynska, Rouhana

Today, more than ever before, Middle East politics has become intertwined with American politics and the lives of many Americans. The minor in Middle East studies is designed to equip undergraduates with a firm multidisciplinary grounding in the region, its history, and its international relations. It is available for enrolled Mason students.

Students pursuing this minor must complete 18 credits, distributed as follows:
- Three core courses (9 credits): HIST 282, GOVT 332, and one of the following: ENGL 349 or ANTH 330
- Three elective courses (9 credits) chosen from GOVT 345; HIST 281, 462, 465, 465, 387; ANTH 399, 399; RELI 211, 272, 374, 375; ARTH 319, 320; GEOG 325; ARAB 325, 330/331. Other relevant courses may be approved by the director of the program.

Only one of the following courses may count as an elective: GOVT 328, 447; CONF 399, 340. Only one elementary or intermediate language course may count as an elective (relevant languages: Arabic, Hebrew, Farsi, Turkish). Students are strongly encouraged to sign up for one of the study tour courses on the Middle East offered by the Study Abroad Program at the Center for Global Education. Destinations include Egypt, Israel, Palestine, Syria, Lebanon, Turkey, Yemen, Morocco, Jordan, and the United Arab Emirates.

Minor in Multimedia
Phone: 703-993-4318

Faculty
Cambridge (co-coordinator), Chung, Forche, Higgins, Lont, Martin, O’Connor, L. Smith (co-coordinator), Weinberger, White

In the multimedia minor, students learn how to create original work and communicate with others through the fusion of images, text, sound, and video. Students analyze and incorporate into their productions contemporary design principles and current software applications. As part of this process, students are encouraged to focus on how multimedia technologies, which offer new tools for investigating and disseminating ideas, can enhance undergraduate research and writing. These skills, now important in most academic disciplines, are also increasingly valuable not only in the specialized information technology industries, but also in business, education, and politics.

This minor is not available to students majoring in AVT with a concentration in digital arts.

Students pursuing this minor must complete 18 to 20 credits distributed as follows:
Students pursuing this minor must complete a minimum of 18 credits. Where relevant to the minor, special topics courses, seminars, independent study, internships, and study abroad may also be taken for elective credit, with prior approval by the coordinator. The credits are distributed as follows:

- One required course (3 credits): GOVT 334 or GOVT 444 (with prior approval of the coordinator)
- Five electives (15 credits), at least one from each field:
  - Field A: History, geography, and politics
    - GEOG 320; GOVT 334 (if not taken as the required course), 337, 338; HIST 314, 322, 329; RUSS 354
  - Field B: Language, literature, and the arts
    - ARTH 362; FREN 441, 442, 470, 580; GERM 451, 580; PHIL 336; SPAN 484, 580

Minor in Political Philosophy

Phone: 703-993-1265

Faculty
Bergoffen, Cherubin, De Nys, Feit, Harbour, Mandaville, Miller, Paden (coordinator), Snyder

The minor provides intensive study in the area of political philosophy and political theory and includes courses that focus on the history of political philosophy; the moral evaluation of political institutions; the ethical, social, and political issues raised by globalization; and the conceptual foundations of democracy and human rights. The minor provides the opportunity for students to study this field from a variety of interdisciplinary perspectives; develops a deeper philosophical perspective on political institutions; and lays the foundation for further graduate study in philosophy, government, or policy studies.

Students pursuing this minor must complete 15 credits distributed as follows:

- Two core courses (6 credits) chosen from PHIL/GOVT 323, 324, 327
- Three elective courses (9 credits) chosen from PHIL/GOVT 323, 324, or 327 (if not used to fulfill the core requirement), PHIL/GOVT 427; PHIL 325, 429; GOVT 328, 329, 420, 421, 428, 448

Special topics courses and independent studies courses, when relevant, may be used to fulfill elective credits with prior approval of the coordinator.

Minor in Science and Society

Phone: 703-993-9621

Faculty
Bitler (co-director), McAuley, Fox, Jacobsen, Kinnaman, Rankin (co-director), Rutledge, Rowan, Smith, Thompson

Through the course work in this minor students explore the effect of science in their daily lives and develop an understanding of the multiple ways that science is integrated into different, nonscience disciplines. As a prerequisite to the minor, students should have completed their general education science requirement of 7 to 8 credits. In coordination with their minor advisor and through CHSS 200, students develop a core of five courses that revolves around a specific theme through which they connect science and society more closely. Possible themes include the environment, ethics, ethnography, faith, healing, justice and the law, media, and medicine, among
others. The program of study must include one foundation course in the related field of study. In addition to completing 15 credits of core courses, students start with CHSS 200 Introduction to Science and Society, which provides them with a broad overview of related topics and helps them to develop their individualized core of courses, and end with a capstone CHSS 400 Perspectives on Science and Society, in which they demonstrate what they have learned through their course of study. Students pursuing this minor must complete a minimum of 18 credits distributed as follows:

- 2 credits of CHSS 200
- 15 credits of an individualized core
- 1 credit of CHSS 400

Only 9 lower-level credits can be applied to the minor (7 within the core and the 2-credit CHSS 200), and no more than 3 credits can be applied to both university general education requirements and the minor. No more than two courses from a single department can be applied to the minor. A minimum GPA of 2.00 is required for course work in this minor.

Sample Individualized Cores

Science, Society, and the Environment
- ECON 335, EVPP 110 (foundation course), GEOG 303, NCLC 319, PHIL 343

Science, Society, and Ethnicity
- ANTH 135 (foundation course), ANTH 365, ENGL 311, GEOG 304, HIST 418

Science, Society, and Faith
- ANTH 135 (foundation course), ANTH 496, PHIL 377, PHIL 378, RELI 100 (foundation course)

Science, Society, and Humankind
- ANTH 120 (foundation course), BIOL 313, ENGL 492, NCLC 300, PHIL 111

Science, Society, and Healing
- HSCI 150 (foundation course), NCLC 378, PHIL 309, RELI 341, SOCI 390

Minor in Urban and Suburban Studies

Phone: 703-993-1418

Faculty

Clapsaddle, Clark, Dumont, Gifford, Hackler (coordinator), Haynes, Horton, Hysom, Mattusch, Samara, Schintler, Schrag, Sockett, Stough, Todd, Travis, Verheyen, Wong

The program offers all course work designated USST in the Course Descriptions chapter of this catalog.

Students pursuing this minor must complete a minimum of 18 credits distributed as follows:

- Three core courses (9 credits): USST 301, 390, 401
- Three elective courses (9 credits) chosen from a list of approved electives, which must be selected from more than one of the following categories: environment and culture, government and policy, and economy. Consult the coordinator for a list of approved courses in each category.

Minor in Women and Gender Studies

See the Women and Gender Studies section of this chapter for a description of the minor.

Interdisciplinary Studies

Phone: 703-993-8762
Web: mais.gmu.edu

Executive Committee

Addleson, Burns, Jordan, Kidd, Lont, Martin, Rodgers, Salmon, Seligmann, Simmons, Snyder (director), Sorrell, Wood, Yocom

Course Work

Students in the Master of Arts in Interdisciplinary Studies (MAIS) Program do most of their work in courses listed under the disciplines that they integrate through this graduate program. In addition, this program offers courses designated MAIS in the Course Descriptions chapter of this catalog.

GRADUATE PROGRAM

- Interdisciplinary MAIS Studies, MAIS

This program is for students who seek a master’s degree that integrates knowledge from several disciplines. It addresses the rapidly evolving demand for unique graduate study by promoting advanced scholarship that transcends traditional disciplinary boundaries.

MAIS offers the following structured interdisciplinary concentrations:

- Community college teaching (in communication, English, information systems, math, Spanish, or TESL)
- Folklore
- Higher education (administration or student affairs)
- Religion, culture, and values
- Video-based production
- Women and gender studies
- Zoo and aquarium leadership

The MAIS also offers students the opportunity to design an individualized concentration to meet the special needs of their careers.

Admission Requirements

Students must show a capacity for original thought in cross-disciplinary research. Students will be admitted only if the program can assign a faculty advisor appropriate for the intended course of study. Applicants must fulfill Mason admission requirements for graduate study. Additional requirements vary by concentration.

Degree Requirements

Students pursuing this degree must successfully complete 36 credits of graduate course work. Students must submit a curriculum contract that has been approved by their faculty advisor and the MAIS director. Specific requirements vary by concentration.

Credits that apply to the MAIS degree follow and are subject to the following restrictions:

- Maximum of 6 credits earned through independent study or directed readings and research courses
• Maximum of 6 credits taken through the Consortium of Universities of the Washington Metropolitan Area (credits are counted as resident, not transfer, credit.)
• Maximum of 15 transfer credits*
• Of the possible transfer credits, a maximum of 6 may be from other accredited institutions (12 for students in the zoo and aquarium leadership concentration)

*Transfer credits are those taken before first enrolling as an admitted degree-seeking student, whether taken at another institution, another Mason graduate program, or completed as a Mason nondegree student, or credits taken at another institution (with prior MAIS approval) after admission to the MAIS Program.

All students complete their work in the program with a project or thesis. Students admitted under this catalog are required to take MAIS 797 Proposal (1 credit) and either MAIS 798 Project (2–5 credits) or MAIS 799 Thesis (5 credits).

▲ MAIS Concentration in Community College Teaching (CCT) (communication, English, information systems, mathematics, Spanish, or teaching English as a second language)

The concentration combines 12 credits of college-teaching courses (including course work required for the certificate in college teaching) with 21 credits of graduate work in one of the following knowledge areas: communication, English, information systems, mathematics, psychology, Spanish, or teaching English as a second language (TESL). This concentration qualifies students to teach entry-level courses in these growing fields at the two-year level. In addition, this MA concentration is an appropriate graduate degree for some faculty currently teaching in community colleges.

Concentration Requirements

Students pursuing this concentration must complete 36 credits of work, distributed as follows:

- College teaching course requirements (12 credits)
  - Four required courses: CTCH 601, 602, 603, 685
- Knowledge area course requirements (21 credits)
  - Communication: 12 credits of core courses (COMM 602 or 634, 605 or 635, 650, 653) and 9 credits of electives in consultation with a faculty advisor from graduate-level communication courses, including core courses listed above not used to meet the 12-credit requirement
  - English: ENGL 701, 610 and/or 615 and additional courses in English chosen in consultation with faculty advisor
  - Information Systems: INFS 515, 590, 612, 614 and three additional graduate-level INFS or INFS-related courses chosen in consultation with a faculty advisor
  - Mathematics: MATH 621, 675 and additional courses in mathematics and related disciplines (including statistics) chosen in consultation with a faculty advisor
  - Spanish: SPAN 502, 505, 510 and an additional 12 credits of graduate-level courses (9 credits must be in designated Spanish courses, of which 3 may be in a graduate course designated FRLN.
  - TESL: LING 520, 521, 522, 523, 525, 582 and one elective chosen in consultation with a faculty advisor. LING 507 may be substituted for LING 521.
- 1 credit of MAIS 797 Proposal
- 2 credits of MAIS 798 Project

▲ MAIS Concentration in Folklore (FLK)

This concentration explores the processes of tradition that move through multiple expressive forms, such as folktales, folk beliefs, folk medicine, folk art, folksong, and literature. A discipline based on ethnographic fieldwork, folklore offers students a chance to work in communities and collect living traditional materials that are critical to human identity and values.

Interdisciplinary by nature, folklore thrives on local particularities and compelling global connections. This course of study prepares students for careers in cultural agencies, governmental organizations, and teaching institutions, and advanced study in the humanities.

Concentration Requirements

Students choose a specialization that draws on unique programs throughout Mason, such as museum studies, conflict resolution, nonprofit management, telecommunications, and writing. Internships in the many Washington, D.C., metropolitan area folklore organizations are central to students’ experiences.

Students pursuing this concentration must successfully complete 36 credits of graduate course work (at least 6 credits must be taken in courses from outside the Department of English) distributed as follows:

- 18 credits of core courses, including
  - 9 credits of special topics in folklore (ENGL 591, 798)
  - 3 credits of pathways in folklore scholarship (ENGL 591 or 798)
  - 3 credits of internship in folklore (ENGL 604)
  - 3 credits of research methodology chosen from ENGL 701, HIST 610, SOCI 634
- 9 credits of specialization (approved by advisor).
  Specialization topics include public folklore (museums, archives, arts and humanities councils, and nonprofit organizations); folklore (ethnicity and immigration); folklore and literature; folklore and the teaching of writing and literature; folklore and history; and folklore and conflict resolution. Students also can opt for open specialization, with courses chosen in consultation with advisor. Possibilities include folklore and editing, applied storytelling, folklore and mythology, folklore and art history, folklore and gender studies, and folklore and communication.
- 3 to 6 credits of electives (approved by advisor)
- 1 credit of MAIS 797 Proposal
- 2 to 5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

▲ MAIS Concentration in Global Interaction (GLOI)

This concentration in global interaction is not available on the Northern Virginia campuses. It is aimed at international students who wish to develop professional skills for functioning in English-language international settings, whether of business, government, education, or civil society. The curriculum provides a range of skills in such crucial areas as organizational structures, economic development, legal instruments, and multicultural communications. It does so with an emphasis on the language and topical skills that are basic to work and life in the global English-speaking community, which spans North America, Europe, Asia, and Africa. The program is explicitly interdisciplinary and multicultural, with an emphasis on course work and thesis development that will help position graduates in this broader global community.
**Concentration Requirements**

Students pursuing this concentration must complete 36 credits distributed as follows:

- Four core courses (12 credits): SOAN 500, GOVT 841, PUAD 504, SOCI 804
- Three courses (9 credits) of specialization chosen from ANTH 635; ECON 676; GEOG 525; GOVT 631, 833; HAP 609; PUAD 636; SOAN 510; SOCI 633
- 1 credit of MAIS 797
- 5 credits of MAIS 799
- Three elective courses (9 credits) chosen from ANTH 617, 630, 632, 640, 655; CONF 720, 728; ECON 825, 842; EDLE 610, 614; GEOG 533, 553; GCH 543; GOVT 540, 614, 725; HAP 542, 621; ITRN 603; JTCP 702, 760; PUAD 502, 640, 643, 660; PUBP 503, 602; RELI 633; SOAN 670; SOCI 635, 651, 619, 692, 850

Courses listed under specialization may also serve as electives subject to advisor approval.

▲ **MAIS Concentration in Higher Education (HEDU)**

This concentration prepares individuals for administrative and leadership positions in colleges and universities, associations, and government agencies whose activities affect higher education. Within the concentration, students may choose to emphasize administration or student affairs.

**Concentration Requirements**

Students pursuing this degree must complete 36 credits distributed as follows:

- Four core courses (12 credits): CTCH 621 or 601 with remaining courses chosen in consultation with advisor
- One course (3 credits) of research methodology
- One course (3 credits) of specialization: CTCH 622 or 644
- Three courses (9 credits) of electives chosen in consultation with advisor
- 3 credits of CTCH 685 Practicum
- 1 credit of MAIS 797 Proposal
- 5 credits of MAIS 798 or 5 credits of MAIS 799

▲ **MAIS Individualized Concentration (IND)**

This concentration is for students who wish to design a graduate program to meet the special needs of their careers and life plans. Students usually choose this option because traditional graduate programs do not meet their specific goals. Students, with help from faculty advisors, design unique programs of study that include courses from several academic departments.

Students must complete a project or thesis that represents the culmination of their program of study. Work on the project or thesis is done under the direction of a faculty committee, usually chaired by the student’s faculty advisor. Project or thesis proposals must be approved by the faculty committee and the MAIS Executive Committee before students can register for project or thesis credits (MAIS 798, 799). The university thesis requirement for continuous registration also applies to the project.

**Concentration Requirements**

Students have access to most graduate courses offered by Mason; note that all course prerequisites are applicable. Specific courses for an individualized degree vary according to student goals and plans. Each student must submit a curriculum contract approved by the student advisor and MAIS director during the first semester enrolled. Any subsequent amendments must have approval of the student advisor and the MAIS director.

Students pursuing this concentration must successfully complete 36 credits of graduate course work distributed as follows:

- 12 to 18 credits in a single discipline (Individualized plan must include a minimum of 12 and a maximum of 18 credits in one concentration.)
- 9 to 18 credits in complementary disciplines (as approved by advisor and MAIS director)
- 3 credits of research methodology (as approved by advisor and MAIS director)
- 1 credit of MAIS 797 Proposal
- 2 to 5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

▲ **MAIS Concentration in Religion, Culture, and Values (RCV)**

This concentration is particularly applicable to, but not restricted to, careers in law, national and international government, print and media journalism, library sciences, archives and museums, public and social service, teaching, advanced graduate studies, and religious communities and institutions. The Washington, D.C., metropolitan area is rich in the presence of many major religious traditions and their places of worship.

**Concentration Requirements**

Students pursuing this concentration must complete a minimum of 36 credits distributed as follows:

- Two core courses (6 credits): RELI 630 and 631
- Two or three additional courses in religious studies (6 to 9 credits) chosen from RELI 591 (may be repeated for credit), 633, 634, 641, or 642
- One course in research methodology (3 credits) chosen from HIST 610 or SOCI 634
- Two or three courses in a specialization (6 to 9 credits) should include one course (3 credits) of religion Specialization in religion, culture, and communication
- COMM 605 and 656
- Specialization in religious traditions and conflict analysis
- CONF 695 (if appropriate), 702, 722, 725
- Specialization in religion, culture, and ethics
- RELI 633, PHIL 640, PHIL 643
- Specialization in religion, values, and international politics
- GOVT 540 and 741 (if appropriate)
- One to four elective courses (3 to 12 credits)
- 1 credit of MAIS 797 proposal
- 2 to 5 credits of MAIS 798 project or 5 credits of MAIS 799 thesis

Electives are chosen in consultation with the student’s advisor, bearing in mind the student’s specialization, project, or thesis topic. Any of the courses listed under the specializations listed above or courses from other disciplines listed below may be used as an elective.

ANTH 535, 615, 684; COMM 605, 656; CONF 695, 702, 722, 725; EDUC 537; ENGL 591 (if appropriate); GOVT
4, 741 (if appropriate); HIST 510; PHIL 604, 617, 640, 643; SOCI 611, 612, 614; WMST 640

MAIS Concentration in Video-Based Production (VBP)
The concentration emphasizes video production that encompasses various components, such as videoconferencing, multimedia, and editing. As low-end, high-quality video equipment becomes more affordable, more organizations (for profit and nonprofit) are investing in in-house production studios and staff. Their needs include traditional videography, videoconferencing, web design, multimedia, and linear editing.

Four units offer relevant courses for the concentration. The Communication Department offers courses in the theory and practice of video production. In the College of Education and Human Development, courses in interactive and distance learning provide a background for pedagogy and a wide spectrum of interactive skills. The English Department offers a course in film theory, and the Art and Visual Technologies Department focuses on computer-mediated visual applications, including the study of multimedia tools and design, digital and electronic art, animation, and virtual reality.

Students must have a basic knowledge of video production. Students with little or no video experience must take COMM 590 Seminar in Video Production within the first 9 credits of the program. Students with video experience who wish to waive a course in film theory, and the Art and Visual Technologies spectrum of interactive skills. The English Department offers a course in film theory, and the Art and Visual Technologies Department focuses on computer-mediated visual applications, including the study of multimedia tools and design, digital and electronic art, animation, and virtual reality.

Students must have a basic knowledge of video production. Students with little or no video experience must take COMM 590 Seminar in Video Production within the first 9 credits of the program. Students with video experience who wish to waive this requirement must provide a videotape of their past work.

Concentration Requirements
Students pursuing this concentration must complete 36 credits distributed as follows:

- Six required core courses: COMM 590, COMM 655 or ENGL 670, COMM 590 or EDIT 704, COMM 697, EDIT 611 or EDIT 750, COMM 694
- 9 to 12 credits of electives chosen from AVT 676; COMM 554, 590, 602, 621, 636, 656, or 696; EDIT 571, 572, 575, 771, 772; HIST 697
- 1 credit of MAIS 797 proposal
- 2 to 5 credits of MAIS 798 project or 5 credits of MAIS 799 thesis

MAIS Concentration in Women and Gender Studies (WGST)
This concentration is for students who wish to explore gender and women’s issues from a variety of disciplinary perspectives. The program combines graduate courses in women and gender studies with courses in a discipline of interest, such as history, literature, sociology, communication, health, education, or public policy. Expertise in the study of gender is increasingly applicable in a variety of professional and academic settings.

Concentration Requirements
Students pursuing this concentration must complete 36 credits distributed as follows:

- Two core courses (6 credits): WMST 630, 640
- 12 credits in a disciplinary focus, selected in consultation with advisor, including 3 credits in a course cross-listed with WMST
- 9 to 12 credits of elective courses, including at least 6 credits in courses cross-listed with WMST that are not part of the disciplinary focus
- 3 credits of research methods, selected in consultation with advisor
- 1 credit of MAIS 797 Proposal
- 2 to 5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

MAIS Concentration in Zoo and Aquarium Leadership (ZAL)
This program prepares students for advanced careers in modern professional zoos and aquariums. The curriculum is designed to enhance relevant social and analytical skills involving critical thinking, problem solving, information technology, and group interaction, as well as advance necessary skills in leadership and fiscal and personnel management.

This concentration offers three specializations within the concentration (see web site for full description): leadership in zoo and aquarium collections management, leadership in zoo and aquarium administration, and leadership in zoo and aquarium conservation education.

Concentration Requirements
Students pursuing this concentration must successfully complete 36 credits of graduate course work distributed as follows:

- Four core courses (12 credits): PUAD 505; NCLC 510, 511, 520
- Three courses (9 credits) of cognate courses, determined by field of specialization and chosen in consultation with advisor and approval of Zoo and Aquarium Leadership (ZAL) faculty coordinator
- 9 to 12 credits of electives, approved by advisory committee and selected in consultation with faculty advisor
- 1 credit of MAIS 797 Proposal
- 2 to 5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

Admitted students who wish to take a course at another accredited institution and apply the credit to this concentration must receive prior approval from the advisor, the MAIS program director, and the dean.

Latin American Studies
Phone: 703-993-1010
Web: las.gmu.edu

Faculty
Berroa (Modern and Classical Languages), Bristol (History and Art History), Burt (Public and International Affairs), Francescato (Modern and Classical Languages), Greet (History and Art History), Karash (History and Art History, director), Leeman (Modern and Classical Languages), Lepore (Dance), Meyer (Economics), Rabin (Modern and Classical Languages), Ramos-Pellicia (Modern and Classical Languages), Seligmann (Sociology and Anthropology), Shutika (English), Yocom (English)

This program offers the opportunity to study one of the world’s most diverse and fascinating regions. Contemporary Latin America is the product of a long and turbulent history of conquest, resistance, and cultural mixing. The result is a rich and unique amalgam of African, indigenous, and European cultures. Understanding these complex societies has never
been more crucial than it is today. While globalization has intensified the historical, cultural, economic, and political links that connect us to Latin America, Latino immigration is transforming who we are. Latinos are now the largest minority group in the United States, representing more than 13 percent of the population, and the numbers continue to rise. Knowledge of Latin American history, culture, society, and politics has become indispensable for anyone who seeks to understand the contemporary United States and its place in the world.

Course Work
The Latin American Studies Program offers courses designated LAS in the Course Descriptions chapter of this catalog. As an interdisciplinary program, Latin American Studies offers many other courses across a range of departments that do not bear the LAS code. For the major and minor, students should consult with the director to determine whether a particular course may be used to fulfill a Latin American studies requirement or elective.

UNDERGRADUATE PROGRAMS

• Latin American Studies, BA  BA-LAS

Degree Requirements
In addition to satisfying university general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete 31 credits in Latin American studies with a minimum GPA of 2.00 distributed as follows:
- One course (1 credit) of LAS 100 (weekly lecture series in which students are introduced to the faculty and the various disciplines that compose Latin American studies)
- Two courses (6 credits) in history: HIST 271, 272
- Two courses (6 credits) of social science courses related to Latin America chosen from GOVT 331, ANTH 302, ECON 361, GEOG 316
- One course (3 credits) of humanities courses related to Latin America chosen from ENGL 333, SPAN 322, SPAN 325
- One course (3 credits) of LAS 499 (synthesis, capstone class)
- Four elective courses (12 credits) in Latin American studies.

Students may satisfy the electives requirement with any course that contains a significant emphasis on Latin America or the culture, politics, sociology, or history of Latinos living in the United States. In addition, students are strongly encouraged to use an internship (LAS 490) or a study-abroad program to fulfill some of these credits.

In addition, all Latin American studies majors must demonstrate reading, speaking, or writing knowledge of Spanish or Portuguese by exam or achieving a minimum grade of 2.00 in a 300-level course in the language selected. Upper-level Latin American literature or culture courses taught in Spanish or Portuguese may be used to satisfy the electives requirement.

Minor in Latin American Studies
Students pursuing this minor must complete a minimum of 18 credits distributed as follows:
- One course (3 credits) chosen from HIST 271, 272; GOVT 331
- Five elective courses (15 credits) in Latin American studies in at least three departments.

Students may fulfill the electives requirement with courses in anthropology, dance, economics, folklore, francophone Caribbean literature, geography, government, history, and Latin American literature or culture. Selection of courses should be made in consultation with the program director.

Students minoring in Latin American studies must also demonstrate competence in reading, speaking, or writing Spanish, Portuguese, or French. Language ability is evaluated by interview or exam with an appropriate faculty member or by achieving at least a C (2.00) in a 300-level course in francophone Caribbean literature or Latin American literature or culture. (Students taking upper-level Latin American literature or culture courses may count them toward the second requirement above.)

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Mason Topics

Phone: 703-993-3912
Web: masontopics.gmu.edu

Faculty
Beach, Berg, Behmand, Burns, Caraballo, Carroll, Cherubin, Chang, Cressey, DeNys, Fahema, Gregg, Kelly, Koch, Lytton, McPherson, Michals (director), Nanian, Robbins, Samuelian (coordinator), Schrag, Scheinfeldt, Shiner, Taciuch, Thompson (coordinator), Tomasovic, Zawacki

Introduction
The Mason Topics Program encourages academically motivated students to make meaningful connections between classes in different disciplines by enrolling them in two linked popular general education classes each semester of freshman year. Faculty members teaching these linked classes work together to highlight shared concepts and skills. Class discussions are not confined to the classroom. The program showcases the cultural resources of the Washington, D.C., region and the university. Students enjoy films, talks, and study sessions linked to their classes on the Mason Topics Living and Learning fl ours in the freshman residence halls, helping academics become a focus for social life.

Course Work
The program coordinates curricular links between a variety of courses that are offered by individual academic departments. These courses satisfy university-wide general education requirements for graduation. The courses selected for linkage vary each semester.

Admission
All entering freshmen are eligible for the program, but priority is given to those students whose high school record indicates they are academically motivated and prepared for the program.
Requirements
The program is not an academic major. Rather, it links classes that fulfill a number of general education requirements for graduation that apply to all majors.

Transfers
Because the program links classes that are regularly offered by Mason’s academic departments, it does not affect the process of transferring to another institution.

Modern and Classical Languages

Phone: 703-993-1220
Web: mcl.gmu.edu

Faculty

Professors: Gilbert, Ricouart, Winkler
Associate professors: Berroa, Chamberlain, Christensen (chair), Goldin, Leeman, Levine, Rabin, Roman-Mendoza
Assistant professors: Carreño-Rodriguez, Markx, Ramos-Pellicia, Sanusi, So, Vivancos-Perez, Zhang
Term assistant professors: Daniels, Descalzo de Blas, Fyfe, Pankova
Term instructors: Hilmi, Kirsch, Lamothe, Mircea-Pines, Sievern, Sweet

Course Work
This department offers all course work designated ARAB, CHIN, CLAS, FREN, FRLN, GERM, GREE, HEBR, ITAL, JAPA, KORE, LATN, RUSS, andSPAN in the Course Descriptions chapter of this catalog.

The following courses are offered in English. Knowledge of a foreign language is not required:

- ARAB 325; CHIN 310, 311, 320, 325, 328; FREN 325, 329;
- GERM 301, 325; RUSS 325, 326, 327, 353, 354; SPAN 321, 322, 325, 329; and all courses designated CLAS and FRLN.

Courses numbered 325 may be repeated once for credit if the authors studied are different.

Courses that Fulfill General Education Requirements
Language courses through the intermediate (200) level can be used to fulfill the college-level requirement in foreign languages for the BA degree in CHSS. Approved literature courses offered by the Department of Modern and Classical Languages can be used to fulfill the university general education requirement in literature. FREN 451 and RUSS 353 and 354 fulfill the college-level requirement in non-Western culture. RUSS 354 and SPAN 322 fulfill the university global understanding requirement.

UNDERGRADUATE PROGRAMS

Foreign Languages, BA

This degree, which offers concentrations in French and Spanish, prepares students for teaching careers at the secondary school level, graduate study in languages, and research and professional work in government and private enterprise. Language majors are encouraged to complete a minor or, if possible, a second major in another field. Students who want a double major in a language and another subject should plan a program of study in consultation with advisors from both disciplines.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level and above. Students in language concentrations may fulfill this requirement by successfully completing FREN 352 or SPAN 452.

Concentration in French (FRN)
In addition to satisfying the university-wide general education requirements and requirements for a BA degree in CHSS, students pursuing this concentration must complete a minimum of 33 credits in French courses at the 300 level and above, each with a minimum grade of 2.00. Students are expected to complete a balanced program that includes courses in language, culture and civilization, and literature. The 33 credits required in the concentration must include the following:

- One advanced language course (6 credits): FREN 309
- Two courses (6 credits) in literature and civilization chosen from FREN 340, 370, 371
- Three elective courses (9 credits) in FREN at the 300 level or above
- Four courses (12 credits) of FREN courses at the 400 level or above: application of French language, and French and francophone literary and cultural competencies, to the study of a given period, genre, or theme (Prerequisites: 15 credits of FREN courses at the 300 level, including FREN 309, or permission of the instructor.)

No more than one course (3 credits) conducted in English (FREN 325, 329) may be used to fulfill requirements for the concentration in French.

Students are encouraged to take courses in other languages and literatures, and related disciplines, such as music, art, history and philosophy.

Concentration in Spanish (SPN)
In addition to satisfying the university-wide general education requirements and requirements for a BA degree in CHSS, students pursuing this concentration must complete a minimum of 33 credits in Spanish courses at the 300-level and above, each with a minimum grade of 2.00.

- Six credits in SPAN 305 and 306; or SPAN 309; or SPAN 315 and one elective course in Spanish (3 credits)
- Three additional required courses (9 credits): SPAN 370, 385, 390
- 12 credits in SPAN courses at the 400 level
- Two Spanish elective courses (6 credits) that may include other SPAN courses not specifically required or not used to fulfill another requirement

With approval of the department, one course taught in English may be applied toward the concentration in Spanish.

Comparative Literature Emphasis
This program combines the study of a language with cross-cultural literary study. The program requires 10 courses above the 200 level, distributed as follows:

- Two courses in a foreign literature with selected readings in the original language
Minor in Classical Studies

The minor is for students who wish to become familiar with the classical cultures and broaden their knowledge of the foundations of Western civilization and students who are studying other areas of the humanities, especially English, languages, comparative literature, history, art history, philosophy, or religion. The minor provides enough flexibility for students to choose relevant courses according to their primary interests.

Students pursuing this minor must complete 18 credits with a minimum grade of 2.00 distributed as follows:

- 6 credits in classics, including CLAS 250
- 3 credits in classical history (HIST 301, 302, 304, 388, or, with approval, 480)
- 3 credits in classical art history, classical philosophy, or religious studies
- 6 credits of approved elective courses from classical art history, classics, classical history, classical philosophy, and religious studies

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Focus on language

- Four courses (12 credits) in Japanese language: JAPA 330, 331, 440, 441
- One course (3 credits) of Japanese and Japan-related history chosen from HIST 251, 252, 356, 357; ARTH 385
- One elective course (3 credits) chosen from JAPA 320; ARTH 482; CHIN 328; GOVT 333, 433; RELI 212, 315

Focus on history and culture

- Two courses (6 credits) in Japanese language chosen from JAPA 330, 331, 440, 441
- Two courses (6 credits) in Japanese and Japan-related history chosen from HIST 251, 252, 356, 357; ARTH 385
- Two elective courses (6 credits) chosen from JAPA 320; ARTH 482; CHIN 328; GOVT 333, 433; RELI 212, 315

Special topics courses, such as HIST 387, when relevant, may be applied to the minor with prior written approval of the coordinator.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Minors in Chinese, French, German, Latin, Russian, or Spanish

Prerequisite: Completion of an intermediate (202 or 209) course in Chinese, French, German, Russian, Spanish, or Latin, or equivalent placement test score.

A minor in any of these languages consists of 18 credits above the intermediate level in a single language. Students must achieve a minimum grade of 2.00 in each course applied to the minor. Except for the minor in Latin, no more than one course taught in English may be applied to the minor.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Minor in Chinese

- Three courses (9 credits) chosen from CHIN 300, 301, 305, 480, or 481
- One course (3 credits) chosen from CHIN 318, 355, or 365
- One additional Chinese course (3 credits) chosen from either of the above groups
- One course (3 credits) chosen from CHIN 310, 311, 320; ARTH 384; HIST 353, 354, 355, 387; RELI 314

Minor in French

- One advanced language course (6 credits): FREN 309
- Two courses (6 credits) in literature and civilization chosen from FREN 340, 370, 371
- Three elective courses (9 credits) in FREN at the 300 level or above

Minor in German

- Three courses (9 credits) chosen from GERM 310, 316, 318, 415, or 418
- One course (3 credits) chosen from genre courses at the 300 level or period courses at the 400 level
- One course (3 credits): GERM 301 or 340
- One German elective course at the 300 level or above (3 credits)
Minor in Latin
• Six courses (18 credits) chosen from LATN 351, 352, 451, 452
• Courses vary in content and may be repeated for credit.

Minor in Russian
• Three courses (9 credits) chosen from RUSS 302 or 303, 380, and 381
• One course (3 credits) chosen from RUSS 310 or 311
• One course (3 credits) chosen from RUSS 353 or 354
• One Russian elective at the 300 level or above (3 credits; course must be conducted in Russian)

Minor in Spanish
• 6 credits of required courses: SPAN 305 and 306; or SPAN 309; or SPAN 315 and one elective course in Spanish (3 credits)
• Two additional required courses (6 credits): SPAN 370 and one course chosen from SPAN 385, 388, 390
• Two Spanish elective courses (6 credits) at the 300 or 400 level (not to include courses taught in English)

Graduate Programs

Foreign Languages, MA – MA-FRLN
This program meets the needs and interests of prospective and practicing teachers and other professionals, and prepares students for doctoral study at other institutions. The program offers three concentrations: French or Spanish, French and Spanish, and Spanish/bilingual-multicultural education.

Application Requirements
In addition to satisfying general admission requirements for graduate study, applicants must hold a baccalaureate degree in French or Spanish, have at least a 3.00 GPA (on a 4.00 scale) in the field, and submit two letters of recommendation from people familiar with their academic qualifications.

Applicants whose baccalaureate degrees were earned in other fields or who otherwise do not meet the above requirements but who provide evidence of a capacity to pursue graduate study are encouraged to apply and may be admitted to the program with provisional status. Applicants in this category may be asked to appear for a personal interview and take the appropriate parts of the GRE. They may also have undergraduate deficiencies to make up before having the provisional qualifier removed.

Degree Requirements
Students who elect a concentration in one language must complete a program of 30 credits. Those who concentrate in two languages must complete a program of 42 credits. The concentration in Spanish/bilingual-multicultural education requires 36 credits. In all three concentrations, 6 of the total credits may be earned with a thesis. Regardless of the concentration selected, all students must meet the core and distribution requirements given below and pass a comprehensive exam.

Concentration in French (FRN)
Students pursuing this concentration must complete 30 credits, with at least 18 credits earned in courses with the subject code FREN and distributed as follows:
• At least 6 credits in literature courses covering two different periods
• At least 6 credits in language and linguistics courses
• At least 6 credits of French elective courses in literature or language
• 12 credits of elective courses, of which up to 6 credits may be used for directed reading and research (798) and thesis (799)

Concentration in Spanish (SPN)
Students pursuing this concentration must complete 30 credits, distributed as follows:
• Three core courses (9 credits): SPAN 502, 505, 510
Full-time students must take this core in their first year.
Part-time students must include these courses within their first 12 credits. Core courses may be taken concurrently with other courses.
• 9 credits of courses in Spanish chosen from
One course (3 credits) in the literature of Spain
One course (3 credits) in the literature of Spanish America
One course (3 credits) in Spanish language or Spanish linguistics
• 12 credits of elective courses chosen from
• Additional courses in Spanish language and literature, including courses taken through the Consortium of Universities of the Washington Metropolitan Area
• Up to 6 credits in SPAN 798 Directed Reading and SPAN 799 Thesis
• Courses under the rubric FRLN
• Courses transferred from other universities, including study abroad
• Up to 6 credits of courses in related fields
Students intending to go on for the PhD in linguistics or literature are strongly encouraged to pursue the thesis option. Independent studies courses are not available for graduate students of Spanish.

Concentration in Spanish and French (SF)
Students pursuing this concentration must complete 42 credits distributed as follows:
• 18 credits in French distributed according to the requirements for the concentration in French
• 18 credits in Spanish distributed according to the requirements for the concentration in Spanish
• 6 credits of elective courses, which may be used for directed reading and research (798) and thesis (799)

Concentration in Spanish/ Bilingual-Multicultural Education (SBM)
Students pursuing this concentration must complete 36 credits distributed as follows:
• At least 18 credits in SPAN distributed according to the requirements for the concentration in Spanish and 6 credits of bilingual education seminars selected from EDCI 516, 517, 518, 519, 520, and 521
• 12 credits of elective courses, of which up to 6 may be used for directed reading and research (SPAN 798) and thesis (SPAN 799)
Philosophy

Phone: 703-993-1290
Web: philosophy.gmu.edu

Faculty

Professors: Bergoffen, Rothbart
Associate professors: Cherubin, De Nys, Eckenwiler, Froman, Holman, Kinnaman (chair), Light, Paden, S. M. Skousgaard
Assistant professor: Leighton
Adjunct professors: Bayer, D. Gregory, Oberoi, Sojka, Yost

Course Work

This department offers all course work designated PHIL in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

- Philosophy, BA

BA-PHIL

The degree program in philosophy covers the major issues and areas in philosophy and serves the needs of students who wish to pursue graduate studies in philosophy or emphasize philosophy while acquiring a broad liberal arts education. Students can use this major as preparation for such professions as law or government service, or complement other interests by taking a double major in philosophy and a related field of study.

Degree Requirements

In addition to university-wide general education requirements and requirements for a BA degree in CHSS, students pursuing this degree must complete at least 33 credits in philosophy, earning a minimum grade of 2.00 in each course. At least 21 credits must be at the 300 level or above, including at least 6 credits at the 400 level or above. The credits must be distributed among area requirements as indicated below. No course may be used to fulfill more than one such requirement.

- At least one course (3 credits) in logic: PHIL 173 or 376
- Two courses (6 credits) in history of philosophy: PHIL 301, 303
- At least one course (3 credits) in the analytic tradition chosen from PHIL 332, 371, 373, 374
- At least one course (3 credits) in the continental tradition chosen from PHIL 336, 337, 340
- At least one course (3 credits) in ethics and social and political philosophy chosen from PHIL 311, 323, 324, 325, 327, 355, 429, 470
- Six elective courses (18 credits) in philosophy chosen from any PHIL courses including those above not used to meet a distribution requirement

When the subject matter is appropriate and with the undergraduate coordinator’s approval, PHIL 391, 392, 421, 425, or 426 may be used to fulfill the analytic tradition, continental tradition, or ethics and social and political philosophy requirements. The following philosophy courses fulfill the general education synthesis requirement: PHIL 309, 343, 377, and 378. Students may choose a concentration in philosophy and law, see below.

▲ Concentration in Philosophy and Law (PHLW)

The concentration in philosophy and law offers philosophy majors the opportunity to focus their study of philosophy in a way that prepares them for the study of the law. In addition to satisfying the university-wide general education requirements and the requirements for a BA degree in CHSS, students pursuing this concentration must also successfully complete 33 credits, with at least 6 credits at the 400 level or above, distributed as follows:

- Five courses (15 credits) from the categories given above in logic (3 credits), history of philosophy (12 credits), the analytic tradition (3 credits), and the continental tradition (3 credits)
- One required course (3 credits): PHIL 311
- At least two courses (6 credits) chosen from PHIL/GOVT 323, 324, 327, 428; PHIL 442 or GOVT 448; PHIL 429, 470
- At least three additional elective courses in philosophy (9 credits)

Other relevant courses may be applied to the concentration with advance written permission of the department.

Writing-Intensive Requirement

The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. All senior seminars in philosophy are writing intensive. Philosophy majors should consult the undergraduate coordinator for other courses that can be taken to fulfill this requirement.

Honors Program in Philosophy

Qualified students may pursue advanced work leading to graduation with honors. An undergraduate student wishing to pursue departmental honors in philosophy must apply for that option. To apply for the honors option, a student must be a philosophy major in his or her last semester as a junior (the semester in which the student will complete his or her 90th credit) and must have a GPA in the major of 3.50 or higher. The application must include a transcript, one letter of recommendation from a member of the philosophy faculty, and one writing sample (a paper from one of the student’s PHIL courses). A committee of departmental faculty will determine whether to accept a student for honors course work in philosophy. A student may begin honors option course work only after the completion of 90 credits.

A student will only receive departmental honors if he or she has taken 6 credits of honors course work and has satisfactorily completed all honors requirements for those courses. A student who fails to complete all assignments or who completes them in an unsatisfactory way may receive credit for the course (if earned) but not departmental honors. To receive honors in philosophy, students must complete 6 credits of honors course work in either PHIL 422, 425, or 471. To graduate with honors in philosophy, students must complete these courses with a minimum GPA of 3.50. Work submitted toward the fulfillment of the honors option requirements will be reviewed by the instructor of each course for which the work was assigned.

PHIL 425, Independent Study in Philosophy, may be used toward the honors option only if all of the following conditions are fulfilled: the student submits a proposal for his or her independent study course to the department and the department approves the proposal before registering for the
course: the student and faculty member meet weekly; the student submits written work as specified by the faculty member each week; the student submits a final research paper; the assignments for this course are in accordance with the standards and guidelines for honors course work set by the department.

Minor in Philosophy
Students can take a general minor or one organized around specific emphases, each one stressing a different aspect of philosophy. The emphasis in the history of philosophy is particularly useful to students in the humanities, especially those who wish to pursue graduate study. Students majoring in the human and natural sciences would benefit from the emphasis in reality, knowledge, and science; while those who hope to pursue a career in law or politics would be well-advised to complete the emphasis in social and political philosophy.

Students pursuing this minor must complete 18 credits in philosophy with a minimum grade of 2.00 in each course. No course may be used to fulfill more than one requirement. The credits are distributed as follows:

• One course (3 credits) in logic chosen from PHIL 173, 180, or 376
• Two courses (6 credits) in history of philosophy: PHIL 301 and 303
• Three elective courses (9 credits) in philosophy (at least 6 must be at the 300 level or above). Students may take their electives within one of the emphases listed below: Emphasis in history of philosophy:
  • At least one course (3 credits) in the history of philosophy chosen from PHIL 302, 305, 332, 335, 336, or 337
  • Two courses (6 credits) of electives Emphasis in reality, knowledge, and science:
  • At least two courses (6 credits) chosen from PHIL 312, 337, 340, 357, 371, 373, 374, 375, 377, or 378
  • One course (3 credits) of electives Emphasis in social and political philosophy:
  • Three courses (9 credits) chosen from PHIL 311, 312, 323, 324, 325, 327, 338, or 470

When the subject matter is appropriate and with the undergraduate coordinator’s approval, PHIL 391, 392, 421, or 425 may be used to fulfill the emphasis requirements.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Minor in Philosophy and Law
The minor in philosophy and law offers students a course of study that emphasizes the philosophical analysis of legal issues. It acquaints students with the rich tradition of philosophical argument dealing with the justification of law, its relation to moral theory, the justifications for punishment, and the concepts of justice, rights, liberty, and legal responsibility. In addition, an education in philosophy in general, and these courses in particular, stress intellectual skills that are important in the study of law.

Students pursuing this minor must complete 18 credits distributed as follows:

• Four required courses (12 credits): PHIL 173, 301, 303, 311
• Two elective courses (6 credits) chosen from PHIL/GOVT 323, 324, 327, 428; PHIL 442 or GOVT 448; PHIL 429, 470 (One elective course (3 credits) may be chosen from other course work designated PHIL with permission of the department.)

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

The department also coordinates the interdisciplinary minor in political philosophy. See the Interdisciplinary Minors section in this chapter for a description.

GRADUATE PROGRAM

Philosophy, MA

The department offers a master’s degree with concentrations in either traditional and contemporary philosophy or professional and applied ethics. The degree is designed for students who intend to go on to pursue a doctorate in philosophy and those who seek the master’s as a terminal degree, either in pursuit of their intellectual interests or to further their professional expertise. Both concentrations provide grounding in the history of philosophy, ethics, metaphysics, epistemology, contemporary continental thought, contemporary analytic philosophy, and philosophy of science. The department also offers a graduate certificate in professional ethics for those master’s students interested in combining the study of ethics in a variety of career settings.

Application Requirements

In addition to fulfilling university admission requirements for graduate study, applicants must submit three letters of recommendation, a statement of student goals in pursuing the degree, and a writing sample. GRE exams are not required. They are recommended, especially for those students planning to pursue a PhD in philosophy.

Degree Requirements

Students pursuing this degree must successfully complete 30 credits, which may include a project or thesis. Students need to identify an advisor on entering the program and meet regularly with that advisor during their course of study. With their advisor’s approval, students may apply up to 9 credits from other departments toward the degree. The credits are distributed as follows:

• Four courses (12 credits) of required course work
  3 credits in ancient or medieval philosophy (PHIL 602, 604, or 681, or 691 where appropriate)
  3 credits in modern philosophy (PHIL 605, 608, or 681, or 691 where appropriate)
  3 credits in contemporary philosophy (PHIL 615, 616, 618, or 681, or 691 where appropriate)
  3 credits in an advanced seminar (PHIL 720, 721, or 733)
• Six elective courses (18 credits), which may include 3 to 6 credits of project or thesis

Concentration in Philosophy and Cultural Theory (PHCT)

Students pursuing this concentration must successfully complete 30 credits distributed as follows:

• Two elective courses (6 credits) chosen from PHIL/GOVT 323, 324, 327, 428; PHIL 442 or GOVT 448; PHIL 429, 470 (One elective course (3 credits) may be chosen from other course work designated PHIL with permission of the department.) In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

The department also coordinates the interdisciplinary minor in political philosophy. See the Interdisciplinary Minors section in this chapter for a description.
• Four courses (12 credits) of required course work
One course (3 credits) in ancient or medieval philosophy (PHIL 602, 604, or 681, or 691 where appropriate)
One course (3 credits) in modern philosophy (PHIL 605, 608, or 681, or 691 where appropriate)
One course (3 credits) in contemporary philosophy (PHIL 615, 616, 618, or 681, or 691 where appropriate)
One course (3 credits) in an advanced seminar (PHIL 720, 721, or 733)
• One required course (3 credits): CULT 802
• One elective course (3 credits) in cultural studies, which may include philosophy courses cross-listed with cultural studies. Students are encouraged to take 802 as early in the program as possible.
• Four elective courses (12 credits) including 3 to 6 credits of project or thesis

▲ Concentration in Professional Ethics (PETH)
Students pursuing this concentration must complete 30 credits distributed as follows:
• Two courses (6 credits) in the history of philosophy, including PHIL 640 (PHIL 691 may be taken to fulfill this requirement only with the written permission of the graduate coordinator.)
• One course (3 credits) in professional ethics: PHIL 641
• Two courses (6 credits) in applied ethics chosen from PHIL 642, 643, 644, or 645 (Where appropriate, and with approval of the student’s advisor, PHIL 691 and 721 may be used to fulfill this requirement.)
• 9 to 12 credits of elective courses
• 3 to 6 credits of project or thesis

■ Certificate in Professional Ethics
CERG-PETH

Students must be admitted to graduate study or approved for graduate course enrollment in nondegree status. Students who initially enroll in the certificate program as nondegree students must apply for admission to the graduate program no later than the second semester of study. The certificate may be pursued concurrently with any other graduate program in the university.

Certificate Requirements
Students pursuing this certificate must successfully complete 15 graduate credits distributed as follows. In consultation with an advisor, students should select their courses to create a coherent program of study.
• One course (3 credits) in the history of ethical theory: PHIL 640
• One course (3 credits) in professional ethics: PHIL 641
• Two courses (6 credits) in applied ethics chosen from PHIL 642, 643, or 644
• One elective course (3 credits) (This requirement may be fulfilled by taking a course in philosophy, but students are encouraged to take courses in other disciplines.)

Psychology

Phone: 703-993-1342
Web: gmu.edu/departments/psychology

Faculty

Professors: Ascoli, Boehm-Davis (chair), Cortina, Denham (director, Applied Developmental Program), Klimoski, Maddux (director, Clinical Program), Mandes, Naglieri (director, School Psychology Program), Parasuraman (director, Human Factors/Applied Cognition Program), Pasnak, Riskind, Rojahn (director, Center for Cognitive Development), R. Smith (director, Biopsychology Program), Tangney, Tetrick (director, Industrial/Organizational Program), Winsler, Zaccaro

Associate professors: Bitler, Blackwell, Buffardi, Flinn, Greenwood, Kello, Kozhevnikov, Peterson, Sanford

Research professors: Butler, Olds

Research associate professors: Bachus, Warren

Assistant professors: Baldwin, Cattaneo, Dalal, Kashdan, Kaplan, King, Mcknight, Mohr, Monk, Perez-Edgar, Rowe, Thompson

Term associate professors: Chroniak, Wanschura

Research assistant professors: Bassett, Fu, McDonald, Stuewig, Tran

Term assistant professors: Battaglia, Hurley, Meier

Affiliates: Eby, Hunt, Traffon

Adjuncts: Anderson, Benedi, Curtin, Dechman, Hawley, Hirsch, Levitas, Mayfield, Perez, Pomeroy, Schumann, Shiraev, Stanhope, Steve, Werber

Course Work
The Psychology Department offers all course work designated PSYC in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

■ Psychology, BA
BA-PSYC

In addition to university-wide general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete the course work with a minimum GPA of 2.00 distributed as follows:

36 credits of psychology (24 of which must be at the 300 and 400 levels), including PSYC 100 (fulfills the university social science requirement), 211 (or two of 313, 314, 415), 231, 300, 301, 317, 325, 372 (or 375, 376), and 465 (Students must have a minimum grade of C- [1.67] in each of these nine or more courses.)

It is strongly recommended that students fulfill the natural science requirement by completing BIOL 103 and 104 because these courses are prerequisites to PSYC 372.

Students who receive transfer credit for a research methods course must take PSYC 304, 309, or 323 unless the transfer course has been approved as writing intensive.

Some of these courses may simultaneously fulfill university general education or college-level requirements; students should consult with an advisor in planning their programs.

■ Psychology, BS
BS-PSYC

In addition to satisfying the university-wide general education requirements for a BS degree, students pursuing this degree
must complete the course work with a minimum GPA of 2.00 distributed as follows:

- 38 credits of psychology (24 of which must be at the 300 and 400 levels), including PSYC 100 (fulfills the university social science requirement), PSYC 211 (or two of 313, 314, 415), 231, 300, 301, 317, 325, 372 (or 375, 376), and 465; and one of the following: PSYC 304, 309, 320, 323, or 373 (Students must have a minimum grade of C- [1.67] in each of these 10 or more courses.
- 14 credits of natural science, including BIOL 103 and 104 (which fulfill the university natural science requirement), plus 6 credits from ASTR, BIOL, CHEM, GEOG 102 and 309, GEOL, PHYS, and UNIV 301
- 6 credits of mathematics, selected from MATH 108, 110, 111, 113, 114; and STAT 250 (Three credits of this requirement fulfill the university quantitative reasoning requirement.)
- 3 credits of IT 103 (fulfills the university information technology proficiency requirement)
- 12 credits of social and behavioral science (not in psychology and not GEOG 102 or 309) and fine arts/religious studies/philosophy (other than PHIL 173 and 376) (Courses must include a minimum of 6 credits in social and behavioral science and 3 credits in fine arts/religious studies/philosophy. These may fulfill the university social and behavioral sciences and fine arts requirements.)
- 3 credits of either ENGL 410 or a third laboratory course in psychology selected from PSYC 304, 309, and 323

For All Psychology Majors

Any psychology course may be used to satisfy the 36-credit psychology requirement for the BA degree or the 38-credit psychology requirement for the BS degree with the following restrictions:

- A maximum of 6 credits of 327, 328, 421, 422, 548, and 549 may be applied to required psychology credits.
- A maximum of 6 credits of 260, 350, and 460 may be applied to required psychology credits.
- No more than 9 credits can be taken from the above without written permission of the department chair.
- PSYC 330 may not be taken for credit by psychology majors.

In addition to course work, undergraduate research experience and letters of recommendation are major factors for admission to graduate study. Therefore, students interested in graduate study should distribute courses across a number of areas in psychology and work closely with one or more professors on individual projects during the junior and senior years.

Honors Program

To receive honors in psychology, students take a sequence of three courses (PSYC 490, 491, and 492) during the spring semester of their junior year and fall and spring semesters of their senior year.

To be eligible for admission, psychology majors must have completed at least 50 credits, a minimum cumulative GPA of 3.25, and a minimum GPA in psychology courses of 3.40. To graduate with honors in psychology, students are required to maintain a minimum cumulative GPA of 3.25 and a minimum GPA of 3.40 in psychology courses. Students must earn at least 3.50 in the three honors courses, which cumulates in the successful completion and presentation of an independent honors thesis.

■ Neuroscience, BS

The BS in neuroscience is an interdisciplinary program emphasizing the relationship between the biology and chemistry of the nervous system and behavior of an organism. The BS in neuroscience prepares students for graduate-level study in both medical school and doctoral and master's-level programs in neuroscience and other health-related fields, and work in the neuroscience field.

In addition to university-wide general requirements, students pursuing this degree must complete the course work distributed as follows:

- Two foundation courses in biology (8 credits): BIOL 213 and 303
- Two foundation courses in chemistry (8 credits): CHEM 211–212*
- One foundation course in mathematics (3 or 4 credits): MATH 113, 114*, or 213
- One foundation course in statistics (3 or 4 credits): STAT 250, PSYC 300, MATH 352, or BIOL 312
- Four foundation courses in physics (8 credits): PHYS 243–244 and 245–246 or PHYS 160–161 and 260–261
- Three foundation courses in psychology (9 credits): PSYC 100, 375, 376
- One foundation course in computer science (4 credits): CS 112
- Three required core courses in neuroscience (9 credits): NSCI 200, 327, and 335
- One required psychology lab course (1 credit): PSYC 373
- 12 credits of elective courses in foundation areas (see advisor for list)
- 12 credits of elective courses in neuroscience (see advisor for list)
- One writing-intensive course (4 credits): NSCI 301

The program requirements also meet the university general education requirements in quantitative reasoning, social and behavioral science, and natural science.

*Students intending to pursue a PhD program in neuroscience or an MD are advised to take CHEM 313 and 315 and MATH 114.

Writing-Intensive Requirement

The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in psychology may fulfill this requirement by successfully completing PSYC 301, 304, 309, or 323. Students majoring in neuroscience may fulfill this requirement by successfully completing NSCI 301.

Minor in Psychology

The Psychology Department offers a minor to students who major in any other discipline. Students pursuing this minor must complete 18 credits in psychology distributed as follows:

- One required course (3 credits): PSYC 100
- Three courses (9 credits) from three of the following five areas (at least one area must be cognition or physiological):
  - Developmental: PSYC 211 or 313
  - Social/personality: PSYC 231 or PSYC 324
  - Cognition: PSYC 317
  - Abnormal: PSYC 325
  - Physiological: PSYC 372 (or 375, 376)
• 6 additional credits of psychology courses (with no more than 3 credits taken from PSYC 260, 350, and 460)

Related course work in psychology can enhance many different majors. Please contact the Undergraduate Psychology Office or the Psychology Department web site for a list of suggested courses for students who are majoring in specific disciplines or areas of study that interact well with psychology.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Teacher Licensure
Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Bachelor’s/Accelerated Master’s Program in Psychology (concentration in biopsychology)
Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain a bachelor’s in psychology and a master’s in psychology with a concentration in biopsychology following satisfactory completion of 146 credits. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Admitted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferral of the undergraduate degree with satisfactory graduate-level performance (3.00 in each course, grade of B or better) in graduate courses, students are given advanced standing in the master’s program. All other master’s degree requirements must be met. This program is available only to students pursuing the concentration in biopsychology. Interested students should contact the department for details about the application process.

GRADUATE PROGRAMS

■ Psychology, MA

The MA in psychology has concentrations in industrial/organizational psychology, human factors/applied cognition, school psychology, applied developmental psychology, and biopsychology. The department does not offer an MA in clinical or counseling psychology, but an MA concentration in clinical psychology is available for students who have been admitted to the PhD program.

Application Requirements
In addition to fulfilling admission requirements for graduate study, applicants must have 15 credits in psychology, including a course in statistics and a laboratory course in psychology. In addition, school psychology requires courses in personality or abnormal psychology, developmental psychology, and tests and measurements. Applicants are required to submit results of the GRE taken within the past five years (applicants should plan to take the GRE at least two months before the deadline); three letters of reference from professors or supervisors; and a departmental application. In addition, applicants are asked to submit a biographical statement outlining their background and experience and describing their future goals in psychology. An overall GPA of 3.00 for the last 60 undergraduate credits is required and, generally, a minimum GPA of 3.25 in undergraduate psychology courses, and combined GRE scores of 1,000 or above are also required. Work experience, publications, or special recommendations may compensate for deficiencies in other qualifications. Because the number of students admitted to each program is limited, meeting these minimum requirements does not guarantee admission.

Financial Assistance
Financial assistance is available through graduate assistantships and various forms of grants, loans, and employment.

Nondegree Status
Applicants who qualify for degree status but who are not applicants for a degree at the university may be admitted to nondegree status. Nondegree status is not intended as a qualifying program for degree status. While consideration may later be given to the application of credits earned toward a degree program while in nondegree status, applicants are not ensured that such requests will be granted; however, if granted, no more than 12 credits earned in nondegree status may be applied to a degree program. All students seeking to pursue this option should make their interests known to the appropriate program director.

Provisional Admission
Students may be admitted provisionally and be required to take 12 credits in psychology and earn a minimum GPA of 3.25 in those courses to qualify for removal of the provisional qualifier. Programs may add other conditions to provisional admission. Individualized study work does not count toward the 12 credits.

Degree Requirements

▲ Concentration in Applied Developmental Psychology (APD)
The applied developmental psychology concentration focuses on child development. It provides basic knowledge about normal development, skills for assessing developmental level, and techniques for planning and evaluating programs that foster optimal development.

Students must complete 32 graduate credits, distributed as follows:

• 6 credits of core from cognitive (PSYC 701, 766, 768), biological (PSYC 558, 559, 702), or social (PSYC 667, 668, or 703)
• 8 credits of quantitative methods: PSYC 611, 612
• 9 credits of specialized content from PSYC 592 (with developmental content), 648, 666, 669, 704, or 780
• 4 credits of research/practicum experience from thesis (4 credits of a combination of 798/799) or practicum/directed reading and research (3 credits of 792 and 1 credit of 597)
• 2 credits of professional seminar (PSYC 591 in fall semester of first year)
• 3 credits of an elective course (content course, practicum, or directed reading and research)
The School of Psychology offers a curriculum that provides an integrative and comprehensive approach to the sciences of mind, brain, behavior, and society. The program is designed to prepare students for careers as researchers, educators, practitioners, and leaders in psychology. Students are encouraged to develop a strong foundation in psychology, with opportunities for specialization and interdisciplinary study.

The curriculum is divided into five concentrations:

1. **Concentration in Biopsychology (BP)**
   - Emphasizes training in the neurobiological bases of behavior.
   - Students pursue a master's degree in psychology.
   - Must complete 32 credits distributed as follows:
     - 8 credits of specialized content: PSYC 527, 531, 558
     - 3 credits from PSYC 556 or 599
     - 8 credits of quantitative methods: PSYC 611, 612
     - 1 credit of professional seminar: PSYC 591
     - 6 credits of elective courses chosen from BIOL 583; PSYC 561, 702, 704
     - 6 credits of thesis: PSYC 798, 799 (A thesis is normally required, but 6 credits of practicum [PSYC 792] may serve as a substitute if approved by the advisor and program coordinator.)

2. **Concentration in Clinical Psychology (CLN)**
   - Emphasizes training in the evolving functions of clinical psychologists, including research, direct provision of clinical services, consultation, program development and evaluation, and consultation.
   - Students pursue a clinical psychology concentration.
   - Must complete 32 credits distributed as follows:
     - Four required courses (14 credits): PSYC 810 (4 credits), PSYC 811 (4 credits), PSYC 822, PSYC 823
     - Two courses (8 credits) in advanced statistics: PSYC 611 and PSYC 612
     - One course (3 credits) in practicum: PSYC 881
     - One course (1 credit) in seminar: PSYC 890
     - Two courses (6 credits) chosen from:
       - Biological bases of behavior (PSYC 558, 559, or 702)
       - Developmental bases of behavior (666, 669, or 704)
       - Social and Cognitive Foundations of Clinical Psychology (PSYC 833)
       - History, Systems, and Theories of Personality and Psychotherapy (PSYC 830)
       - Social-Cognitive Interventions in Clinical Psychology (PSYC 831)
       - Community Psychology I (PSYC 840)
       - Community Psychology II (PSCY 841)

3. **Concentration in Industrial/Organizational Psychology (IO)**
   - Emphasizes training in work settings.
   - Students pursue an industrial/organizational psychology concentration.
   - Must complete 32 credits distributed as follows:
     - One core course (3 credits): PSYC 667, 701, or 703
     - Two courses (8 credits) of quantitative and research methods: PSYC 611, 612
     - One course (1 credit) in seminar: PSYC 890
     - Two courses (6 credits) chosen from:
       - Biological bases of behavior (PSYC 558, 559, or 702)
       - Developmental bases of behavior (666, 669, or 704)
       - Social and Cognitive Foundations of Clinical Psychology (PSYC 833)
       - History, Systems, and Theories of Personality and Psychotherapy (PSYC 830)
       - Social-Cognitive Interventions in Clinical Psychology (PSYC 831)
       - Community Psychology I (PSYC 840)
       - Community Psychology II (PSCY 841)

4. **Concentration in School Psychology (SCH)**
   - Emphasizes training in the sciences of mind, brain, behavior, and society.
   - Students pursue a school psychology concentration.
   - Must complete 38 credits distributed as follows:
     - Four courses (12 credits) of specialized content: PSYC 636 and 639; 3 credits from PSYC 557, 592, 631, 638, 640, 733, and 736; and select 3 credits from PSYC 592, 635, 735, 739, and 741
     - Practicum (optional: 6 credits of practicum; requires permission of advisor)
     - Thesis (optional: 6 credits of thesis; requires permission of chair)
     - Electives: no more than 6 credits of advisor-approved electives from outside the department

   - Emphasizes training in the sciences of mind, brain, behavior, and society.
   - Students pursue a certificate of advanced graduate studies in school psychology.
   - Must complete 32 graduate credits with a grade B or better distributed as follows:
     - EDCD 603; EDSE 628 or 629; PSYC 669 or 704 or 506; PSYC 592, 611, 612, 617, 619, 671, 709, 710, 750, 892

The certificate in advanced graduate studies in school psychology forms a two-level degree program with the school psychology concentration in the MA in psychology. This program prepares graduates for professional certification in school psychology and is approved by the National Association of School Psychologists.

Students who wish to apply directly to the certificate program must have earned a master’s degree in an allied field, such as counseling, clinical psychology, developmental psychology, or special education, in which at least 15 graduate credits correspond to required courses in the master’s curriculum. They must complete all requirements of the master’s in school psychology that they have not previously taken.
Students who have not already earned a master’s degree in a related field must apply for admission to both the master’s program and the certificate.

Students pursuing this certificate must complete 26 credits. They must receive a grade of B or better in the course work, which must be completed before the internship (PSYCH 790). School psychology students are required to enroll full time. The credits are distributed as follows:

- PSYC 592, 597, 722, 750, 790, 792; EDCD 608

Previously Earned Credit

With approval of the school psychology faculty, graduate coordinator, and dean, the number of credits required for the concentration may be reduced by a maximum of 18 credits on the basis of graduate course work completed before admission.

With approval of the graduate coordinator and the dean, students admitted directly to the certificate program may transfer up to 3 graduate credits from another institution.

A special policy applies to students admitted directly to the certificate program who received a master’s degree in psychology with a concentration in school psychology from Mason. If the degree was received within five years of admission to the certificate program and students took at least 13 credits of course work in the certificate of advanced graduate studies as part of the master’s, they may earn the certificate with as few as 6 additional graduate credits. Such students should consult with an advisor.

Students choose to complete a thesis or practical research project. All students must complete a full year of internship. An unsatisfactory evaluation at any time by the school psychology committee may result in separation from the School Psychology Program.

Concentration in Human Factors/Applied Cognition (HF)

The human factors/applied cognition concentration trains students in the application of cognitive science to real-world problems. Students gain expertise in such areas as human-computer interaction, cognitive system engineering, cognitive ergonomics, and transportation. Faculty members help place students who do not have real-world experience in a part- or full-time practicum before completing the degree.

Students pursuing this concentration must complete 32 graduate credits distributed as follows:

- One core course (3 credits): PSYC 701, 759, 766, or 768
- Two courses (8 credits) of quantitative and research methods: PSYC 611, 612
- Two courses (6 credits) of specialized content: PSYC 530, 645
- Two courses (6 credits) of PSYC 734, 766, 768, or 737 (these may be repeated)
- Practicum 792 (optional: 6 credits of practicum requires advisor’s permission)
- Thesis 798, 799 (optional: 6 credits of thesis requires chair’s permission)

Other courses within or outside the department may be taken with advisor’s approval.

Certificate Programs

A certificate may meet the needs of students who desire to upgrade their skills and earn a certificate as evidence of their skill attainment. Each of these certificates may be earned separately or concurrently with another program or certificate.

The certificate programs are open to all students who hold a bachelor’s degree from an accredited university and meet admissions requirements for the MA or PhD concentration in human factors and applied cognition. Students who have been admitted as certificate-seeking students may apply for admission to the master’s degree program in human factors and applied cognition at any time. A maximum of 12 credits may be transferred to the master’s degree program from the certificate program with the approval of the program director and the dean, provided that the grade in each course is 3.00 or better. (There are other restrictions on the number of credits that may be transferred, so students interested in this option should consult the program director.)

Certificate in Aviation CERG-AVIP Psychology

Students pursuing this certificate must successfully complete five courses (15 credits) distributed as follows:

- Three required courses (9 credits): PSYC 530, 645, and 734 (when aviation-related topic is approved for this certificate by the program director)
- Two elective courses (6 credits) chosen from PSYC 597 (when topic is approved for this certificate), 768, 766; SYST 560, 671

Certificate in Usability CERG-UBTY

Students pursuing this certificate must successfully complete five courses (15 credits) distributed as follows:

- Three core courses (9 credits): PSYC 530, 645, 737
- Two elective courses (6 credits) of electives chosen from PSYC 597 (when topic is approved for this certificate), 764, 734 (when topic is approved for this certificate), 737, 766, 768; EDIT 526, 571, 705, 773

Certificate in Cognitive Neuroscience CERG-CNEU

Students pursuing this certificate must successfully complete six courses (18 credits) distributed as follows:

- Three core courses (9 credits): PSYC 530 and 768 (repeatable, when topic is cognitive neuroscience)
- One course (3 credits) chosen from PSYC 527, 531, 556, 558, or 559
- Two elective courses (6 credits) chosen from PSYC 702 and PSYC 768, 766, 597 (when topics for these three courses are approved for this certificate by the program director)

Neuroscience, PhD SC-PHD-NEUR

The interdisciplinary doctoral program in neuroscience is offered jointly by CHSS, the College of Science, and the Krasnow Institute for Advanced Study. For details, see the College of Science chapter in this catalog.

Psychology, PhD PHD-PSYC

The goal of the doctoral program is to train students in the principles and applications of psychology. The program provides knowledge of the basic content areas in psychology and practical experience in applying this knowledge to solving human problems in life, work, and school. The program offers
the following concentrations: industrial/organizational psychology, human factors/applied cognition, clinical psychology, applied developmental psychology, and biopsychology.

**Admission Requirements**

Entering students are accepted only for fall semesters. The department does not usually consider applications that fail to meet the minimum criteria of 3.00 undergraduate GPA, 3.25 GPA in psychology course work, and combined GRE scores of 1,100. Applicants who meet this minimum receive continued consideration for the final candidate pool on the basis of experience, letters of recommendation, objective test scores, and (in some programs) an interview. No specific set of qualifications guarantees admission.

In addition to admission materials required by the university, applicants must submit the following:

- Completed Department of Psychology form
- Three letters of recommendation from individuals who have firsthand knowledge of the applicant’s academic capabilities or work experience
- A two- to three-page typewritten personal statement describing professional goals, training history, and reasons for seeking the PhD
- GRE results taken within the past five years and before the application deadline. Applicants should take the GRE by October because applications cannot be processed until these scores are received. Scores must be sent directly from Educational Testing Service, P.O. Box 955, Princeton, NJ 08541. Only the aptitude scores are required, but scores for the Advanced Test in Psychology may also be submitted.

Applicants are responsible for ensuring that all materials arrive before the application deadline. Also, applicants in the final candidate pool may be required to participate in an interview.

In addition to fulfilling admission requirements, applicants are expected to have the following:

For the PhD with a concentration in industrial/organizational psychology or in human factors/applied cognition, at least 15 credits in psychology, including a statistics course and a laboratory course in psychology. A tests and measurements course is recommended.

For the PhD with a concentration in clinical psychology, at least 15 credits in psychology, including a statistics course, laboratory science course, and abnormal psychology. Courses in developmental psychology, personality, physiological psychology, and tests and measurements are desirable.

For the PhD with a concentration in applied developmental psychology, at least 15 credits in psychology, including statistics and a laboratory course in experimental psychology. Courses in personality, abnormal psychology, developmental psychology, and tests and measurements are also required for applications to the school psychology concentration within the MA program.

For the PhD with a concentration in biopsychology, at least 15 hours of psychology, including physiological psychology, statistics, and a lab course in experimental psychology.

**Financial Assistance**

Financial assistance is available through graduate assistantships, doctoral fellowships, and various forms of grants, loans, or employment.

**Reduction of Credit**

For students entering the doctoral program with a master’s degree, the number of credits required may be reduced by a maximum of 30 credits subject to the approval of the program faculty and the dean. Requests for reduction of credit are reviewed by a committee only after acceptance to the PhD program.

**Degree Requirements**

The PhD program has four educational components: core courses, upper-level specialty courses, supervised practica, and dissertation.

**Core Courses**

Core course requirements cover the basic subject matter identified by the profession as essential to doctoral training: biological bases of behavior, social bases of behavior, cognitive bases of behavior, individual behavior, and history of psychology.

**Specialty Courses**

The 700-, 800-, and 900-level courses provide doctoral candidates with greater depth of study in specific content areas.

**Practica**

The purpose of the practica is to provide a broad range of experiences in settings related to the students’ concentrations.

**Advancement to Candidacy**

To advance to candidacy, students must complete all required, nonelective course work on their approved program of study. Students must also successfully complete and pass written and oral comprehensive exams.

**Dissertation**

The dissertation requirement is designed to demonstrate the student’s ability to apply psychological principles to research problems. Students must take at least 3 credits of proposal (998) and 3 credits of research (999), and have at least 12 credits of 998 and 999 combined. (No more than 12 credits of 998 and 999 may be applied toward the degree.) Once enrolled in 998, a student must maintain continuous registration in 998 or 999 each semester until the dissertation is submitted to and accepted by University Libraries.

**Student Evaluation**

Students in the doctoral program are evaluated on the basis of grades, comprehensive exams, research, and communication skills. In doctoral courses, A and B are the only acceptable grades. Students in the doctoral program must successfully complete comprehensive exams administered each year.

▲ Concentration in Applied Developmental Psychology (APD)

The applied developmental psychology concentration is concerned with enhancing developmental processes and preventing developmental disorders in individuals and families across the life span. It uses the knowledge base and methodologies of developmental science to assist the development of individuals who vary in cultural and ethnic backgrounds; economic and social opportunities; physical, social, emotional, and cognitive abilities; and conditions of living (e.g., families, neighborhoods, communities, and physical
The program emphasis is on child development (infancy, early childhood, middle childhood, and adolescence), and students may focus their studies on the cognitive, social, emotional, language, personality, or physiological aspects of development.

The applied developmental concentration has two goals: to train students to teach and do research on basic and applied issues in child development for employment in such settings as universities, research institutes, and organizations, and to train students to do applied work in developmental psychology (consultation, program evaluation, assessment and evaluation, developmental interventions, and parent training) in such settings as schools, hospitals, courts, child care facilities, and other organizations. Applied developmental psychology doctoral students have the option of also completing course requirements for the MA concentration in school psychology.

Students pursuing this degree must complete 72 credits distributed as follows:

• 3 credits of developmental core (704)
• 6 credits of cognitive, biological, social, or history core (two of 701, 702, 703, or 705)
• 8 credits of quantitative methods: PSYC 611 and 612
• 9 credits of advanced specialized methods, including the following: quantitative methods: at least 3 credits from PSYC 652, 754, 755, or 756; research methods: at least 3 credits from PSYC 646 or 654; specialized methods: PSYC 619, 673, 684, 709*, 710*, 722*, 786; EDSE 649
• 15 credits of specialized content: foundations: at least 9 credits from PSYC 614, 615, 666**, 669**, 892 (special topics with developmental content); applications: PSYC 630, 648, 780**
• 3 credits of professional seminar/professional ethics (taken during first year: fall, 2 credits; spring, 1 credit)
• 8 credits of Directed Readings and Research (897)
• 12 credits of dissertation: PSYC 998 and 999 (at least 3 of 998 and 3 of 999)
• 8 credits of elective courses:
  • 0 to 6 credits of Practicum (792)
  • 0 to 8 credits of other electives
• Can be taken only by students concurrently enrolled in school psychology MA concentration.

** Required

In addition, students are required to complete a second-year research project before they can take comprehensive exams. The expectation is that the research will be submitted for presentation at a national conference or to an appropriate journal for publication.

▲ Concentration in Biopsychology (BP)

The biopsychology concentration focuses on studying the biological substrates of behavior. Core and affiliated faculty in the neuroscience and cognitive programs study areas as diverse as neural control of behavioral development; brain systems in substance abuse; animal models of learning and memory and their disorders (such as Alzheimer’s); human brain systems involved in cognition, perception, and movement; and computational models of neural functioning.

The program’s core facilities have well-equipped behavioral testing and histological/histochemical facilities. The program’s strong links to the Krasnow Institute for Advanced Study and the Center for Biomedical Genomics and Informatics allows opportunities for collaborative work as diverse as tissue slice preparations and molecular genetics. The doctoral program prepares students for research-based careers in academics, government, or industry.

Students pursuing this degree must complete 72 graduate credits distributed as follows:

• 11 credits from a biopsychology core: PSYC 527, 531, 558; and one of the following: 559, 556, 592
• 6 credits from a cognitive core (PSYC 701, 766, or 768), developmental core (PSYC 666, 669, 704), social core (PSYC 667, 668, 703), or historical (PSYC 705)
• 8 credits of quantitative and research methods: PSYC 611 and 612
• 6 credits of quantitative or research methods: at least 3 credits from PSYC 652, 754, 755, 766
• 6 credits of research: PSYC 897 (1 credit per first 3 semesters) and a third-year research project, 3 credits of PSYC 897, or credits of MA Thesis (PSYC 798, 799)
• 15 credits of specialized content selected from an approved list, including PSYC 561, 592, 702; BIOL 572, 583; CSI 734, 739
• 6 credits of elective courses with approval of advisor
• 12 credits from neuroscience seminars including 1 credit of professional seminar: PSYC 890 and NSC 709
• 12 credits of dissertation: PSYC 998 and 999

▲ Concentration in Clinical Psychology (CLN)

The clinical psychology concentration is committed to the scientist–practitioner model. The goal of the program is to train clinical psychologists who are capable of integrating research and applied clinical activities. The program is unique in approaching clinical psychology from social psychological and community perspectives. A social psychological approach uses theory and research from social psychology to understand emotional, cognitive, behavioral, and interpersonal functioning. A community approach stresses the impact of social and cultural factors on the individual and the impact of the individual on the community. Most of the faculty members employ cognitive–behavioral and interpersonal approaches to research and clinical practice.

Students pursuing this concentration must complete 72 graduate credits distributed as follows:

• One course (3 credits) of biological bases of behavior: PSYC 558, 559, or 702
• One course (3 credits) of developmental bases of behavior PSYC 666, 669, or 704
• Thirteen required courses (45 credits): PSYC 611 (4 credits), PSYC 612 (4 credits), PSYC 810 (4 credits), PSYC 811 (4 credits), PSYC 822, PSYC 823, PSYC 830, PSYC 831, PSYC 833, PSYC 840, PSYC 841, PSYC 881 (7 credits), PSYC 890 (1 credit)
• Three elective courses (9 credits), which must be approved by advisor
• 12 credits of dissertation (998 and 999; at least 3 credits of each)
• Full-time, 12-month clinical psychology internship at a site accredited by the American Psychological Association
• Optional, but recommended: part-time clinical psychology externship in the third or fourth year of the program
The human factors and applied cognition concentration covers basic theoretical and empirical issues and emphasizes research that applies cognitive science to real-world problems. The program builds bridges between human factors engineering and cognitive psychology. Many applications of cognitive science are in the domain of human factors, and many doctoral students who complete our program go on to be human factors professionals.

Students pursuing this concentration must complete 72 graduate credits distributed as follows:

- One course (3 credits) of cognitive core: PSYC 701, 759, 766, or 768
- Two courses (6 credits) of core from biological (PSYC 558, 559, or 702), social (PSYC 667, 668, or 703), developmental (PSYC 666, 669, or 704), or historical (PSYC 705)
- Two courses (8 credits) of quantitative and research methods: PSYC 611 and 612
- Two courses (6 credits) of core from biological (PSYC 558, 559, or 702), social (PSYC 667, 668, or 703), developmental (PSYC 666, 669, or 704), or historical (PSYC 705)
- Three courses (9 credits) of advanced statistics or qualitative methods
- Two courses (6 credits) of specialized content: PSYC 530 and 645
- Three courses (9 credits) of additional specialized content to include PSYC 734, 737, 766, or 768
- One course (3 credits) of special topics in professional issues: PSYC 890
- 12 credits of dissertation: PSYC 998 and 999
- Options: To reach the 72 credits required for the PhD, students may repeat 734, 737, 766, or 768, or they may take 3 to 6 credits of practicum (PSYC 730) with permission of the advisor. (Students who do not have work experience in applied cognition or human factors are encouraged to take up to 6 credits of practicum.)

Students are to take credits in PSYC 897 each semester. Students are strongly encouraged to develop competence in programming and computer science through course work or independent study. Students are encouraged to identify and take relevant courses within or outside the department (with advisor’s approval).

The industrial/organizational psychology concentration focuses on multiple aspects of behavior in organizational settings, including personnel selection, quantitative analyses, teams, leadership, work and family issues, and organizational health issues. Mason’s graduate work in this area emphasizes research as the key to knowledge in both academic and applied settings. The program fosters a peer-oriented environment where students collaborate on numerous projects in addition to working with faculty members, in many different areas of industrial/organizational psychology.

Students pursuing this concentration must complete 74 graduate credits distributed as follows:

- Three courses (9 credits) of core from cognitive (PSYC 701, 759, 766, or 768), social (PSYC 667, 668, or 703), and historical (PSYC 705) (one from each cluster)
- Two courses (8 credits) of quantitative and research methods: PSYC 611 and 612
- Three courses (9 credits) of advanced quantitative and research methods: PSYC 557, 754, and 756
- Six courses (18 credits) of specialized content: PSYC 636, 639; 6 credits from PSYC 631, 638, 640, 733, 736, 592/892; and 6 credits from PSYC 667, 735, 739, 741, 592/892
- One course (3 credits) of special topics in professional issues: PSYC 890
- Three elective courses (9 credits) (can be from outside the department with advisor approval)
- 6 credits of practicum: PSYC 730
- 12 credits of dissertation: PSYC 998 and 999

### Public and International Affairs

**Phone:** 703-993-1400  
**Web:** pia.gmu.edu

### Faculty

**Robinson Professors:** Hecko, Paden  
**Emeritus faculty:** Brown, Clark, Early, Gortner, Hart-Nibbring, Knight, White

**Professors:** Cioffi-Revilla, Conant, Conlan, Druckman, Dudley (chair), Katz, Posner, Regan, Sackett, Wan, Wilsford

**Associate professors:** Burt, Hackler, Harbour, Lukacs, Mahler, Mandaville, McDonald, McFerson, Nguyen, Sacco, Snyder, Toepler, Travis

**Assistant professors:** Balint, Benjamin, Brigety, Dueck, Koblenz, McClintchey, Miller, Tsvetovat

**Term assistant professors:** Burroughs, Bushée, Robbins, Walker

**Adjuncts:** Becella, Butler, Combs, Day, Dinella, Fant, Froehlich, Ghosh, Hall, Hauss, Heniff, Long, Maslyn, Raffety, Sauer, Shafroth, Shiraev, Stahl, Swanson, Tadie, Taylor, Tibbets, Vance, Willett

**Affiliate faculty:** Casamayou, Connolly, Edner, Shogan

### Course Work

The Public and International Affairs Department offers all course work designated BIOD, GOVT, and PUAD in the Course Descriptions chapter of this catalog.

### UNDERGRADUATE PROGRAMS

#### Government and International Politics, BA

In addition to satisfying university-wide general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete the course work distributed as follows:

- Five core courses (16 credits): GOVT 101, 103, 132, 133, 300
- Eight advanced government field courses (24 credits) with at least 3 credits in each of the four fields:  
  - American politics: GOVT 301–319, 400–419  
**International and comparative politics:** GOVT 330−349, 430−449
**Public policy and administration:** GOVT 350−369, 450−469
- 3 credits of GOVT 490, 491 (fulfills the university synthesis requirement)

With permission of an advisor, 9 credits of GOVT 480 and 496 may be substituted for government field courses. Only 3 credits of GOVT 480 and 6 credits of GOVT 496 may be substituted for major requirements. GOVT 490 may not be applied to a field requirement or concentration.

Only courses passed with a grade of C (2.00) or better may be used to fulfill major requirements.

With careful planning, some courses required for the major may also fulfill general education requirements or college-level requirements for the BA. See an advisor before registering.

Students may choose to concentrate in one of the four advanced government fields by completing five courses in that field. They must still complete 3 credits in each of the other three fields.

▲ **Concentration in American Politics (AMP):**
Five courses (15 credits) chosen from GOVT 301−319, 400−419

▲ **Concentration in Political Theory and Law (PTL):**
Five courses (15 credits) chosen from GOVT 320−329, 420−429, 470−472

▲ **Concentration in International and Comparative Politics (ICOM):**
Five courses (15 credits) chosen from GOVT 330−349, 430−449

▲ **Concentration in Public Policy and Administration (PPA):**
Five courses (15 credits) chosen from GOVT 350−369, 450−469

■ **Public Administration, BS BS-PUAD**

In addition to satisfying university-wide general education requirements, students majoring in public administration must complete the following. With careful planning, some courses required for the major may also fulfill university general education requirements. See an advisor before registering.

- Six core courses (19 credits): GOVT 101, 103, 132 or 133, 300, 304, 351 (fulfill the university social science, global understanding, and information technology and information technology ethics requirements)
- 21 credits of advanced GOVT courses, including GOVT 355, 356; and 3 credits from GOVT 357, 358, 452, 464 or NCLC 331; 3 credits from GOVT 320s or 420s; 3 credits from GOVT 360s or 460s; 3 credits of upper-level GOVT taken outside of GOVT 350s and 450s (may include GOVT 480 or 496). Only 3 credits of GOVT 480 may be substituted for a major requirement.
- 3 credits of GOVT 490, 491 (fulfills the university synthesis requirement)
- 6 credits in analytical skills chosen from OM 210, 301; IT/STAT 250, 350; SOCI 313; MATH 106, 108, 110, 111, 113, or 115
- 9 credits from ECON 103, 104; and any upper-level course in ECON or FNAN, or GOVT 343
- 3 credits in ACCT or GOVT 358
- 9 credits in information technology or up to 12 credits in a foreign language

Information technology: GOVT 359, 459; any CS, INFSC, IT, or MIS course; STAT 362; SOCI 405
Foreign language: One modern foreign language through the intermediate level

Only courses passed with a grade of C (2.00) or better may be used to fulfill major requirements (which include GOVT courses, major supporting courses, and Option A or B courses). The following courses can be applied to only one major requirement: IT/STAT250; GOVT 343, 358, and 464.

**Writing-Intensive Requirement**

The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in government and international politics, and public administration may fulfill this requirement by successfully completing the 300-level GOVT courses in their major programs.

**Honors Program**

Qualified students majoring in government and international politics, and public administration may pursue advanced work leading to graduation with honors from the Department of Public and International Affairs. Those highly qualified students selected for the honors program participate in a two-course sequence, GOVT 491 and 496. To graduate with honors, students must complete these courses with a GPA of at least 3.00.

**Teacher Licensure**

Students who plan to seek teacher licensure and become K−12 teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gsw.gmu.edu.

**Interdisciplinary Minors**

The department coordinates the interdisciplinary minors in Asia-Pacific studies, global systems, and urban and suburban studies. It participates with the Philosophy Department in the minor in political philosophy. See the Interdisciplinary Minors section in this chapter for descriptions.

**Minors**

For policies governing all minors, see the Academic Policies chapter of this catalog. In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. All courses applied to any minor offered by public and international affairs require a grade of C (2.00) or better.

**Minor in American Government**

This minor develops knowledge of the principles, institutions, and behaviors of the American political system.

Students pursuing this minor must complete 18 credits in government distributed as follows:
• One core course (3 credits): GOVT 103
• Five elective courses (15 credits) chosen from
  • Any GOVT 301–309 political institutions
  • Any GOVT 310–319 political behavior
  • GOVT 344
  • Any GOVT 409–420
  • Relevant GOVT 480 with approval of the minor coordinator

Minor in International/Comparative Studies
This minor increases students’ awareness of the regions and current issues of the world on theoretical and practical levels.

Students pursuing this minor must complete 18 credits in government distributed as follows:
• One core course (3 credits): GOVT 132 or 133
• Five elective courses (15 credits) chosen from
  • GOVT 101
  • Any GOVT 330–339 comparative politics
  • Any GOVT 340–349 international studies
  • Any GOVT 430–439 comparative politics
  • Any GOVT 440–449 international studies
  • Relevant GOVT 480 with approval of the minor coordinator

Minor in Legal Studies
This minor focuses on the constitutional foundations, interpretation, processes, and functions of domestic and international law.

Students pursuing this minor must complete 18 credits in government distributed as follows:
• Two core courses (6 credits): GOVT 103 and 301
• Four elective courses (12 credits) chosen from
  • GOVT 350–359 public administration
  • Any GOVT 360–369 public policy
  • Any GOVT 450–459 public administration
  • Any GOVT 460–469 public policy
  • Relevant GOVT 480 with approval of the minor coordinator

Minor in Public Policy and Management
This minor introduces students to the theory and process of policy formulation and implementation in the political and governmental arena.

Students pursuing this minor must complete 18 credits in government distributed as follows:
• Two core courses (6 credits): GOVT 103 and 301
• Four elective courses (12 credits) chosen from
  • GOVT 350–359 public administration
  • Any GOVT 360–369 public policy
  • Any GOVT 450–459 public administration
  • Any GOVT 460–469 public policy
  • Relevant GOVT 480 with approval of the minor coordinator

Bachelor’s/Accelerated Master’s Program in Political Science
Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain both BA and MA degrees after satisfactory completion of 150 credits. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Admitted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferral of the undergraduate degree with satisfactory performance (3.00 in each course, grade of B or better) in graduate courses, students are given advanced standing in the master’s program. All other master’s degree requirements must be met.

Applicants must have a cumulative GPA of 3.50 or higher and submit an application, two letters of recommendation (preferably from professors), and a résumé. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

Bachelor’s/Accelerated Master’s Program in Public Administration
Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain both BS and MPA degrees after satisfactory completion of 150 credits. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Admitted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferral of the undergraduate degree with satisfactory performance (3.00 in each course, grade of B or better) in graduate courses, students are given advanced standing in the master’s program. All other master’s degree requirements must be met.

Applicants must have a cumulative GPA of 3.40 or higher and submit an application, two letters of recommendation (preferably from professors), and a résumé. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

GRADUATE PROGRAMS

■ Biodefense, MS  MS-BIOD
The MS in biodefense provides students with a foundation in the science and technology of biodefense and the opportunity to specialize in the areas of intelligence and threat assessment, nonproliferation, and medical and public health preparedness. Students are able to select a concentration in one of two fields: international security or homeland security.

Application Requirements
Students must meet the admission standards and application requirements of the university. See the Graduate Admission Policies section of the catalog. Because of the breadth of the program, students with backgrounds in science or other areas, such as international affairs, political science, law, public policy, and conflict resolution, are encouraged to apply. In addition to fulfilling the admission requirements for graduate study, applicants must submit:
• Three letters of recommendation from faculty members or individuals who have firsthand knowledge of the applicant’s academic or professional capabilities
• A statement of purpose consistent with research interests or professional goals
• A current résumé
• Scores from GRE taken within five years prior to date of application

Degree Requirements
Students must successfully complete 37 credits distributed as follows:
• Seven required courses (19 credits): BIOD 604, 605, 609, 702 (1 credit); PUAD 630; GOVT 500, 540
• At least three elective courses (9 credits) in biodefense
• Up to two courses (6 credits) of approved non-BIOD electives
• 3 credits of BIOD 798 or 6 credits of BIOD 799

Students may elect to take their elective courses within one of the concentrations listed below.

▲ Concentration in International Security (INLS)
Four courses (12 credits) chosen from BIOD 620, 621, 622, 705, 706, 709, 722, 725, 760, 761; GOVT 641, 741, 745, 843; PUAD 504, 701, 727

▲ Concentration in Homeland Security (HMLS)
Four courses (12 credits) chosen from BIOD 710, 722, 723, 725, 726, 751, 752, 760, 761, 766, 767; GOVT 510, 706, 755; PUAD 631, 635, 727, 731, 750; PUBP 757, 758; PHIL 642

Students are strongly encouraged to take the core courses as early as possible because they provide the foundation for the rest of the program. The schedule of courses that students plan on taking should be approved in an education plan designed by the students and their advisor during the student’s first semester. Students must receive the permission of their advisor to take courses outside of the Biodefense Program.

To graduate from the MS in Biodefense Program, students must complete a substantial research paper to demonstrate the ability to conduct original, independent research. This goal can be achieved in two ways: a research project or a thesis. The objectives of both the research project and thesis are to serve as a capstone for the student’s graduate education and to demonstrate the student’s research, analytical, and writing skills. Both options require the student to produce a substantial and original contribution to the fields of biodefense or biosecurity on the model of a paper suitable for presentation at a scholarly conference or an article in a peer-reviewed scholarly journal.

■ Biodefense, PhD PHD-BIOD

The PhD program in biodefense is designed to prepare students to serve as scholars and professionals in the fields of biodefense and biosecurity. The program integrates knowledge of natural and man-made biological threats with the skills to develop and analyze policies and strategies for enhancing biosecurity. Other areas of biodefense including nonproliferation, intelligence and threat assessment, and medical and public health preparedness are integral parts of the program.

Application Requirements
Students must meet the admission standards and application requirements of the university. See the Graduate Admission Policies section of the catalog. Because of the breadth of the program, students with backgrounds in science and other areas, such as international affairs, political science, law, public policy, and conflict resolution, are encouraged to apply. In addition to fulfilling the admission requirements for graduate study, applicants must submit:

• Three letters of recommendation from faculty members or individuals who have firsthand knowledge of the applicant’s academic or professional capabilities
• A statement of purpose consistent with research interests or professional goals
• A current résumé or curriculum vitae
• Scores from GRE taken within five years prior to date of application
• Writing sample such as a full-length research paper

Degree Requirements
Students pursuing this degree must successfully complete a minimum of 72 graduate credits distributed as follows:

• Seven required courses (19 credits): BIOD 604, 605, 609, 630, 702 (1 credit); GOVT 540, 500
• One course (3 credits) of an additional approved advanced research course (qualitative or quantitative)
• Four courses (12 credits) in a concentration:

▲ Concentration in International Security (INLS)
Four courses (12 credits) chosen from BIOD 620, 621, 622, 705, 706, 709, 722, 725, 760, 761; GOVT 641, 741, 745, 843; PUAD 504, 701, 727

▲ Concentration in Homeland Security (HMLS)
Four courses (12 credits) chosen from BIOD 710, 722, 723, 725, 726, 751, 752, 760, 761, 762, 766; GOVT 510, 706, 755; PUAD 631, 635, 727, 731, 750, 757, 758; PHIL 642

• Two courses (6 credits) from the field outside of the student’s concentration
• 6 to 9 credits of BIOD 998
• 15 to 18 credits of BIOD 999

Once enrolled in 998, a student must maintain continuous registration in 998 or 999 each semester until the dissertation is submitted to and accepted by the University Library.

Students are strongly encouraged to take the core courses as early as possible because they provide the foundation for the rest of the program. The schedule of courses that students plan on taking should be approved in an education plan designed by the students and their advisor during the student’s first semester. Students may take up to 12 credits of courses outside of the Biodefense Program. Students must obtain the permission of their advisor to take such courses. Consult with the graduate program director or coordinator for a list of BIOD electives and approved non-BIOD electives that can be used to fulfill these concentration and distribution requirements. Some electives can be counted for more than one concentration. The same course, however, cannot be used to fulfill requirements in more than one concentration.

Reduction of Credit
Students entering the doctoral program with a master’s degree or other graduate credit may be able to apply up to 30 credits toward PhD requirements. The number of credits that will be accepted will be approved by the director of the Biodefense Program. Students and their advisor will make a recommendation to the director as to how many credits should be accepted and toward which requirements they will be counted. At minimum, the last 42 of the 72 credits for the PhD must be earned in the program. University standards for prior course credits and reduction of credit are described in the Academic Policies/Graduate Policies section of this catalog.

Advancement to Candidacy
Following completion of all required course work, students are required to take a qualifying exam. On successful completion, the student is advanced to candidacy and may select a dissertation committee. The student must offer a successful public defense of the dissertation proposal before registering for 999 dissertation credits. Students must present the results of the dissertation research to their dissertation committee in a seminar and defend their dissertation to the university community. Successful completion of a dissertation is contingent on approval of the dissertation committee and the dean.
Political Science, MA

MA-POS

This 36-credit degree program prepares students for advanced work in political science, teaching, and research about government; a career in government and politics; and work in domestic and international nongovernmental organizations. Students may specialize in American government and politics, international relations, or comparative politics. In addition, interdisciplinary opportunities allow students to take up to 9 credits in related fields such as history or public policy.

The program is made up of four core courses in political science, two required seminars in a field of specialization, advanced seminars in the Department of Public and International Affairs, and elective courses in other departments.

The MA degree is the first step in an engaging and stimulating career. Students develop a deeper understanding of political ideas and institutions, more sophisticated research skills, a better grasp of the intricacies of governments abroad, and a deeper knowledge of the complexities of international politics. This degree can lead to a career teaching about government; working with legislative bodies, government agencies, and international organizations; or doing research and writing about politics and government.

Application Requirements

Admission is in the fall and spring. Late applications are considered on a space-available basis. In addition to university graduate application requirements, applicants to the master’s in political science should submit three letters of recommendation, preferably from recent professors; GRE scores; resume listing employment and volunteer work; and a statement of interests and career goals. A writing sample is strongly recommended.

Degree Requirements

Students complete 36 credits distributed as follows:

- Four core courses (12 credits): GOVT 510, 520, 530, 540
- Three to five courses (9 to 15 credits) in one of three fields:
  - American government and politics: 6 credits of required field seminars chosen from GOVT 603, 604, 605, 706, and 3 to 9 credits of elective courses
  - Comparative politics: 6 credits of required field seminars (GOVT 631 and 731) and 3 to 9 credits of elective courses
  - International relations: 6 credits of required field seminars chosen from GOVT 641, 741, 743, 745 and 3 to 9 credits of elective courses
- Two courses (6 credits) of methods courses: GOVT 500 and 711
- 3 credits of GOVT 798 Research Project or 6 credits of GOVT 799 Thesis; 3 credits of GOVT 798 may be linked to an advanced specialty course to produce a final research project. A director and a committee of two additional faculty members read and approve the thesis if this option is selected. Arrangements for any of these options should be made with the advisor
- Remaining credits chosen from additional courses and may include an internship, additional courses in the specialization, or course work from other departments (see below)

Up to 9 credits of course work from other departments may be selected to complement the specialization and reflect the ideas, institutions, or processes of contemporary governance. Courses should be approved in an education plan designed by students and their advisor. Students who wish to begin or alter their career in government and politics are encouraged to take a 3-credit internship in their area of interest. Internships can be arranged through the Department of Public and International Affairs.

Political Science, PhD

PHD-POS

The PhD program is designed to prepare students for teaching and conducting research about government, careers in government and politics, and work in domestic and international nongovernmental organizations. The program allows students to combine their academic education with experience in the kinds of complex domestic and international political organizations they are studying. This model for political science education, patterned after the American Political Science Association’s Congressional Fellows Program, is designed to foster scholarship and a firsthand understanding of domestic and international institutions such as think tanks, international bodies, nongovernmental organizations, journals of political opinion, and congressional and executive branch offices.

Application Requirements

Applications will be accepted for the fall semester only. In addition to university graduate admissions requirements, applicants should submit three letters of recommendation from faculty members or those who can evaluate the applicant’s academic potential, a statement of purpose of study, GRE scores, and a writing sample such as a full-length research paper. Usually, GRE scores up to five years old may be used.

Degree Requirements

The degree requires 72 credits of course work divided among core courses, advanced courses in the student’s major and minor fields, supporting courses that can be outside the department, research methods courses, courses in political theory, experiential learning, and dissertation guidance. The program allows students to specialize in one of four major fields: American government and politics, international relations, comparative politics, or public administration.

The course work is distributed as follows:

- Three core courses (9 credits) chosen from GOVT 510, 520, 530, 540, 550
- At least seven advanced courses (21 credits) divided between two major fields:
  - American government and politics: 6 credits of required field seminars chosen from GOVT 603, 604, 605, 706, and 3 to 9 credits of elective courses
  - Comparative politics: 6 credits of required field seminars (GOVT 631 and 731) and 3 to 9 credits of elective courses
- International relations: 6 credits of required field seminars chosen from GOVT 641, 741, 743, 745, and 3 to 9 credits of elective courses
- Public administration: 6 credits of required field seminars (GOVT 753 and 755) and 3 to 9 credits of elective courses
- At least three advanced courses (9 credits) in a third field to be designed by the student and advisor to complement the major fields and with written approval of student’s advisor on the education plan
- Three advanced methodology courses (9 credits): GOVT 500, 711, and one other course in quantitative or
Financial Assistance

The program offers financial assistance on a competitive basis through graduate teaching assistantships. Students on financial assistance must show satisfactory progress in the degree program.

Reduction of Credit

For students entering the program with a bachelor’s or MPA degree, the number of credits required for the doctorate may be reduced by a maximum of 30 credits subject to approval of the graduate coordinator and the dean.

Progress Review

For students who have been admitted with a bachelor’s degree, the Faculty Review Committee will review each student’s progress after 30 credits of course work to determine whether the student will be allowed to continue their work toward the PhD. For students entering the program with a master’s degree, this review will occur after 12 credits in this program. If this decision is negative, the student will continue to be eligible for the MA degree.

Advancement to Candidacy

To advance to candidacy, students must complete all course work required on their approved program of study. Students must also successfully complete and pass two qualifying exams in major fields. In addition, students must have an approved dissertation committee as well as an approved proposal. Evidence of the approved proposal must be on file in the Dean’s Office before a student can advance to candidacy.

Public Administration, MPA-PUAD

This 36-credit program is designed to build the knowledge base and skills of people who are playing or intend to play a leadership role in organizations that develop or implement public policy. In addition, the program is among the first to address implications of the growing reliance of government on a wide range of third parties, including other governments, private contractors, and nonprofits, for public goals and accountability. In the required courses, emphasis is placed on the development of knowledge about public policy and management, as well as analytical problem-solving and communication skills, and third-party governance. Elective courses can be used by students to focus their knowledge and skill development within one of the following concentrations: public management, policy studies, public and nonprofit finance, nonprofit management, international management, state and local government, environmental science and public policy, human resources management, administration of justice, emergency management and homeland security, and third-party governance. Alternatively, the electives can be used to extend the breadth of study, with courses drawn from a variety of concentrations or even from other departments and schools within the university.

MPA students at Mason have the research and cultural resources of the Washington, D.C., area at their disposal. Government agencies representing all levels in the U.S. federal system are located close to the campus, as are the National Archives, the Library of Congress, and the Smithsonian Institution. Another benefit is the wide range of internship opportunities available in governmental and nonprofit organizations. The MPA Program regularly has internship invitations from national, state, and local government organizations, as well as from nonprofit organizations whose principal work is at the local, state, national, or international levels. Many of these internships are paid positions.

MPA courses are held at the Fairfax and the Arlington Campuses during the week and on the weekend in an accelerated format.

Application Requirements

Students are admitted for fall or spring semesters. Late applications are considered on a space-available basis. In addition to the graduate application requirements specified in the Admissions chapter of the catalog, students should submit three letters of recommendation; test scores from the GRE, GMAT, or LSAT; a résumé listing work experience and volunteer activity, and a statement of professional goals. Applicants may petition the Admissions Committee by letter to waive the exam if the student has a master’s degree or an undergraduate cumulative GPA of 3.30 or above from a U.S. institution of higher education. Students who want to be considered for an assistantship must submit a GRE score.

Transfer of Credits

Students may transfer credit into the MPA Program from graduate courses taken at other institutions or taken at Mason in nondegree status. Transfer credit is subject to university and college policies and must be approved by the MPA Program director and the dean. Students who enroll initially through nondegree studies should submit their application to the MPA Program in the first semester of study. Only 9 credits taken in nondegree status may be transferred to the degree program.

Degree Requirements

To receive an MPA, students must successfully complete 36 credits distributed as follows. The required courses are focused
on the knowledge and skills needed by people who want to play a leadership role in organizations that develop and implement public policy. Through these courses, students develop a shared knowledge base and skill set.

• Six core courses (18 credits): PUAD 502, 611, 620, 640, 700, and 703
• One additional methods course (3 credits) chosen from PUAD 612, 613, 741 or 742
• One course (3 credits) in accounting, budgeting, and financial management chosen from PUAD 660, 662, 663 or 664
• Four elective courses (12 credits)

Students may take their elective courses within one of the concentrations listed below. As an alternative, with the approval of their advisor, students may select their elective courses from several concentrations or fields. Students may declare only one concentration. PUAD 794 Internship and PUAD 796 Directed Reading and Research may be applied to a concentration where content is appropriate and with prior written approval of the MPA director. Other courses may also be applied to a concentration with prior written approval of the director.

▲ Concentration in Administration of Justice (ADJ)
• Four courses (12 credits) chosen from PUAD 730, 781; CONF 501; ILCP 509, 510, 691, 740, 741, 742, 743, 749, 781; SOCI 607, 608, 609

▲ Concentration in Emergency Management and Homeland Security (EMHS)
• Four courses (12 credits) chosen from PUAD 630, 631, 632, 633, 634, 635, 727, 731, 738; BIOD 723, 752; COMM 637; PUBP 742, 754, 758

▲ Concentration in Environmental Science and Public Policy (EVPP)
• One required course (3 credits): PUAD 642
• Three elective courses (9 credits) chosen from PUAD 730, 741, 749, 758 or BIOL and EVPP courses with written approval of an advisor

▲ Concentration in Human Resources Management (HRM)
• One required course (3 credits): PUAD 670
• Three elective courses (9 credits) chosen from PUAD 623, 652, 671, 672, 729, 730; PSYC 631, 635, 638, 639, 640, 667

▲ Concentration in International Management (IM)
• One required course (3 credits): PUAD 504
• Three elective courses (9 credits) chosen from PUAD 634, 636, 730, 738, 739; GOVT 540, 631
• CONF and ITRN courses with written prior approval of the director

▲ Concentration in Nonprofit Management (NPMG)
• Two required courses (6 credits): PUAD 505 and 659
• Two elective courses (2 credits) chosen from PUAD 636, 652, 653, 654, 655, 657, 660, 664, 680, 720, 730

▲ Concentration in Policy Studies (PS)
• Four courses (12 credits) chosen from PUAD 615, 622, 661, 662, 663, 680, 727, 730, 741, 742, 749, 750, 781; GOVT 520, 605, 703

▲ Concentration in Public Management (PMG)
• Four courses (12 credits) chosen from PUAD 615, 622, 623, 660, 661, 662, 663, 664, 670, 680, 720, 729, 730, 731, 742, 750, 781

▲ Concentration in Public and Nonprofit Finance (PNF)
• Four courses (12 credits) chosen from PUAD 660, 661, 662, 663, 664, 729, 730, 769

▲ Concentration in State and Local Government (SLG)
• Four courses (12 credits) chosen from PUAD 505, 615, 623, 630, 651, 660, 661, 662, 663, 680, 729, 730, 750, 759, 781

▲ Concentration in Third-Party Governance (TPG)
• Four courses (12 credits) chosen from PUAD 613, 622, 623, 635, 636, 659, 750

Certificate Programs

The department offers six graduate certificates. Students must apply for admission to the certificate program and meet the admission standards and application requirements for all graduate students as stated in the Graduate Admissions Policies section.

Students pursuing a certificate must complete five courses (15 credits) distributed as follows:

■ Certificate in Administration of Justice
  - CERG-ADJ
  • Three required courses (9 credits): PUAD 502; ILCP 509, 691
  • Two JLCP elective courses (6 credits)

■ Certificate in Association Management
  - CERG-AM
  • Three required courses (9 credits): PUAD 657, 659, 664
  • Two elective courses (6 credits) in the nonprofit area

■ Certificate in Critical Analysis and Strategic Responses to Terrorism
  - CERG-CASR
  The Certificate in Critical Analysis and Strategic Responses to Terrorism (CASR) in an interdisciplinary introduction to the phenomenon of modern terrorism and its implications for US domestic and foreign policy. It focuses on multidisciplinary analysis and holistic cross-sectoral approaches to long-term prevention of and response to terrorism.
  • Two required courses (6 credits): GOVT 541 and 640
  • Three elective courses (9 credits) related to terrorism analysis and/or response chosen in consultation with an advisor and approved in advance by the program director.

■ Certificate in Emergency Management and Homeland Security
  - CERG-EMHS
  • Three required courses (9 credits): PUAD 502, 630, 632
  • Two elective courses (6 credits) in the emergency management and homeland security area
Certificate in Nonprofit Management

This certificate is offered in class or online.

- Three required courses (9 credits): PUAD 505, 659, 664
- Two elective courses (6 credits) in the nonprofit area

Certificate in Public Management

- Three required courses (9 credits): PUAD 502, 620, 640
- Two elective courses (6 credits) in the public management area

Religious Studies

Phone: 703-993-1290
Web: religious.gmu.edu

Faculty

Associate professors: Bond, Burns, M. Dakake, M. Farina, Nguyen, Rashkover, Ro (chair), Shiner
Adjuncts: Bond, Catlett, D. Dakake, Dreyer, Hebbar, Hostetter, Padgett

Course Work

This department offers all course work designated RELI in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Religious Studies, BA

The major in religious studies is intended to bring the student to an understanding of the major traditions of world religions. Areas of study include Asian religious traditions; Near (Middle) East religious traditions, including Judaism, Islam, and Christianity; and comparative aspects of religion. Students develop skills in reading and interpreting sacred texts. They explore the cultural and social dimensions of religion, along with a consideration of religious values and ethics, from comparative and cross-cultural perspectives with relation to global issues.

The courses are writing intensive. They enable students to study and analyze religious ideas and symbols, and encourage them to present well-argued papers.

In addition to university-wide general education requirements and requirements for a BA in CHSS, religious studies majors must complete at least 33 credits in religious studies, earning a minimum grade of 2.00 in each course. Note that all students must have a minimum cumulative GPA of 2.00 to graduate. No course may be used to fulfill more than one requirement.

Students pursuing this degree must complete the course work distributed as follows:

- Two required courses (6 credits) of introduction to the main world religions: RELI 211 and 212
- One writing-intensive seminar (3 credits) taken during the senior year: RELI 420
- Two courses (6 credits) emphasizing comparative or methodological aspects of the study of religion, chosen from ANTH 313, PHIL 313, RELI 337, RELI 341, RELI 490, SOCI 385.

When the subject matter is appropriate, with the approval of the undergraduate coordinator, RELI 376 may be used to fulfill this requirement.

- A minimum of 12 credits in 300- or 400-level RELI courses other than those not used to fulfill the second and third requirements above
- 6 elective credits in religious studies or related disciplines (including anthropology, art history, and history) to be chosen in consultation with the student’s advisor

Up to 6 credits of a scriptural language (such as Arabic, Biblical Hebrew, Chinese, Classical Greek, Latin, or Sanskrit) may be used to fulfill either of the last two requirements.

Writing-Intensive Requirement

Mason requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Religious studies majors may fulfill this requirement by successfully completing the second requirement above.

Minor in Judaic Studies

The minor in Judaic studies is designed for students interested in the culture, history, and politics of Jewish communities across the world.

Students pursuing this minor must complete 15 credits distributed as follows:

- Three core courses (9 credits): RELI 370, 371; HIST 388/SOC 450 or HIST 461
- Two elective courses (6 credits) chosen from HEBR 150; HIST 465; RELI 211, 352, 372, 373

Special topics courses and independent studies courses, when relevant, may be used to fulfill elective credits for the minor with prior approval of the coordinator.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Minor in Religious Studies

The minor in religious studies introduces students to the world’s religious traditions. Within the minor, students may pursue religious traditions of Asia or the Near (Middle) East or comparative aspects of religion.

Students pursuing this minor must complete 18 credits distributed as follows:

- One course (3 credits) chosen from RELI 100, 211, 212
- Five elective courses (15 credits) with at least three courses (9 credits) in 300- and 400-level RELI courses

Students must earn a minimum grade of 2.00 in each course applied to the minor.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.
**Russian Studies**

Phone: 703-993-1233
Web: russianstudies.gmu.edu

Faculty
Barnes (History and Art History), Bockman (Sociology and Anthropology), Boettke (Economics), Christensen (Modern and Classical Languages), Johnsen-Neshati (Theater), Katz (Public and International Affairs), T. Mills Kelly (History and Art History), Levine (Modern and Classical Languages, director), McGlinchey (Public and International Affairs), Verhoeven (History and Art History)

UNDERGRADUATE PROGRAM

**Russian Studies, BA**  
BA-RUST

Students may pursue one of two directions in this degree program: Russian studies as one element of a double major or Russian studies as a single degree program. In the first option, students must fulfill all requirements of the program as noted below. Students must also fulfill requirements of the second major. Obvious combinations with Russian studies include geography, history, government and international politics, and economics. This program may be accomplished within a four-year period and is recommended for students who intend to seek employment in government, industry, or journalism.

The second option is recommended for students who intend to study Russian language and literature in graduate school, are interested in careers as translators, or are studying for self-enrichment.

Degree Requirements
In addition to satisfying university-wide general education requirements and requirements for a BA degree in CHSS, students majoring in Russian studies must complete the following course work with a minimum GPA of 2.00:

- Russian language through the intermediate level through course work or testing
- Two courses (6 credits) of RUSS 380 and 381
- One course (3 credits) of RUSS 480 or 481 (preferably both)
- Two courses (6 credits) of Russian literature
- Three courses (9 credits) of additional upper-level courses bearing the RUSS course code, two of which must chosen from RUSS 302, 303, 310, 311, 401, 410, and 480 or 481 (whichever is not taken to fulfill the third requirement above)
- One course (3 credits) of RUSS 353 or HIST 328
- One course (3 credits) of RUSS 354 or HIST 329
- One course (3 credits) of GEOG 330 or GOVT 338

Qualified students are strongly encouraged to participate in study abroad programs in Russia. Through a cooperative agreement with the American Council of Teachers of Russian, students may apply to summer or semester Russian language programs at one of several leading universities in Moscow and St. Petersburg. Interested students should consult with their major advisor.

**Writing-Intensive Requirement**
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in Russian studies may fulfill this requirement by successfully completing RUSS 302, 325, or 407.

**Sociology and Anthropology**

Phone: 703-993-1440  
Web: sociology.gmu.edu  
anthropology.gmu.edu

Faculty
Emeritus faculty: Black, Dumont, Golomb (anthropology)  
Professors: Gusterson, Lancaster, Seligmann, Williams (anthropology); Dennis, Scimecca, Vallas (chair) (sociology)  
Associate professors: Haines, Palkovich, Snead, Trencher (anthropology); Best, Guagnano, Hanrahan, Jacobs, Rader, Rosenblum (sociology)  
Assistant professors: Bentiez (anthropology); Bickford, Bryant (anthropology); Bockman, Dale, Davis, Samara (sociology)  
Term associate professor: Masters (sociology)  
Term assistant professors and instructors: Arabandi, Zimmerman (sociology)  
Affiliate professors: Avruch (anthropology); Bainbridge, Dopkins, Goldstone, Johnson, Levine (sociology)  
Adjuncts: Mashayekhi, Minnich, Nambiar, Pearlman, Sandole-Staroste

Course Work
This department offers all course work designated ANTH, SOAN, and SOCI in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

**Anthropology, BA**  
BA-ANTH

Anthropology is the study of human beings and their cultures. It draws broadly from the social sciences, humanities, and natural sciences. Anthropology is thus an ideal undergraduate major, providing sound interdisciplinary preparation for a variety of careers.

Degree Requirements
In addition to satisfying university-wide general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete 36 credits with a minimum GPA of 2.00 distributed as follows:

- Three core courses (9 credits) anthropology: ANTH 114, 390, 490  
- One course from each of the three fields listed below (9 credits): Anthropology: ANTH 120 or 420  
  Biological anthropology: ANTH 135 or 365  
  Linguistic anthropology: ANTH 380 or LING 326  
- Six courses (18 credits) of 300- and 400-level electives: SOCI 311 and 313 may be applied toward the 18-credit elective requirement. SOCI 311 may substitute for ANTH 390.
See an advisor to learn how anthropology majors may fulfill university-wide requirements in global understanding, information technology, and synthesis, as well as the CHSS requirement in non-Western culture.

Students wishing to pursue careers in anthropology should consider including ANTH 492 (or subfield specialty equivalents, such as ANTH 420, 450, 495, or 496) as an elective in their program of study.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in anthropology may fulfill this requirement by successfully completing ANTH 490.

Honors Program in Anthropology
Anthropology majors who wish to pursue the honors program in anthropology must meet the following criteria: a minimum GPA of 3.50, 60 credits, completion of ENGL 302 for the social sciences, 3.75 GPA in anthropology courses, and 15 credits of anthropology (ANTH 114, 120, and 135, and two additional courses).

Candidates for honors in anthropology are expected to earn 6 credits in one of two possible sequences of special honors sections: ANTH 492 (for those focusing on sociocultural anthropology) or ANTH 420 (for those interested in archaeological or biological anthropology). All honors candidates will undertake additional research leading to the completion of an honors thesis in ANTH 499. For more information, contact the anthropology coordinator at 703-993-1334.

Minor in Anthropology
Students pursuing this minor must complete 21 credits in anthropology with a minimum GPA of 2.00 distributed as follows:

- Four required courses (12 credits): ANTH 114, 120 or 135, 332, 430 or 450
- One regional ethnography course (3 credits) chosen from ANTH 301, 302, 303, 304, 306, 307, 308, 309, 311
- One topical course (3 credits) chosen from ANTH 300, 305, 310, 312, 313, 315, 320, 322, 325, 360, 365, 370, 371, 375, 380, 381, 399
- One additional 300- or 400-level anthropology course (3 credits)

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see Minors under the Undergraduate Academic Program section in the Academic Policies chapter of this catalog.

Sociology, BA

Sociology involves the systematic study of social structures, cultural patterns, and human relationships. The sociological imagination combines rigorous methods with theory and observation, yielding insights that challenge commonly held assumptions about the social world. Sociology also informs the practice of social and public service, aiding efforts to address important social problems. Majoring in sociology positions students so they can pursue a varied set of career paths, ranging from teaching, human service, and human resource occupations to positions in the criminal justice system, marketing, and social research. The sociology major is excellent preparation for students considering law school or graduate training in the social and behavioral sciences.

Degree Requirements
In addition to satisfying university-wide general education requirements and requirements for the BA degree in CHSS, students pursuing this degree must complete 35 credits of sociology courses with a minimum GPA of 2.00 distributed as follows:

- Five core courses (17 credits): SOCI 101 or 102, 303, 311, 313, and 412, each of which must be completed with a minimum grade of 2.00
- Six elective courses (18 credits) in sociology at the 300 or 400 level

Of the required 35 credits in sociology, no more than 6 credits of courses with unsatisfactory grades (C- or D) may be applied toward the degree, none of which can be core courses.

Concentrations
In completing the 18 credits of study beyond the core sociology courses, students are strongly encouraged to select a concentration to suit their interests and career objectives. Students who are invited to participate in the sociology honors program may apply 3 credits of honors course work (480, 481, or 482) to their selected concentration.

Concentration in Childhood and Youth (CYC)
This concentration focuses on the changing social realities, experiences, and identities of children and youth as they are formed in different social and historical contexts. It emphasizes children in peer groups, youth subcultural activities, youth and children and the media, schools, families, social movements, social policy, and the welfare state. This concentration is appropriate for students interested in working directly with children and youth or in organizations serving them in a broad range of fields, such as educational counseling, teaching, policy, advocacy or clinical work, family and community services, social work, early childhood development, and juvenile justice.

Students pursuing this concentration must complete 12 credits distributed as follows:

- One required course (3 credits): SOCI 360
- Three courses (9 credits) chosen from SOCI 302, 307, 309, 315, 382, 395 (depending on topic), 483; ANTH 315

Concentration in Culture (CLTR)
This concentration focuses on the social and institutional forces that shape religion, the arts, language, gender, and cultural norms and tastes. It is appropriate for students interested in the media, the arts and popular culture, identity, multiculturalism, and the problems of cultural difference, religion, education, and the construction of knowledge in contemporary societies. Cross-cultural work in this field is encouraged.

Students pursuing this concentration must complete 12 credits distributed as follows:

- One required course (3 credits): SOCI 314
- Three courses (9 credits) chosen from SOCI 309, 315, 332, 355, 377, 382, 385, 395 (depending on topic), 414, 505; ANTH 332, 488
■ Concentration in Deviance, Crime, and Social Control (DSCS)
This concentration focuses on the social, legal, and political systems that underpin social control in Western societies and beyond. The emphasis is on how norms, values, and common sense regulate human action and the social forces that produce deviant behavior and societal responses to it. This concentration is appropriate for students interested in the criminal justice system and the law.

Students pursuing this concentration must complete 12 credits distributed as follows:
• One required course (3 credits): SOCI 300
• Three courses (9 credits) chosen from SOCI 301, 302, 307, 308, 310, 332, 340, 352, 355, 395 (depending on topic), 402, 502

■ Concentration in Global Sociology (GSOC)
This concentration focuses on global interconnectedness and its effect on the nature of societies around the world. It emphasizes new technologies and social processes, migration, transnational communities, global cities, and social movements working across state borders. This concentration is appropriate for students interested in pursuing internationally oriented careers in social change, political reform, and international development.

Students pursuing this concentration must complete 12 credits distributed as follows:
• One required course (3 credits): SOCI 320
• Three courses (9 credits) chosen from SOCI 307, 308, 326, 332, 340, 413 (depending on topic), 523; ANTH 332

■ Concentration in Inequality and Social Change (INSC)
The focus is on inequalities, such as those of race, class, and sex, and on the manner in which such inequalities become structurally rooted in a society. The emphasis is on understanding the rise of the struggle for human rights, democracy, and various social movements that have sought to reverse these inequalities through protests, demonstrations, counterorganizations, and the ballot. This concentration is appropriate for students who seek careers in social justice organizations, social services, or teaching, and those who wish to participate in social and political movements.

Students pursuing this concentration must complete 12 credits distributed as follows:
• One required course (3 credits): SOCI 355
• Three courses (9 credits) chosen from SOCI 300, 308, 310, 315, 332, 340, 360, 390, 395 (depending on topic), 450, 523

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in sociology may fulfill this requirement by successfully completing SOCI 412.

Honors Program in Sociology
Sociology majors who have completed 75 credits (with a minimum of 15 credits in sociology, 6 of which must have been taken at Mason) and have a 3.50 GPA overall and a 3.50 GPA in sociology may apply for admission to the honors program in sociology. To graduate with honors in sociology, students must complete SOCI 480 and 481 with a minimum GPA of 3.50 overall and in sociology courses presented for graduation. The 6 credits of honors courses may be counted toward the major requirement in sociology. For more information or application procedures, contact the department.

Minor in Sociology
Students pursuing this minor must complete 21 credits in sociology with a minimum GPA of 2.00 distributed as follows:
• Two required courses (6 credits): SOCI 101 and 311
• Five elective courses (15 credits)

Students may select a focus to their minor from one of the five concentrations offered by the department.

Academically strong undergraduate majors are encouraged to apply to the accelerated master’s program after they complete 90 credits. Applicants should have a 3.25 GPA, with a 3.50 in sociology courses. If not, they may submit two letters of reference from faculty in the department. For more information, see the sociology graduate coordinator.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Interdisciplinary Minors
The department coordinates the interdisciplinary minor in immigration studies. See the Interdisciplinary Minors section of this chapter for more information.

Teacher Licensure
Students who plan to seek teacher licensure and become K–12 teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail geoadmit@mcm.edu, or go to gse.gmu.edu.

Bachelor’s/Accelerated Master’s Program in Sociology
Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain both a BA and an MA in sociology following satisfactory completion of 144 credits. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Accepted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferral of the undergraduate degree with satisfactory grade-level performance (3.00 in each course, grade of B or better) in graduate courses, students are given advanced standing in the master’s program. All other master’s degree requirements must be met.

Applicants must have a cumulative GPA of 3.25 or higher, with a 3.50 in sociology courses, or submit two letters of reference from faculty in the department. Interested students should contact the department for details about the application process.
GRADUATE PROGRAMS

Assistantships
The Department of Sociology and Anthropology offers a limited number of merit-based graduate assistantships.

Financial Aid
The Department of Sociology and Anthropology offers a limited number of graduate assistantships. For more information, call 703-993-1440.

Anthropology, MA  MA-ANTH
The master’s degree program in anthropology prepares students for advanced work in anthropology through courses focusing on the study of culture. Students learn how to use participant-observation field work methods, as well as comparative and holistic knowledge and research methods. Areas of emphasis are advanced training in sociocultural anthropology; culture, health and bioethics; and transnational and global issues. Regional area coverage includes Central and South America, Europe, Africa, the Middle East, Asia, and the United States. Course work progresses from core courses to more advanced courses and culminates in a thesis.

Nondegree Status
Students with a 3.00 or above who do not wish to pursue a degree may enroll as nondegree students. Nondegree students may later apply for admission to the degree program, and up to 9 credits earned in non degree status may be applied to the master’s degree, subject to the approval of the program director and dean.

Application Requirements
In addition to fulfilling the admission requirements for graduate study at Mason, applicants for this degree must submit:

• Three letters of recommendation from faculty members or others who can evaluate the applicant’s academic potential (If possible, at least one letter should be from an academic setting.)
• 1,000-word writing sample, such as an essay or full-length research paper
• A current résumé

Degree Requirements
Students must successfully complete 36 credits distributed as follows:

• Six required core courses (16 credits): ANTH 535, 536, 635, 650, 750, 797 (1 credit)
• 14 credits of elective courses chosen from advanced courses in anthropology. Up to 6 credits may be from other programs, subject to the approval of the director.
• 6 credits of proposal (ANTH 798) and thesis (ANTH 799)

Students have the option of completing an internship (ANTH 690). An internship can serve as a primary field research site for the thesis, if appropriate. Courses in archaeology and biological anthropology may not be used to meet any requirements for the MA in anthropology.

Sociology, MA MA-SOCI
Students pursuing a master’s degree in sociology may choose an emphasis in general sociology; sex and gender; crime, delinquency, and corrections; race and ethnicity; cultural studies; or conflict analysis and management. The general sociology emphasis allows maximum flexibility in the application of sociological knowledge to the analysis of social processes and systems. All emphases are appropriate for those anticipating further graduate study leading to the PhD in sociology.

The department provides opportunities for students to develop expertise in a variety of areas, including applied methods, community, conflict analysis and management, development and social change, deviance, environmental sociology, gerontology, medical sociology, occupations and professions, policy analysis, race and ethnicity, sociology of science and technology, cultural studies, and survey research.

Admission Requirements
In addition to meeting general admissions requirements for graduate study, applicants must present the following:

• Minimum of 3 credits each in undergraduate sociological theory, statistics, and research methods. Equivalent courses in other disciplines may be substituted for some of these requirements, with permission.
• Three letters of recommendation from people who have supervised the student’s work. Two should be from an academic setting.
• A written statement (approximately 600 words) explaining the student’s interest in sociology
• Writing sample, such as an essay or full-length research paper
• A current résumé

Nondegree Status
Students with a 3.00 or above who do not wish to pursue a degree may enroll as nondegree students. Nondegree students may later apply for admission to the degree program, and up to 12 credits earned in non degree status may be applied to the master’s degree, subject to the approval of the program director or dean.

Degree Requirements
Students are required to complete 33 credits distributed as follows:

• Two courses (6 credits) of social theory: SOCI 611 and 612
• Three courses (9 credits) of research methods, including SOCI 530
• 3 to 6 credits of master’s thesis (SOCI 799)
• 14 to 17 credits of elective courses
• 1 credit of SOCI 797

Emphasis in General Sociology
Additional sociology electives

Emphasis in Sex and Gender
9 credits in sex and gender (SOCI 505, 525, and 696)

Emphasis in Conflict Analysis and Management
9 credits in the sociology of conflict and conflict management
Emphasis in Race and Ethnicity
9 credits in race and ethnicity

Emphasis in Crime, Delinquency, and Corrections
9 credits in crime, delinquency, and corrections (SOCI 607, 608, and 609)

Emphasis in Sociology of Culture
A degree with this emphasis prepares students for the doctoral program in cultural studies. It requires SOCI 614; a 3-credit master’s-level course that also serves as an introduction to a cultural studies feeder program in a department other than Sociology and Anthropology; and CULT 802.

Master’s Thesis
A master’s thesis is required to demonstrate capacity to carry out independent research. The thesis consists of a substantial sociological research or theoretical project that will contribute to sociological knowledge.

Sociology, PhD
PHD-SOCI
The PhD in sociology provides rigorous training in public and applied social research, including skills in research design, data analysis, and substantive areas that are pertinent to various sectors in the Washington, D.C., area. Successful students have the theoretical, analytical, and professional skills that allow them to transition into academic positions in teaching or research. They are also well-qualified for nonacademic positions in the many settings that look to sociologists, such as human service agencies, marketing research firms, educational systems, nonprofit foundations, and law enforcement agencies.

Application Requirements
See the Application for Graduate Study for admission deadlines. In addition to materials required of all applicants for graduate study at Mason, applicants to the PhD in sociology should submit the following:
- A statement of purpose of academic study
- A writing sample such as a full-length research paper
- Three letters of recommendation from faculty members or those who can evaluate the applicant’s academic potential
- GRE scores (the general test is required; subject tests are optional)

Degree Requirements
To receive the PhD, students must complete a minimum 72 credits including foundation courses in theory and methods, course work in a specialization, and electives. Following completion of all required course work and passing a candidacy exam, students are advanced to candidacy by the dean and complete a dissertation, an original and independent research project. Students with a master’s degree may be allowed a reduction of credit up to a maximum of 30 credits, subject to the approval of the program director and the dean.
- Nine foundation courses (27 credits)
  6 credits of SOCI 801, 802
  6 credits of theory: SOCI 711, 712
  9 credits of methodology and analysis: SOCI 620, 636, then 730 or 634
  6 credits of statistics/methods courses chosen from SOCI 631, 632, 634; PUBD 704, 705; ANTH 613, 650; WMST 610; COMM 644
- Two courses (6 credits) of proseminars: SOCI 803, 804
- Three courses (9 credits) in one of two specializations, up to 6 credits of which may be from courses that are not in sociology
  Specialization in institutions and inequalities
  SOCI 605 840, 844, 845; PUAD 620, 640, 651, 750;
  GOVT 852; ILCP 749, WMST 610, 611
  Specialization in sociology of globalization
  SOCI 523, 850, 851, 853, 857; ANTH 630, 631, 632, 655;
  CONF 736; PUBP 602, 758
- Five courses (15 credits) of electives, up to 6 credits may be from courses that are not in sociology, with the guidance of the student’s advisor or the graduate director
- 15 credits of dissertation proposal and research
  3 credits of SOCI 998
  12 credits of SOCI 999

Once enrolled in SOCI 998, students must maintain continuous registration for at least 1 credit; once enrolled in 999 students must follow the university continuous registration policy.

Research Proficiency
Students must demonstrate proficiency in a range of quantitative and qualitative research methods prior to taking the qualifying exams for candidacy. Proficiency is determined by satisfactory course work or an exam. Students in the specialization in sociology of globalization must also demonstrate proficiency in one foreign language at an advanced level of reading and comprehension.

Advancement to Candidacy
To advance to candidacy, doctoral students must complete all course work required on their approved program of study. Students must also successfully pass two written qualifying examinations. One examination is in the foundations of sociological inquiry, linking research methods and sociological theory to public concerns. The second examination is in the student’s area of specialization, administered by a faculty committee appointed by the graduate program director. In addition, students must have a dissertation committee appointed by the Dean’s Office as well as have an approved dissertation proposal. Evidence of the approved proposal must be on file in the Dean’s Office before a student can be advanced to candidacy.

Women and Gender Studies

Phone: 703-993-2896
Web: wmst.gmu.edu

Faculty
Amireh, Baker, Beach, Bergoffen, Bernard, Best, Bullard, Burr, Carbonneau, Cattaneo, Censer, Cheldelin, Cherubin, Christensen, Cohen, Constantine, Copelman, Davidson, Davis, Deshmukh, Dunne, Eby, Ffolliott, Fischer, Friedley, Fuchs, Frye, Gilbert, Gring-Pemble, Hamdani, Hanrahan (director), Harvey, Hodges, Hodzie, Jadallah, Johnsen-Ne-shati, Jordan, Kaplan, Karametou, King, Kirkland, Kirsch, Koch, Lont, Mann, Masters, Michals, Misencik, Muir, Palkovich, Pascarell, Pavloski, Rabin, Regan, Ricouart, Rosenblum, Samuelian, Sandole-Staroste, Scott, Seligmann, Snyder, Stearns, Tichy, Todd, Tolchin, Travis, Vivancos Perez, Weitzman, Yocom, Zawacki
Course Work
The Women and Gender Studies Department offers all course work designated WMST in the Course Descriptions chapter of this catalog.

By choosing to pursue work in women and gender studies, students at all levels engage in an interdisciplinary exploration of gender roles in social, political, cultural, and economic life; gender roles in history; women and the media; feminist theory; the relationship between sex and gender; the impact of sex, race, class, disability, and sexual orientation on people’s lives; and the ways in which gender stereotypes influence the self in relationship to others. Students in many courses have the opportunity to investigate these issues in a cross-cultural and global perspective.

UNDERGRADUATE PROGRAM

Minor in Women and Gender Studies
This is an interdisciplinary minor open to the entire undergraduate student body. Students in this minor complete 18 credits with a minimum GPA of 2.00, distributed as follows:

- Two required courses (6 credits): WMST 200, 330
- Four courses (12 credits) selected from courses in women and gender studies, courses cross-listed with women and gender studies, or course offerings in other departments approved by the director. No more than 6 credits may be taken in any one department.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

GRADUATE PROGRAM

Certificate in Women and Gender Studies
The certificate may be taken alone or in conjunction with another graduate program. Courses taken toward the certificate may also be used in a degree program, subject to approval of the graduate coordinator in the respective program.

Admission
The certificate is open to all students who meet university criteria for admission to graduate study. Students must submit an application for graduate study.

Transfer Credit
Students may transfer up to 3 graduate credits earned at another accredited institution, and 9 graduate credits earned at Mason in nondegree status toward the certificate, subject to approval of the director and the dean and in accordance with university policy.

Certificate Requirements
Students must complete 15 graduate credits and a capstone portfolio. The credits are distributed as follows:

- Two required courses (6 credits): WMST 630, 640
- Three electives (9 credits) chosen from relevant courses with approval of the director

These credits may be in departments across the university that address the study of women and gender, courses in the Women and Gender Studies Program, and appropriate directed readings or independent study courses.

- Capstone portfolio

Students synthesize their work in the certificate program by reflecting on how issues, ideas, and theories raised in the core courses inform their understanding of gender issues within their area of interest. The portfolio includes three to five items produced in previous course work and a 7- to 10-page essay discussing them. Items selected may include course papers, performance videos, photos of exhibits, tapes of music, or other items as agreed on by the student and advisor. The portfolio must be approved by the advisor and submitted to the Women and Gender Studies where it will be presented, displayed, and archived.

See MAIS section of this chapter for MAIS concentration in Women and Gender Studies.

New Century College

Phone: 703-993-1436
Web: ncc.gmu.edu

An integral part of CHSS, New Century College (NCC) offers students a small college interdisciplinary education within the context of a large public university. Using a cohesive interdisciplinary faculty and borrowing faculty members from other disciplines, NCC provides a learning environment that integrates interdisciplinary knowledge with workplace and lifelong learning skills. NCC has a strong commitment to enhancing technology skills, improving student writing, and providing challenging opportunities.

NCC meets this challenge by having students interact closely with faculty; engage in critical thinking, problem solving, creative activity, and leadership development; and participate in experiential education in the form of internships, field studies, service learning, or study abroad. NCC teaches students to develop original ideas, engage in active and reflective learning, master competency areas, and conduct independent inquiry with high ethical standards. Both NCC’s structure and curriculum respond to the needs of civic and corporate communities and provide instruction for a rapidly changing society.

Administration
Nance Lucas, associate dean
Kelly Dunne, director of academic affairs
Karen Misencik, director of experiential learning
Sarah Sweetman, director of student services

Faculty
Professor: O’Connor
Associate professors: Gabel, Garner, Gring-Pemble, Lucas, Muir, Smith, Wood
Assistant professors: Cambridge, Wingfield
Term assistant professors: Scott, Szuclczewski
Adjunct faculty: Bernard, Bruno, Fuertes, Grymes, Holder, Johnson, Raffel, Ryan, Underwood, Uy-Tioco, West

Centers
Center for Field Studies
Greg Justice, program manager
Center for Leadership and Community Engagement
Heather Hare, associate director
Misty Hensley-McGaffey, program coordinator

Course Work
NCC offers all course work designated NCLC in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Integrative Studies, BA-INTS, BS-INTS
The curriculum is based on intensive, interdisciplinary learning communities, coordinated with traditional academic programs. The result is an integrated program of study that emphasizes collaboration, experiential learning, and self-reflection. The program provides interdisciplinary, integrated concentrations.

Students who enroll in this degree program their first year of college take four highly focused, interdisciplinary courses (8 credits each), one course at a time. They learn how to make distinctions, appreciate different perspectives, and find connections in what they learn. After the first year, the curriculum offers various learning communities that feature experiential learning and faculty-student research that addresses fundamental questions. Students complete their degree programs with an interdisciplinary concentration. The program requires mastery of essential competencies (communication, valuing, global understanding, problem solving, group interaction, effective citizenship, aesthetic awareness, critical thinking, and information technology) assessed through freshman and graduation portfolios.

Admission Requirements
Students who meet Mason’s general admission requirements may enroll in the integrative studies program. Each student works with an advisor from the college’s advising staff to identify the student’s academic and professional objectives.

Degree Requirements
Students must complete an equivalent of 120 credits of course work with at least 24 credits in learning communities, 12 credits of experiential learning (see Curriculum Requirements below), and 35 credits in general education. A student’s concentration consists of at least 30 credits with a minimum GPA of 2.00, which may draw from learning communities, experiential learning, independent study, and traditional university courses. Students must present a final cumulative portfolio and a college senior exposition.

Curriculum Components
The curriculum has four major components. Division I is general education, which can be completed through the first year of common courses, experiences, and integrated learning (also known as the “First-Year Experience”) or through traditional university course work. Thereafter, students pursue their academic and career goals through learning communities (Division II) and courses for their concentration (Division III), and experiential learning (Division IV).

General education requirements are met in Division I and II. Division I fulfills most general education requirements. Students may also test out of some requirements. The university’s 6-credit written communication general education requirement is met through completion of Division I and Division II with an overall 2.00 GPA. All 300-level and above learning communities include at least one writing assignment that requires revision.

Division I, or first-year, experience/general education: The first-year experience is a sequence of four courses following a common curriculum. Each learning community (NCLC 110, 120, 130, 140) is six or seven weeks long and separated by two-week intersession or a winter intersession. Each meets Monday through Thursday and may include lectures and exams but emphasizes seminar discussions, collaborative assignments, and problem-centered projects.

NCLC 110 emphasizes composition and communication, computer applications, and analytical reasoning; NCLC 120 studies the natural world and develops computational skills; NCLC 130 studies the socially constructed world through the interdisciplinary study of global civilization; and NCLC 140 studies the relationship between the individual and society. The intersessions are built into the curriculum to allow co-curricular activities, such as community service learning, leadership training, or specialized workshop courses. The winter intersession also allows for intensive short courses, study abroad, individualized projects, research, or experiential learning outside the college.

Division II, learning communities: combines subjects usually taught in separate courses into a single course of study. Learning communities offer the equivalent of between 3 and 9 credits of undergraduate work and replace the often fragmented classroom experience many students encounter in a series of unconnected course offerings. In interdisciplinary learning communities, faculty and students explore various ways to understand a topic. Learning communities also offer a greater sense of identity with an academic community, especially in the college environment typical of a regional state university. Several learning communities are scheduled to make attendance easier for part-time students. Team teaching: collaborative projects; emphasis on writing and critical thinking; opportunity for independent study; and integrative experiential learning are all important components of learning communities. Many learning communities have experiential learning attached, either as a part of the class or an option for students to take. A minimum of 24 credits in learning communities is required for graduation.

Division III, a concentration: the equivalent of a major in a traditional degree program. Students complete an interdisciplinary concentration already established in the integrative studies curriculum or, in some cases, create with faculty a unique program of study to fit their particular interests and needs. The concentration comprises traditional courses, learning communities, independent study, and experiential learning. Students must create a portfolio of their work that is reviewed by NCC faculty, as well as a culminating college senior exposition, which is done through NCLC 491 Senior Capstone. Students are required to take NCLC 491 the semester prior to graduation.

Division IV, experiential learning requirement: A minimum of 12 credits of experiential learning are required to fulfill graduation requirements. Experiential learning sites may change each semester to include study abroad programs, internships, community service learning, and field study opportunities. In many cases, students should complete learning contracts for experiential learning activity undertaken. This
Humanities &
Social Sciences

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College of Humanities and Social Sciences

requirement reflects the college’s commitment to provide
educational experiences that prepare graduates for the workplace and the demands of active and responsible citizenship.
The faculty’s goal is twofold: to engage the workplace as a
site of instruction and expose students to the variety of skills
needed to succeed, and to combine work experience with
academic study so that each will enrich the other. Experiential learning may include course field trips and off-campus
learning experiences. Students may be responsible for their
own transportation, including bus, subway, and carpooling.
Student liability insurance for the experiential learning internship is provided by Mason. Students are responsible for their
own health care, including emergency care. New Century
College assumes no financial responsibility for the health
care of students. An accident and health insurance plan is
available through the university. No more than 24 credits of
experiential learning can count toward a student’s total credits for graduation.

• Six courses chosen from ANTH 114, 300, 305, 312, 370;
ECON 100, 103, 104, 335, 350, 360; EVPP 336, 350;
GEOG 102, 301, 303, 304, 305, 306, 309; GEOL 101,
102, 305, 309; GOVT 103, 132, 133, 318, 351, 357, 364;
PHIL 155; PRLS 300, 302, 316, 402
• One course chosen from NCLC 220, 305, 307, 308, 331

Concentrations for Bachelor of Arts
Specific sections of NCLC 275, 375, and 475 Special Topics
and other relevant course work may be applied toward a
concentration with prior written approval of the undergraduate director.

▲▲ Information and Society (INSO)
• NCLC 245 or 249; COMM 202 or AVT 180 or IT 108;
IT 204 or IT 205; IT 304 or MSOM 302; NCLC 345 or
NCLC 349; NCLC 348 or NCLC 350
• One course chosen from NCLC 343, 435, 445, 449
• Three courses chosen from ANTH 380, 395; AVT 280,
382, 383, 390; COMM 303, 351, 353, 380, 435, 454, 455;
CS 105, 112; ENGL 309, 311, 399, 410, 489; IT 207, 208,
212, 214, 221, 222, 314, 350, 353; PHIL 112, 312, 373;
PSYC 231, 317; SOCI 304, 414; STAT 250

▲▲ Advertising (ADV)
• ACCT 201 or 203; COMM 230; ECON 103; MKTG
301, 312, 313; MSOM 301 or MGMT 301; MSOM 302;
NCLC 202, 249, 345
• One course chosen from NCLC 331, 350, 420, 423, 431,
445, 449
• Two courses chosen from ACCT 301; AVT 104, 180, 280,
381; BULE 302; COMM 157, 375, 430; DESC 210; FNAN
301; GOVT 358; MIS 301; MSOM 304, 305; NCLC 195
Network Graphics or Video Workshop; WMST 100, 304;
SPMT 412
▲▲ Arts and Culture (ACLT)
• NCLC 200 or AVT 371; NCLC 245; AVT 307 or DANC
307 or NCLC 446 or THR 307; NCLC 346 or NCLC
347
• Five courses chosen from AVT 104, 105, 180, 222, 232,
262, 280, 305, 323, 333, 363, 381, 392; COMM 157,
302, 350, 355, 358, 360, 365, 380, 452, 456; ENGL 327,
332, 334, 343, 344, 421, 422, 490, 493; MSOM 300,
301, 302, 303, 304, 305; NCLC 202, 249, 330, 331, 345,
420, 445; MUSI 301; PSYC 100, 211, 313, 314, 324,
325; RUSI 470
• One course chosen from NCLC 244, 270, 304, 305, 310,
312, 315, 320, 330, 331, 337, 343, 345, 349, 350, 361, 381,
445, 449
▲▲ Child and Family Studies (CFS)
• Eight courses: NCLC 312, 317; PSYC 100, 211, 313;
STAT 250 or SOCI 313; EDUT 411 or SOCI 310 or
SOCI 315; PSYC 415 or SOCW 435 or SOCI 441
• Two courses chosen from ADJ 302; ANTH 301, 302, 303,
304, 306, 311, 330; CONF 101; HEAL 325, 327, 330, 350;
HSCI 150, 250, 295, 307, 332, 422; NCLC 231, 305, 310,
312, 320, 331, 379, 410, 440, 441; PSYC 314, 324, 325,
330, 362, 414, 418, 466; SOCW 415, 423; SOCI 302, 315,
383; WMST
▲▲ Conservation Studies (CNST)
• NCLC 211, 311, 401; EVPP 110, 111

▲▲ Elementary Education (ELED)
• 9 credits of ENGL or COMM course work
• 12 credits of MATH course work, STAT 250 or PHIL
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• 12 credits of natural science
• 3 credits of humanities course work
• 3 credits of U.S. history
• 3 credits of ECON course work
• 3 credits of GEOG course work
• 3 credits of GOVT course work
• 3 credits of HIST course work

▲▲ International Studies (INST)
• GOVT 132, 133 or 149; ANTH 114 or CULT 320;
GOVT 322; NCLC 305 or CONF 101; NCLC 422 or
GOVT 344 or HIST 345
• Five courses chosen from ADJ 475; ANTH 135, 302,
306, 312, 330, 331, 333, 365, 385; ARTH 200, 201, 203,
204, 319, 320, 321, 322, 324, 333, 334, 340, 341, 342,
344, 345, 360, 362, 376, 380, 383, 384, 385, 440, 482;
CHIN 310, 311, 320, 325, 328; CLAS 260; COMM 320,
330, 335; CONF 101, 300, 330, 340, 399; HEAL 150;
DANC 119; ENGL 203, 204, 335, 336, 400, 401, 402,
404–408, 436, 437, 440, 443, 445, 450, 453, 456, 462,
471–474, 477; FREN 325, 329, 451, 453; GEOG 316,
320, 325; GERM 301, 325; GOVT 323, 324, 327, 328,
331, 332, 333, 334, 337, 338, 339, 345, 432, 433; HIST
251, 252, 262, 263, 271, 272, 281, 282, 301, 302, 304,
305, 306, 308, 309, 312, 314, 321, 322, 328, 329, 335,
353, 354, 355, 356, 357, 364, 365, 388, 426, 431, 435,
436, 460, 462, 465, 466; JAPA 320; LAS 100; MSOM
302, 303, 304, 305; NCLC 315, 330, 331, 423, 431;
PHIL 301, 302, 303, 323, 324, 327; RUSS 325, 326, 327,
353, 354, 407, 410; RELI 212, 272, 314, 315, 317, 337,
351, 352, 370, 374, 375, 402, 405; SOCI 120, 308, 320,
326, 340, 450; SPAN 321, 322, 323, 325, 329
• Language competency at the intermediate level required
(by course work or examination)
▲▲ Language Arts for Education (LAED)
• NCLC 202; LING 326, 522; ENGL 330 or 494 or 495;
ENGL 349 or 350 or 439; ENGL 309 or 396 or 410 or
489
• One course chosen from ENGL 335, 336, 400, 401, 402,
404, 405, 406, 407, 408, 431, 440, 443, 445, 450, 453,
456
• One course chosen from ENGL 333, 368, 371, 372, 380,
423, 425, 429, 447, 452, 454


Concentrations for Bachelor of Science

**Concentration in Civil Engineering (CENG)**
- BIOL 103, 104, 213, 214, 300, 301, 303, 304, 312, 364; ECON 100, 103, 300, 301, 303, 304, 305, 306, 309; ENGL 100, 102, 103, 309; GOVT 103, 132, 133, 318, 351, 357, 364; HIST 110, PRLS 100, 300, 302, 316, 402
- One course chosen from NCLC 220, 305, 307, 308, 331

**Concentration in Environmental Engineering (EEENG)**
- BIOL 103, 104, 213, 214, 300, 301, 303, 304, 312, 364; ECON 100, 103, 300, 301, 303, 304, 305, 306, 309; ENGL 100, 102, 103, 309; GOVT 103, 132, 133, 318, 351, 357, 364; HIST 110, PRLS 100, 300, 302, 316, 402
- One course chosen from NCLC 220, 305, 307, 308, 331

**Individualized Concentration (IND)**
With approval of the undergraduate director, students may construct an individualized concentration.

**Concentration in Biology and Biotechnology (BBTB)**
- BIOL 103, 213, 303, 304, 307; ECON 103 or 307; GOVT 311, 314, 401; HIST 110, 111, 112, 113, 114; PHIL 105 or 309; STAT 250

**Concentration in Chemistry (CCHEM)**
- BIOL 103, 213, 300, 303, 304, 307; CHEM 110, 111, 112, 113, 114; HIST 110, 111, 112, 113, 114; PHIL 105 or 309; STAT 250

**Concentration in Computer Science (CSC)**
- BIOL 103, 213, 300, 303, 304, 307; CHEM 110, 111, 112, 113, 114; HIST 110, 111, 112, 113, 114; PHIL 105 or 309; STAT 250

**Concentration in Economics (CECON)**
- BIOL 103, 213, 300, 303, 304, 307; ECON 103, 104, 303, 304, 305, 306, 309; GOVT 103, 132, 133, 318, 351, 357, 364; HIST 110, PRLS 100, 300, 302, 316, 402
- One course chosen from NCLC 220, 305, 307, 308, 331

**Transfer Students**
NCC accepts students from other four-year institutions or community colleges, as well as from other academic units within Mason, into the integrative studies program after admission to the university. NCC’s academic advisors work with students to best use transfer credits and provide a plan for timely completion of the bachelor’s degree. All transfer students are required to take NCLC 391 within their first two semesters in NCC and meet with an academic advisor as soon as possible. For more information, call 703-993-1436.

**Minor in Leadership**
The minor in leadership helps prepare students to lead effectively in the 21st century. It provides a broad understanding of leadership in contemporary society and emphasizes civic engagement. Through the required course work, students
examine theories of leadership, analyze methods and styles of leadership, and participate in experiences to develop their own leadership skills. Students demonstrate what they have learned through community service-learning to Mason and the greater Washington, D.C., metropolitan area.

The minor in leadership may be pursued concurrently with any undergraduate major.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements

Students in the minor complete 15 credits of course work distributed as follows:

• Three required core courses (11 credits): NCLC 204 (4 credits), NCLC 375 (3 credits), NCLC 435 (4 credits)
• One course (1 to 3 credits) of experiential learning, which may be fulfilled through an approved internship, community service course, or other course work that includes experiential learning. The following courses fill this requirement as do some offerings under the courses NCLC 195, 395, and UNIV 300. Students should seek prior approval of the director for courses to apply to this requirement.
  COMM 349 (1 credit)
  NCLC 195 (1 credit)
• One elective course (3 to 4 credits), which may be fulfilled through AVT 309/NCLC 346 (4 credits), AVT 370 (4 credits); CONF 300; CVPA 305; DESC 456; EDUC 303; EVPP 361; FNAN 401; GOVT 430; HEAL 323; HSCI/ NURS 436; IT 304; MGMT 413; MIS 435; MKTG 471; MLSC 300 (1 credit), 400, 401; MSOM 301, 302, 305, 306; PRLS 316; PSYC 231, 333; SOCI 307; TOUR 330

Other electives may be applied to the minor with prior approval of the director.

Interdisciplinary Minor in Multimedia

NCC and the College of Visual and Performing Arts coordinate the interdisciplinary minor in multimedia. See the Interdisciplinary Minors section of this chapter for a description.

Minor in Nonprofit Studies

Faculty

Benjamin, Sacco, Smith (coordinator), Toepler

The nonprofit minor introduces students to the theories and practical realities of working in the American nonprofit or charitable sector. The required course work highlights the historical, legal, and social foundations of nonprofit organizations and their operating characteristics, focusing on such distinctive issues as mission-drive management, earned and unearned revenue, and volunteerism. Elective courses and experiential learning encourage students to explore their professional and/or personal interests.

Students pursuing this minor must complete 16 credits distributed as follows:

• Three required courses (11 to 12 credits): NCLC 331* (4 credits), NCLC 431* (4 credits), one course chosen from GOVT 358 (4 credits), NCLC 435 (4 credits); CONF 101, 300; NCLC 305 (Sections of NCLC 375 or 395 may count toward this requirement when appropriate and with prior written approval of the coordinator.)
• One to two elective courses (3 to 4 credits) chosen from AVT 370; COMM 300, 301, 335; CVPA 305; ECON 309; ENGL 410; MSOM 301, 321; NCLC 211, 304*, 340, 349, 410, 422; SOCI 492; SOCW 352, 483 (Sections of NCLC 375 and 390/490* may be used with prior written approval of the coordinator.)

Each of the required courses is writing intensive with a requirement of at least 3,500 words in logs, essays, and analyses. Writing assignments are aggregated with a cover document at the end of the program into a portfolio that documents the student’s experience in studying the nonprofit world.

* These courses are approved to earn experiential learning credits.

In accordance with university policy, at least 8 credits must be applied only to the minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor. For policies governing all minors, see the Academic Policies chapter of this catalog.
The Volgenau School of Information Technology and Engineering

Graduate Admissions: 703-993-1512
Graduate Student Services: 703-993-1505
Undergraduate Student Services: 703-993-1511
Web: volgenau.gmu.edu
College Code: VS

Administrative Units
Department of Applied Information Technology
Department of Civil, Environmental, and Infrastructure Engineering
Department of Computer Science
Department of Electrical and Computer Engineering
Department of Statistics
Department of Systems Engineering and Operations Research

The Volgenau School of Information Technology and Engineering is concerned primarily with study areas that involve integrating the information basis for modern engineering with the more conventional physical and materials science approach. The careful integration of these areas results in a unique academic experience for highly motivated students.

The Volgenau School offers several degree programs that concentrate on important contemporary technological issues and needs. Bachelor’s degree programs are offered in the areas of applied computer science, civil and infrastructure engineering, computer engineering, computer science, electrical engineering, electronics and communications engineering, information technology, and systems engineering. Minors in information technology, computer science, software engineering, and data analysis are also available.

Master’s degree programs are available in the following areas: applied information technology, civil and infrastructure engineering, computer engineering, computer science, electrical engineering, electrical engineering, information security and assurance, information systems, operations research, software engineering, statistical science, systems engineering, and telecommunications. Several doctoral programs are offered, including a cross-disciplinary program in information technology and more focused programs in civil and infrastructure engineering, computer science, electrical and computer engineering, systems engineering and operations research, and statistical science. In addition, the engineer degree in information technology provides post-master’s training in an application area.

Undergraduate certificates are offered in applied statistics, computer science, information technology, postbachelor computer science, and operations research and engineering. For graduate students, certificate programs are offered in advanced network protocols for telecommunications; architecture-based systems engineering; biometrics; e-commerce; command, control, communications, and intelligence; intelligent agents; communications and networking; computational modeling; systems engineering for computer, information, and software-intensive systems; federal statistics; information engineering; information systems security; military operations research; signal processing; software engineering; telecommunications forensics and security; very-large-scale-integration (VLSI) design and manufacturing; civil infrastructure and security engineering; discovery, design, and innovation; computer networking; network technologies and applications; wireless communications; telecommunications systems modeling; data mining; database management; and web-based software engineering.

The undergraduate degree programs prepare students to enter directly into professional employment or continue studies at the graduate level. The requirements for the bachelor’s degrees include required and elective courses in mathematics, humanities, and general education, and specialty courses in applied computer science, civil and infrastructure engineering, computer engineering, computer science, electrical engineering, electronics and communications engineering, information technology, and systems engineering. Each program strongly emphasizes English composition and communication.

Students also have opportunities to develop interest areas in other fields within the Volgenau School that offer undergraduate courses but do not have undergraduate majors. The bachelor of individualized study (BIS) degree program may appeal to adult students who have completed a substantial portion of their studies at other institutions.

Bioengineering has been increasingly represented at the Volgenau School. New faculty members are working with other departments, schools, and institutes at Mason to provide a quality education to students interested in this rapidly growing field. The faculty at the Volgenau School hopes to work with numerous Washington-area organizations dedicated to health-oriented research or clinical service.

Administration
Lloyd Griffiths, Dean
Daniel A. Menasce, Associate Dean for Research and Graduate Studies
E. Bernard White, Associate Dean for Undergraduate Studies
Sharon Caraballo, Assistant Dean for Academic Affairs
Jennifer Lamb, Assistant Dean for Development
Terri Mancini, Director, Sponsored Research Administration
Melinda Barnhart, Executive Director, Finance and Administration
Jonathan Goldman, Director, Computing Resources

Bachelor of Science Programs
The Volgenau School offers eight programs in its academic units. Policies regarding admission and degree requirements are provided in the department sections that follow.

BS Degree | Department
---|---
Applied Computer Science | Computer Science
Civil and Infrastructure Engineering | Civil, Environmental, and Infrastructure Engineering
Computer Engineering | Electrical and Computer Engineering
Computer Science | Computer Science
Electrical Engineering | Electrical and Computer Engineering
Electronics and Communications Engineering | Electrical and Computer Engineering
Engineering Information Technology | Applied Information Technology
Systems Engineering | Systems Engineering and Operations Research

Undergraduate Mission, Goals
The undergraduate mission is to provide a quality education to support the needs of Virginia and the nation. The goal is to graduate students who are technically competent; prepared for ethical professional practice and a lifetime of learning; communicate effectively and work as members or leaders of technical teams; and understand the global nature and effect of information technology and engineering.

Degree Requirements
The following general requirements must be completed by all undergraduate students:

- At least 120 credits of academic work including at least 45 credits of upper-level courses (numbered 300 or above)
- At least 6 credits of English composition, 3 credits of literature, and 3 credits of oral communication (university general education electives)
- At least 3 credits of arts, 3 credits of Western civilization, 3 credits of social and behavioral science, and 3 credits of global understanding issues (university general education electives)
- At least 24 credits of social science and humanities course work, which is normally satisfied by the 24 credits of university general education courses described above
- All requirements listed in the following sections for specific Volgenau School majors, including university requirements for mathematics, natural science, information technology competency and ethics, and synthesis

Freshmen who are undecided about their specific majors may select Volgenau School undeclared as their major. Sample schedules that fulfill degree requirements for individual programs within the Volgenau School are available from the departments. With approval of department advisors, some courses may be taken out of the indicated sequences, particularly English, literature and social science courses.

Students should consult the baccalaureate degree requirements in the Academic Policies chapter in this catalog for detailed information concerning requirements for graduation, residence, and academic quality for graduation. That chapter also lists additional university requirements for minor programs and additional (double) majors. The requirements for the BIS degree can be found in the College of Humanities and Social Sciences chapter. Requirements for the civil and infrastructure engineering, computer engineering, computer science, electrical engineering, electronics and communications engineering, IT, and systems engineering undergraduate degree programs are provided in the academic departments’ sections of this chapter.

Academic Progression, Course Repeat
Students majoring in the Volgenau School programs are expected to have an acceptable plan of study formulated with assistance from the department advisor on file. They are expected to make reasonable progress toward their degree during each semester they are enrolled. Students may be required to obtain permission from the Volgenau School Student Services Office to repeat some courses required for the major in which they have previously received a grade of D or F. Individual Volgenau School programs may disallow students from retaking certain high-demand courses in which they have already earned a grade of C or better if they want to retake the course to improve their GPA.

Restricted Courses
Students are encouraged to take advantage of the many excellent courses available to broaden their educational experience or strengthen their background; however, some credits earned may not satisfy any degree requirements. Degree requirements for the Volgenau School undergraduate programs may not include credits earned in activity courses in any department. Examples are many of the courses listed under the catalog designations of art, dance, music, or theater; individual sports, physical education, or team sports; and recreational activities. Exceptions in these categories are courses that meet the university general education requirements for the major, including global understanding or Arts. Whenever there is uncertainty, students must consult with an academic advisor in their department. Generally, degree requirements for computer science and engineering majors may not be met by 100- to 400-level courses designated “IT” (and any associated cross-listed courses) in the Course Descriptions chapter of this catalog. The respective computer science or engineering student’s department might approve requests for some IT courses, such as IT 350, 362, 462, and 466, to satisfy degree requirements. For more information, contact the department or the Volgenau School Student Services Office at 703-993-1511.

Writing-Intensive Requirement
The university requires all undergraduate students to successfully complete a course, or combination of courses, designated “writing-intensive” in their majors at the 300 level or above. To determine the writing-intensive course requirements for specific degrees, refer to the major program descriptions in the following department sections.
BS/Accelerated MS Programs

Many of the BS degree programs offered within the Volgenau School may be packaged with some of the MS degree programs in ways that reduce the total number of credits required. Details may be found in the following department sections.

Master of Science Programs

Degree Requirements

The Volgenau School offers 12 master of science programs in its academic units. Policies regarding admission and degree requirements are provided in the department sections that follow.

<table>
<thead>
<tr>
<th>MS Degree</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Information Technology</td>
<td>Applied Information Technology</td>
</tr>
<tr>
<td>Civil and Infrastructure Engineering</td>
<td>Civil, Environmental, and Infrastructure Engineering</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Computer Science</td>
</tr>
<tr>
<td>E-Commerce</td>
<td>Interdisciplinary Programs</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>Information Security</td>
<td>Information and Software and Assurance Engineering</td>
</tr>
<tr>
<td>Information Systems</td>
<td>Information and Software Engineering</td>
</tr>
<tr>
<td>Operations Research</td>
<td>Systems Engineering and Operations Research</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>Information and Software Engineering</td>
</tr>
<tr>
<td>Statistical Science</td>
<td>Statistics</td>
</tr>
<tr>
<td>Systems Engineering</td>
<td>Systems Engineering and Operations Research</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Interdisciplinary Programs</td>
</tr>
</tbody>
</table>

Doctor of Philosophy Programs

The Volgenau School offers PhDs in computer science, electrical and computer engineering, IT, and statistical science. The PhD in computer science is described in the Computer Science section of this chapter, the PhD in electrical and computer engineering is described in the Electrical and Computer Engineering section, and the PhD in statistical science is described in the Statistics section of this chapter. The PhD in information technology is a program that builds on a fundamental core and emphasizes cross-disciplinary efforts among the 12 master’s programs in the Volgenau School, as well as with related units at Mason. Specific entrance and degree requirements for this doctoral program are found in the Interdisciplinary Programs section of this chapter.

Engineer Degree in Information Technology

The engineer degree is a post-master’s degree, but it does not confer a doctorate. Students pursuing the engineer degree can take advanced PhD courses and complete a project of an applied nature to fulfill program requirements. Students who are awarded an engineer degree will be able, at a later date, to work toward a PhD in information technology. Details about the engineer degree can be found in the Interdisciplinary Programs section of this chapter.

Applied Information Technology

Phone: 703-993-3565
Web: ait.gmu.edu

Faculty

Professors: Gantz (chair), Jajodia, Marchant
Associate professor: Snow (associate chair)
Assistant professors: Aksoy, Boicu, Bruno, Rytko
Instructors: D’Alessandro, Islam, Lyons, Quinn, Sanghara
Adjunct professors: Alper, Angelone, Curts, Eichers, Enochson, Farrel, Garrison, Haliyur, Hammond, Jainou, Kahrl, Khan, Long, Lord, Montana, Moody, Phung, Raymond, Reo, Ronk, Santucci, Schorling, Sun, West, Zabin

Information Technology, BS – BS-INFT

The BS in information technology prepares students to apply IT to support business processes. The degree produces graduates with strong problem-solving, writing, and communication skills who successfully compete for technical employment and are prepared for advanced study. The objective of the degree is to provide students with the following:

- Fundamental knowledge regarding concepts, tools, and methods of IT, including the opportunity to learn appropriate conceptual and computational tools essential for a successful career
- A broad background across fundamental areas of IT along with a depth of understanding in a particular area of interest
- Skills for effective written and oral communication with technical and nontechnical people in the IT field and the chosen area of interest, as well as skills and strategies for facilitating group projects and activities
- Working knowledge of leading-edge technologies and advanced systems through computer laboratory courses
- Industry-validated curriculum that maintains currency with business needs
- Preparation for graduate studies in information security, information systems, telecommunications, and related IT areas
- Appreciation for the global influence of IT on society and an understanding of the ethical and social responsibilities of IT professionals

The BS in information technology aims to meet the existing and emerging needs of the IT industry by educating new IT workers in current principles and practices in IT and its applications. Graduates are versed in the technical aspects of IT, but their role in the modern enterprise will focus on the use and management of IT resources rather than on the development of leading-edge intellectual property. Graduates fill jobs that focus on the application of IT in an increasing number of emerging subdisciplines, including network administration, information security, information systems, telecommunications, web development, and computer graphics.
Admission Requirements
Students who meet Mason’s general eligibility requirements may apply for admission to the IT major. Admission is based on the appropriateness of the student’s academic objectives and the likelihood of the student benefiting from the program. Preference in admission is given to students who have four years of high school mathematics, including precalculus.

The program can be successfully completed in eight full-time years of high school mathematics, including precalculus. The 120-credit degree requirement consists of Mason general education requirements, IT foundation and core courses, and courses required for the chosen IT concentration. At least 30 credits toward the BS degree must be earned at Mason, and at least 45 credits must be at the 300 level or above. The Applied Information Technology Department is based at the Prince William Campus.

Degree Requirements
In addition to Mason general education requirements, including humanities and social sciences and mathematics and basic sciences, the BS in information technology requires IT foundation, core, and concentration courses as described below. The IT major also requires a 7-credit capstone design project to be completed over two consecutive semesters.

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>IT 101 Introduction to Information Technology</td>
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<tr>
<td>IT 103 Introduction to Computing</td>
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<tr>
<td>IT 108 Programming Fundamentals</td>
</tr>
<tr>
<td>IT 212 Computer Hardware Fundamentals</td>
</tr>
<tr>
<td>STAT 250 Introductory Statistics I</td>
</tr>
<tr>
<td>IT 207 Applied Information Technology Programming</td>
</tr>
<tr>
<td>IT 213 Multimedia and Computer Graphics</td>
</tr>
<tr>
<td>IT 223 Information Security Fundamentals</td>
</tr>
<tr>
<td>IT 300 Modern Telecommunications</td>
</tr>
<tr>
<td>IT 304 IT in the Global Economy (3 credits)</td>
</tr>
<tr>
<td>CS 105 Computer Ethics and Society (1 credit)</td>
</tr>
<tr>
<td>CS 306 Synthesis of Ethics and Law for the Computing Professional (3 credits)</td>
</tr>
<tr>
<td>IT 341 Data Communications and Networking Principles</td>
</tr>
<tr>
<td>IT 343 Information Technology Resources Planning</td>
</tr>
<tr>
<td>MSOM 300 Managing Financial Resources</td>
</tr>
<tr>
<td>MSOM 301 Managing People and Organizations</td>
</tr>
<tr>
<td>SYST 469 Human Computer Interaction</td>
</tr>
<tr>
<td>IT 492 Senior Design Project I</td>
</tr>
<tr>
<td>IT 493 Senior Design Project II</td>
</tr>
</tbody>
</table>

Two-semester sequence of approved capstone design courses

Information Technology Concentrations
Students choose one of four concentrations from the list below. To fulfill the requirements for a concentration, students need 15 credits made up of four courses from their chosen concentration and a fifth course chosen from any of the four concentrations.

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT 208 Program Design and Data Structures</td>
</tr>
<tr>
<td>IT 308/INFS 310 Event-Driven Programming</td>
</tr>
<tr>
<td>IT 314/INFS 311 Database Management</td>
</tr>
<tr>
<td>IT 414/INFS 414 Advanced Database</td>
</tr>
</tbody>
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<tr>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>IT 353 Information Warfare and Defense</td>
</tr>
<tr>
<td>IT 357/ADJ 304 Computer Crime, Forensics, and Auditing</td>
</tr>
<tr>
<td>IT 366 Network Security I</td>
</tr>
<tr>
<td>IT 462/INFS 462 Information Security Principles</td>
</tr>
<tr>
<td>IT 466 Network Security II</td>
</tr>
</tbody>
</table>

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<tr>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>IT 331 Web I: Web Development</td>
</tr>
<tr>
<td>IT 332 Web Site Administration</td>
</tr>
<tr>
<td>IT 413 Digital Media Editing</td>
</tr>
<tr>
<td>IT 415 Information Visualization</td>
</tr>
<tr>
<td>IT 431 Web II: Advanced Web Development</td>
</tr>
</tbody>
</table>

Other Requirements
COMM 100 Public Speaking

Natural Science: 11 credits of natural science, including a sequence of two 4-credit courses with labs. Students should choose these from the list of courses approved for general education (7 of these credits apply toward general education requirements)

MATH 108 Introductory Calculus with Business Applications, MATH 112 Discrete Math for BSIT, and STAT 250 Introductory Statistics I (3 of these credits apply toward general education requirements)

Sample Schedule

First Semester
ENGL 101 Composition ...........................................3
HIST 100 History of Western Civilization .................3
IT 101 Introduction to Information Technology .............3
IT 103 Introduction to Computing ..........................3
MATH 108 Introductory Calculus with Business Applications ...........................................3
Total ..............................................................15

Second Semester
COMM 100 Public Speaking ....................................3
IT 108 Programming Fundamentals ........................3
STAT 250 Introductory Statistics ............................3
Nonlab natural science ........................................3
Literature .........................................................3
Total ..............................................................15

Third Semester
IT 207 Applied Information Technology Programming .....3
IT 212 Computer Hardware Fundamentals ..................3
IT 214 Database Fundamentals .................................................. 3
Natural science with lab ........................................................... 4
Social/behavioral science ......................................................... 3
Total ..................................................................................... 16

Fourth Semester
IT 213 Multimedia and Computer Graphics .............................. 3
IT 223 Information Security Fundamentals ............................... 3
MATH 112 Discrete Math for BSIT .......................................... 3
Natural science with lab ........................................................... 4
Arts ....................................................................................... 3
Total ..................................................................................... 16

Fifth Semester
ENGL 302 Advanced Composition ........................................... 3
IT 341 Data Communications and Networking Principles .......... 3
MSOM 300 Managing Financial Resources ............................. 3
SYST 469 Human Computer Interaction .................................. 3
Elective ................................................................................. 3
Total ..................................................................................... 15

Sixth Semester
IT 300 Modern Telecommunications ...................................... 3
IT 304 Information Technology in the Global Economy .......... 3
IT 343 Resources Planning .................................................... 3
IT concentration course .......................................................... 3
MSOM 301 Managing People and Organizations ................. 3
Total ..................................................................................... 15

Seventh Semester
IT 492 Senior Design Project I ................................................ 3
IT concentration course .......................................................... 3
IT concentration course .......................................................... 3
Global understanding ............................................................ 3
Elective ................................................................................. 3
Total ..................................................................................... 15

Eighth Semester
IT 493 Senior Design Project II ................................................. 3
IT concentration course .......................................................... 3
IT concentration course .......................................................... 3
Elective ................................................................................. 3
Total ..................................................................................... 13

Writing-Intensive Requirement
The university writing-intensive requirement is satisfied by IT 343.

Grades
Students must have a C or better in any course that satisfies a prerequisite for an IT course. To graduate with the BS in information technology, students must have a GPA of 2.50 or better across the IT foundation, core, capstone, and concentration courses.

BS in Information Technology/Accelerated MS in Information Security and Assurance
See the description listed under the Computer Science Department.

BS in Information Technology/Accelerated MS in Information Systems
See the description listed under the Computer Science Department.

BS in Information Technology/Accelerated MS in Software Engineering
See the description listed under the Computer Science Department.

BS in Information Technology/Accelerated MS in Telecommunications
See the description listed in the Interdisciplinary Programs section of the Volgenau School chapter.

Certificate in Information Technology
This certificate is designed primarily for those students who have earned a nontechnical bachelor’s degree. It allows students with nontechnical backgrounds to augment the knowledge gained through their major-related courses with additional computer and IT knowledge, and skills to improve their attractiveness to employers in the high-technology community. This certificate requires a minimum of 24 credits, including 15 credits of core courses. Beyond these requirements, the student is free to define a technical focus area. The focus area must be composed of at least three courses (9 credits). Elective courses selected for the technical focus area must be approved by an IT advisor.

Credits
Core Courses ........................................................................ 15
IT 101 Introduction to Information Technology ....................... 3
IT 103 Introduction to Computing ............................................ 3
IT 108 Programming Fundamentals ....................................... 3
Select two of the following:
IT 212 Computer Hardware Fundamentals ........................... 3
IT 213 Multimedia and Computer Graphics ........................... 3
IT 214 Database Fundamentals ............................................. 3
IT 250 Introductory Statistics I .............................................. 3
Technical Focus Area ......................................................... 9

Minor in Information Technology
The minor is designed primarily for those non-Volgenau School majors who desire to augment the knowledge gained through their major-related courses with additional computer and IT knowledge. It also gives students the necessary skills to improve their attractiveness to employers in the high-technology community. The minor requires a minimum of 15 credits, including 9 credits of core courses. Beyond these requirements, the student is free to define a technical focus area, for example, information security. Focus areas are composed of at least two courses (6 credits). Students pursuing the IT minor should obtain a list of approved electives from the Applied Information Technology Department.

Credits
Core Courses ................................................................. 9
IT 101 Introduction to Information Technology ....................... 3
IT 103 Introduction to Computing ............................................ 3
IT 108 Programming Fundamentals ....................................... 3
Technical Focus Area ......................................................... 6

Applied Information Technology, MS (pending SCHEV approval)
We propose to provide the very best graduate education in IT for high-potential leaders, especially those working with IT solutions that affect the federal government. Our objective...
is to graduate men and women of competence and character who can lead multidisciplinary teams in the design, justification, development, and the management of megasystems from data to decision in the private and federal sectors. Faculty includes professors from the Volgenau School, the School of Management, and the College of Humanities and Social Sciences, plus industry leaders with unique reputations in the subject as adjunct professors and guest lecturers. The faculty exposes students to the pragmatic issues of IT, not just the theory.

Admission Requirements

Applicants must have completed a baccalaureate degree from an accredited program with a reputation for high academic standards and have earned a GPA of 3.00 or better over their 60 highest-level credits. They must be experienced in the fundamentals of IT, quantitative methods, and finance. In addition, applicants must

• provide three letters of recommendation, preferably from academic references or references in industry or government who are familiar with the applicant’s professional accomplishments.
• provide a detailed statement of career goals and professional aspirations.
• be able to show satisfactory performance on the GRE if they have not earned a bachelor’s degree from a U.S. university.
• have a minimum TOEFL score of 575 for the paper-based exam or 230 for the computer-based exam (a minimum score of 600 for the paper-based exam or 250 for the computer-based exam is required for applicants who wish to be considered for a graduate teaching assistantship) if their native language is not English.

Degree Requirements

This 30-credit program consists of a set of IT core courses, plus electives chosen from complementary subject areas. Students take four core courses (12 credits), plus electives in IT (9 credits), analysis and management (3 credits), leadership and ethics (3 credits), and a final capstone seminar course (3 credits).

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Courses</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>ECE 541 Computer Architectures: A Survey</td>
<td>3</td>
</tr>
<tr>
<td>INF 622 Information Systems Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>NCLC 504 Leadership Theory, Praxis, and Development for the Information Technology</td>
<td>3</td>
</tr>
<tr>
<td>SYST 510 Systems Design and Cost Modeling</td>
<td>3</td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td>INF 614 Database Design and Management</td>
<td>3</td>
</tr>
<tr>
<td>ISA 562 Information Security Theory and Practice</td>
<td>3</td>
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<tr>
<td>SWE 621 Software Modeling and Architectural Design</td>
<td>3</td>
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<tr>
<td>SYST 619 Introduction to Architecture-Based Systems Engineering</td>
<td>3</td>
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<tr>
<td>SYST 631 Systems Engineering of Information Architecture</td>
<td>3</td>
</tr>
<tr>
<td>SYST 632 System Integration and Architecture Evaluation</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose one 3-credit course from the following analysis and management courses:

- IT 665 Managing Information Technology
- Programs in the Federal Sector
- OR 540 Management Science
- SWE 625 Software Project Management

Choose one 3-credit course from the following leadership and ethics courses:

- PHIL 641 Ethics and the Professions
- PHIL 644 Business and Organizational Ethics
- TECM 700 Leading Information Technology Organizations through Change

Capstone Course

IT 685 Capstone Seminar

Civil, Environmental, and Infrastructure Engineering

Phone: 703-993-1675
Web: civil.gmu.edu

Faculty

**Professors:** Arciszewski, Bronzini (chair), Houck
**Associate professors:** deMonsabert, Flannery, Venigalla
**Assistant professors:** Casey, Urgessa
**Research professor:** Hero
**Adjunct professors:** Ali, Binning, Chase, Chipley, Choudhury, Donahue, Doyle, Furey, Gagne, Goode, Hartmann, Harrop-Williams, Kirby, Liner, Matusik, Miller, Rodriguez, Ward, Zobel

The Civil, Environmental, and Infrastructure Engineering (CEIE) Department offers a BS and an MS in civil and infrastructure engineering. These degree programs complement the study of civil and environmental engineering with advances in information technology (IT), and they focus on the physical and organizational infrastructure essential to the functioning of an urban society. The bachelor’s program in civil and infrastructure engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, Maryland 21202-4012; 410-347-7700. Students interested in pursuing doctoral education in civil and infrastructure engineering are encouraged to read the sections on the interdisciplinary PhD in information technology and PhD study in civil and infrastructure engineering.

Civil and infrastructure engineering is the study of land, transportation, water, environmental, structural, energy, and telecommunications systems from a civil engineering perspective and within a complex technological, social, political, economic, and environmental context. The focus is on how these systems are successfully conceived, developed, designed, built, operated, maintained, and renewed in the built environment such as the Washington, D.C., metropolitan area.

An urban society thrives and prospers when adequate, appropriate, reliable, robust, secure, and cost-effective infrastructure systems are provided. The investment in existing infrastructure and other urban systems in the United States is enormous. The investment required to maintain, operate, renew, and manage the evolution of these infrastructure systems in the future is even greater. The need for highly
educated professionals to confront and solve these continuing vital problems is pressing. Examples of infrastructure systems include water supply and distribution; streets, roads, and highways; wastewater management; transit; storm water management; public utilities; energy supply and distribution; telecommunications; buildings, facilities, and structures; and solid waste management.

**Course Work**
The department offers all courses designated CEIE and some of the ENGR and IT courses in the Course Descriptions chapter of this catalog.

**Undergraduate Program**

**Civil and Infrastructure Engineering, BS-CEIE**
The bachelor's degree program provides a solid foundation in the theory of civil and infrastructure engineering. Students benefit from exposure to practical civil, environmental, and infrastructure engineering problems and their solutions in the classroom, lab, and field. Students also have the opportunity to work as engineering interns each summer. The goal of the department is to graduate students who are prepared to

- Solve problems in the civil engineering domain, such as integrating the traditional civil engineering disciplines of transportation, environment, structures, construction, and water; incorporating social, political, and economic considerations; and including a conscious life-cycle costing philosophy.
- Develop and apply IT to civil engineering problems.
- Communicate effectively in written, oral, and visual ways.
- Pursue a lifelong process of learning.
- Enter the civil engineering profession as productive engineers.

Civil engineering students can look forward to a career in local, state, and federal government organizations and architectural and engineering firms that specialize in land development, transportation, water resources, environment, structures, construction, and other related fields. The program also prepares students for continuing graduate studies.

**Degree Requirements**
Degree requirements include 120 credits distributed in courses in three main areas: mathematics and basic science, humanities and social sciences, and civil engineering analysis and design.

The prerequisite structure for these courses is extensive. The sample schedule below provides a listing of major and general education course requirements, as well as a guide to the progression of the courses to satisfy all prerequisites.

Students are required to see their faculty advisor at least once each semester to plan for the next semester’s registration. Each student is expected to complete an approved plan of study, which constitutes a learning plan for the degree program.

A variety of classes will count for credit as CEIE technical electives. All electives must be selected with the advice and approval of the academic advisor. Paid internships during the summer (CEIE 197, 198, and 199; 297, 298, and 299; and 397, 398, and 399) may also be used as technical electives.

**Writing-Intensive Requirement**
The university’s writing-intensive requirement for civil and infrastructure engineering majors is satisfied by the successful completion of CEIE 360.

**Sample Schedule and Degree Requirements**

**First Semester**

- CHEM 251 General Chemistry for Engineers ...............4
- ENGL 101 Composition ............................................3
- ENGR 107 Introduction to Engineering ......................2
- ENGR 183 Engineering Computer Graphics ..................3
- MATH 113 Analytic Geometry and Calculus I ..............4

**Total .................................................................................16**

**Second Semester**

- CS 112 Computer Science I ........................................4
- ECON 103 Microeconomic Principles .......................3
- MATH 114 Analytic Geometry and Calculus II ............4
- PHYS 160 University Physics I ..................................3
- PHYS 161 University Physics II Laboratory ..............1

**Total .................................................................................15**

**Third Semester**

- CEIE 290 Engineering Computation and Design ..........3
- MATH 213 Analytic Geometry and Calculus III ...........3
- PHYS 260 University Physics II ..................................3
- PHYS 261 University Physics II Laboratory ..............1
- General education literature course .......................3

**Total .................................................................................13**

**Fourth Semester**

- CEIE 230 Hydraulics .................................................3
- COMM 100 Oral Communication .................................3
- ENGR 210 Statics and Dynamics .................................3
- MATH 214 Elementary Differential Equations ............3
- STAT 344 Probability and Statistics for Engrs and Sci I ....3

**Total .................................................................................15**

**Fifth Semester**

- CEIE 301 Engr and Economic Models in Civil Engineering ..................................................3
- CEIE 340 Water Resources Engineering ....................3
- ENGL 302 Advanced Composition ...............................3
- ENGR 310 Mechanics of Materials ..............................3
- HIST 100 History of Western Civilization ..................3

**Total .................................................................................15**

**Sixth Semester**

- CEIE 305 Soil Mechanics ..........................................3
- CEIE 311 Structural Analysis ......................................3
- CEIE 360 Introduction to Transportation Engineering ....3
- PHYS 266 Introduction to Thermodynamics ..............1
- General education arts course .................................3
- General education global understanding course ..........3

**Total .................................................................................16**

**Seventh Semester**

- CEIE 367 Behavior of Concrete and Steel Structures ....3
- CEIE 400 Civil Engineering Planning and Management ...3
- CEIE 440 Water Supply and Distribution ..................3
- CEIE 455 Introduction to Environmental Engineering ....3
- CEIE technical elective* .............................................3

**Total .................................................................................15**

**Eighth Semester**

- CEIE 463 Construction Systems ..................................3
CEIE 490 Senior Design Project ........................................ 3
CEIE technical elective* .................................................. 3
CEIE technical elective* .................................................. 3
CEIE technical elective* .................................................. 3
Total ................................................................................ 15

* Of the 12 technical elective credits, 3 credits of a CEIE transportation elective and 3 credits of a CEIE environmental elective are required.

BS/Accelerated MS in Civil and Infrastructure Engineering

This option provides a way for Mason students to earn an MS in civil and infrastructure engineering in less time than if they graduated from the BS program and then applied to the MS program. This program can be completed in 144 credits.

Admission Requirements

Mason students in the BS in Civil and Infrastructure Engineering Program may apply for the BS/accelerated MS if they have earned 90 undergraduate credits with an overall GPA of at least 3.30 or their GPA in ENGR and CEIE courses is at least 3.30. Students who have not yet finished 90 credits may be accepted provisionally subject to satisfactory completion of 90 credits. All other criteria for admission are identical to criteria for admission into the MS program.

Degree Requirements

Students must complete 144 credits that satisfy requirements for both the BS and MS programs. Students register for 6 credits of CEIE 500-level courses in place of undergraduate technical elective courses. The CEIE 500-level courses selected for this purpose must be approved by the academic advisor. Students complete all MS requirements and may apply the two CEIE 500-level courses included in the BS program toward satisfaction of these requirements.

Conferral of Degrees

Students must apply to have the BS degree conferred the semester before they expect to complete the BS requirements. The master’s degree is granted on completion of MS requirements.

GRADUATE PROGRAMS

Civil and Infrastructure MS-CEIE Engineering, MS

The MS program educates students in the theory and practice of civil, environmental, and infrastructure engineering. IT and automated tools for analyzing and solving urban systems problems are important components of the program. The civil and infrastructure engineer can look forward to pursuing a career in the private or public sector or continuing graduate study toward the PhD.

Admission Requirements

To be considered for admission to the program, a candidate must:

• Satisfy general university requirements for admission to a graduate program.
• Have earned a baccalaureate degree in engineering, physical sciences, economics, or other civil and infrastructure engineering-related field.

• Provide three letters of reference, submitted by former professors or supervisors.

Acceptance to the degree program is based on an assessment of the applicant’s capacity to pursue these graduate studies successfully. Consideration is given to the undergraduate record, any previous graduate work, professional work experience, reference letters, and any recent GRE scores, which are required for international students. Well-qualified students with minor admission deficiencies may be admitted subject to completing an articulation program. Courses taken in the articulation program extend the minimum requirements for the degree.

Degree Requirements

The program includes three core courses, electives selected by the student with the aid of a faculty advisor, a thesis or civil infrastructure engineering project, and a seminar requirement. Students must complete a faculty-approved plan of study with a minimum of 30 credits of graduate work, including the thesis (6 credits) or the research project (3 credits).

Core Courses

Students must complete the following three core courses. These courses provide a common background for understanding the breadth and complexity of civil and infrastructure engineering, and introducing the application of IT and the systems approach to analyzing and solving problems in civil and infrastructure engineering.

CEIE 601 Infrastructure Modeling
CEIE 605 Infrastructure Systems Analysis
CEIE 685 Civil Engineering Information Management

Emphases

Students must select an additional five or six electives that together constitute an emphasis area. With prior approval of a faculty advisor, students may design their own emphasis or select from one of several standard emphases, including the following:

• Water and environmental systems
• IT in civil engineering
• Infrastructure management
• Civil infrastructure and security engineering
• Real estate development
• Transportation engineering

Project or Thesis

Students must complete a project (3 credits) or thesis (6 credits) under the direction of a CEIE faculty member. Under the project option, students complete 3 credits of CEIE 798, during which they prepare and present a scholarly paper. The scholarly paper is a technical report on an independent study, laboratory or computer experimentation, or literature search on a current civil and infrastructure engineering topic selected under the guidance of a faculty advisor. Students must demonstrate knowledge of the topic and make a satisfactory technical presentation of the paper in the CEIE graduate seminar (CEIE 795).

Under the thesis option, students complete 6 credits of CEIE 799. The master’s thesis should reflect a significant independent research effort. The work is conducted under the guidance of a faculty thesis advisor, and the final written thesis and oral defense are approved by a three-member faculty committee. In addition, students must make a satisfactory presentation of
the thesis in the CEIE graduate seminar. The thesis is particularly recommended for those students who wish to develop and document their research skills, or contemplate subsequent enrollment in a PhD program.

Seminar Requirement
All degree candidates must attend a minimum of 10 graduate seminars approved by the CEIE Department for the degree program.

■ Graduate Certificate in CERG-CISE
Civil Infrastructure and Security Engineering
This program is appropriate for civil infrastructure (such as transportation, water and wastewater, and utilities) operators and operators, designers, planners, maintenance staff, and other technical workers in the public and private sectors who are responsible for improving facility and equipment performance, reliability, security, efficiency, and management practices.

New approaches to civil infrastructure problems are emerging that use traditional civil engineering domain knowledge in the context of IT with a systems approach to analyze the complexity of and interaction among various infrastructure components and their performance. Currently, the most important challenge to infrastructure engineering is to improve the quality of stewardship, which falls far short of public expectations, and improve immediately the security of critical civil infrastructure. The certificate is intended to respond uniquely to the need for broad training in the holistic and systems approach to the long-term management of infrastructure, with specific attention to risk and vulnerability assessments, and creative solutions to providing improved system security. The certificate program is flexible and can be tailored to the needs of students within the infrastructure engineering community, but it is also intended to be responsive to the needs of infrastructure owners, operators, and other technical staff.

Admission Requirements
Candidates should have a bachelor’s degree in engineering, architecture, mathematics, science, or other related technical field, and must be computer literate. Candidates should inquire with the certificate coordinator for details of program planning. Courses are offered in late afternoon and evening and are particularly suitable for part-time students.

Certificate Requirements
The certificate program consists of 15 credits (five courses) selected from certificate program courses and elective courses. The certificate courses are aimed at building the foundations of asset management methods based on a holistic and systems approach. The certificate program courses consist of the following:

One core course Credits
CEIE 680 Introduction to Infrastructure and Security Engineering............................................... 3

Minimum of two of the following specific sector courses:
CEIE 681 Security of Structural Systems ...................... 3
CEIE 683 Water and Wastewater Systems Security .............. 3
CEIE 686 Transportation System Security and Safety ........ 3

Remaining elective credits selected from the following:
CEIE 510 Geographical Information Systems in Engineering
CEIE 511 Design and Inventive Engineering
CEIE 670 Civil Engineering Decision Methods and Tools
CEIE 671 Best Engineering Management Practices
CEIE 685 Civil Engineering Information Management
CEIE 690 Special Topics (depends on the topic; requires coordinator approval)
PUAD 640 Public Policy Process
PUAD 661 Public Budgeting Systems
PUBP 729 Transportation Asset Management
PUBP 752 Infrastructure Finance

Selection of courses is subject to approval of the certificate coordinator to ensure cohesiveness and compatibility. Some courses may have prerequisites for which the student must qualify or seek a waiver from the appropriate instructor. A cumulative GPA of 3.00 is required, and no more than one course with a grade of C may be applied toward the certificate.

■ Graduate Certificate in CERG-DDI
Discovery, Design, and Innovation
This program responds to the growing need for professional knowledge in innovation. It provides students with a balanced understanding of the entire process from the discovery of knowledge, its use in inventive problem solving and the development of inventions, and familiarity with the use of various inventive design methods and tools. The program is available to students who hold a master’s degree in engineering and scientific disciplines or are currently in such graduate programs. Students may pursue the certificate concurrently with any of the graduate programs in the Volgenau School; however, the certificate is not awarded until all requirements have been completed.

Certificate candidates must complete at least 15 credits with an average grade of B or higher. To obtain the certificate, students must take SYST 520 and IT 894 and IT/OR/SYST 944. Students also must take two of the following: CEIE 601 or 670; SYST 512 (recommended courses if continuing for MS in civil and infrastructure engineering) or 573; STAT 664/ SYST664; SYST 781/STAT 781; STAT 652, 700, and 701; or 671/SYST 671; or IT 819.

For the Graduate Certificate in Foundations in Real Estate Development (CERG-FRED), please see Catalog Addendum.

For the Graduate Certificate in Sustainability and the Environment (CERG-SENV), please see Catalog Addendum.

PhD Study in Civil and Infrastructure Engineering
Doctoral studies in civil and infrastructure engineering may be pursued in two ways.

Doctoral study in civil and infrastructure engineering is available through the PhD in Information Technology Program, which offers advanced courses in this discipline. Pending approval of the State Council of Higher Education of Virginia (SCHEV), the CEIE Department will be offering a PhD in Civil and Infrastructure Engineering Program beginning fall 2008.

■ Information Technology, PhD PHD-INFT
▲ Concentration in Civil and Infrastructure Engineering (CEIE)
Students who pursue a concentration in this doctoral program will have the concentration noted on their transcript. The degree conferred on a graduating student is a PhD in information technology with a concentration in civil and infrastructure
engineering. Students may also pursue such doctoral studies without designating a concentration.

**Requirements**

Students seeking this concentration must satisfy all the requirements for the PhD in information technology degree. In addition, the following requirements must be met:

**Plan of Study**

All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of the CEIE Department chair.

**Doctoral Supervisory Committee**

The dissertation director must be a CEIE Department faculty member. The composition of the doctoral supervisory committee is to be approved by the CEIE Department chair and the Volgenau School associate dean for research and graduate studies. Permission for the comprehensive exam and the dissertation defense is requested from the Volgenau School associate dean on the basis of a written request and plan approved by the supervisory committee and the CEIE Department chair.

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<th>Civil and Infrastructure Engineering, PhD (pending SCHEV approval)</th>
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The doctoral program offered by the CEIE Department is unique in Virginia, incorporating the varied areas of civil engineering with a focus on infrastructure operation and management. The program is structured to prepare students for advanced leadership positions in research and development in the public or private sector, academics, and government. Students may elect to study in the areas of IT and computing in civil engineering, environmental engineering, water and wastewater engineering, construction engineering and management, infrastructure security and engineering, structural engineering, or transportation engineering. Requirements include course work, qualifying exams, a teaching requirement, dissertation proposal defense, and dissertation research and defense.

**Admission Requirements**

All general Mason and specific Volgenau School admission requirements apply. In addition, all applicants, including Mason undergraduates, must submit the following:

- Official transcript of undergraduate and graduate course work
- For applicants whose native language is not English, official TOEFL results showing a minimum score of 575 for the paper-based exam or 230 for the computer-based exam. A minimum score of 600 for the paper-based exam or 250 for the computer-based exam is required for students who wish to be considered for a graduate teaching assistantship.
- Three letters of recommendation, with at least two from individuals with doctorates
- Recent résumé
- Substantial statement of interest that includes a description of specific area of proposed dissertation research, contacts they have made with potential faculty advisors, and an explanation of career and research goals
- Official results of the GRE general test are recommended for students with BS or MS degrees obtained outside the United States

Applicants will be encouraged to schedule an interview with the graduate coordinator or faculty member in their proposed area of research. Admission decisions will be based on the student’s qualifications and the availability of a faculty advisor. The application material will be reviewed by the department doctoral committee and decisions made with input from appropriate faculty members.

The application material will be reviewed by the graduate admissions officer for the department and decisions made with input from appropriate faculty members and/or the department chair.

**Dissertation Committee**

A dissertation committee is recommended to be formed within the first semester following successful completion of the qualifying exams. The dissertation committee is to consist of the CEIE Department dissertation director, two or more CEIE Department faculty members, and at least one committee member from outside the department. At least three members of the committee are to be members of the Mason graduate faculty. The composition of the dissertation committee must be approved by the CEIE Department chair.

**Degree Requirements**

With the completion of a BS degree, 72 additional credits are required to complete a PhD in civil and infrastructure engineering. Of these 72 credits, 24 are required for dissertation research. Students may apply up to 24 credits from their MS degree toward their required 72 credits beyond the BS subject to the approval of the dissertation committee and the CEIE Department chair. Students with degrees earned outside the United States may use some course credit toward the required 72 credits but not more than 24 credits.

Of the 72 credits beyond the BS, 48 credits of course work are required. Of these 48 hours, a maximum of 18 credits (normally part of the MS or equivalent program) may be at the 500 level, and a minimum of 9 credits at the 700 level or higher must be completed. For courses taken elsewhere, the PhD director must determine equivalent levels and obtain approval from the CEIE Department chair to apply these courses to the required 48 credits of course work. Individualized reading courses at any level cannot exceed 6 credits. A minimum GPA of 3.50 is required and no C grades are allowed for the 24 credits earned beyond the MS.

Students are also required to take a minimum of 3 credits of statistics at the 500 level or above outside the CEIE Department. Substitution of quantitative or scientific course work in some other discipline that is more relevant to the intended doctoral research may be approved by the dissertation committee and the department chair.

Research work in the PhD program is to be completed in courses CEIE 998 and CEIE 999. A minimum of 12 credits of CEIE 998 (Doctoral Dissertation Proposal Preparation) and 12 credits of CEIE 999 (Doctoral Dissertation) are to be completed. Students cannot enroll in CEIE 999 before the research proposal is presented and approved by the dissertation committee.
Qualifying Exam

Qualifying exams will be offered twice a year prior to the start of the fall and spring semesters. The qualifying exam is intended to test the student’s familiarity with concepts presented at the MS level or post-BS level and serve as guidance for the dissertation director to help shape the student’s course work needs at the PhD level.

Students entering with an MS degree must take the qualifying exam on completion of 18 credits of study. Students entering without an MS degree must take the qualifying exam on completion of 24 credits. The qualifying exam consists of a written exam taken in an eight-hour period and an oral interview attended by an examining committee of at least five members of the CEIE faculty. The qualifying exam may be repeated once. A student failing the qualifying exam twice will be removed from the program.

The qualifying exam includes information from the following focus areas:

Area A: Water and Environmental Engineering
Area B: Information Technology and Computing in Civil Engineering
Area C: Construction Engineering and Management
Area D: Land Development Engineering
Area E: Transportation Engineering
Area F: Infrastructure and Security Engineering
Area G: Structural Engineering

Prior to the exam, students are required to select two focus areas for examination. Candidates for the PhD in information technology and engineer degree in information technology who wish to transfer to the PHD-CEIE program who have successfully completed two qualifying exams based on CEIE courses are not required to take the CEIE qualifying exam.

Dissertation Committee

A dissertation committee is recommended to be formed within the first semester following successful completion of the qualifying exams. The dissertation committee is to consist of the CEIE Department dissertation director, two or more CEIE Department faculty members, and at least one committee member from outside the department. At least three members of the committee are to be members of the Mason graduate faculty. The composition of the dissertation committee must be approved by the CEIE Department chair.

Research Competency Exam, Dissertation Proposal Defense

Students may not schedule their dissertation proposal defense (research competency exam) before successful completion of the qualifying exam. On completing all course work and successfully passing the qualifying exam, students are to present their written dissertation proposal to their dissertation committee. The dissertation proposal defense includes a written proposal and presentation of the intended direction of the dissertation research. The dissertation proposal defense is not to include completed research because the dissertation committee is to use the dissertation proposal defense to provide input and guidance to the student prior to beginning dissertation research. The dissertation proposal defense is also an opportunity for dissertation committee members to examine the student’s knowledge in higher-level course work and familiarity with existing and emerging research related to the student’s research area. The exam is administered by the student’s dissertation committee and must be attended by all dissertation committee members and the department chair.

In preparation for the dissertation proposal defense, the student shall prepare a written dissertation proposal outlining the intended direction of the research and the review of existing research previously published on the topic. The dissertation proposal shall be submitted to the dissertation committee for review at least two weeks prior to the dissertation proposal defense date. The dissertation proposal is then presented by the student as part of the research competency exam. If a student fails the competency exam, the student may request to take the exam again through a formal written request to the doctoral dissertation director within 60 days of receiving notice of the exam result. If the student fails the competency exam and does not request to take the exam again within 60 days of the original date, the student will be dismissed from the PhD program. After successful completion of this requirement, the student is formally admitted as a PhD candidate.

Teaching Requirement

Because one of the characteristics of a good researcher and scholar is the ability to express ideas and concepts to a broader audience in a clear manner, each doctoral candidate will be required to organize and deliver a series of lectures and recitations in the CEIE Department to undergraduate students. Working with his or her doctoral dissertation advisor, the candidate will gain experience in the classroom that will benefit the student should he or she decide to pursue an academic or an advanced research career.

Dissertation Research and Defense

On successful completion of the dissertation proposal, students are to conduct research under the guidance of their dissertation director and dissertation committee members. Students are not to schedule their dissertation defense sooner than two semesters after a successful proposal defense. During the dissertation research period, students must present their research at least once in the form of a department seminar. The dissertation must represent achievement in research, must be a significant contribution to the field of civil engineering, and should be deemed publishable in refereed journals. When the majority of the research has been completed, the candidate is to submit a written draft dissertation to the doctoral dissertation committee and schedule an oral predefense with the doctoral dissertation committee. The predefense is to be attended by the doctoral dissertation committee and the department chair.

A final public oral defense may be scheduled no sooner than one month after the conclusion of the predefense, which will allow for a minimum of two weeks to advertise the defense. The final defense is to be attended by the doctoral dissertation committee and the department chair. On successful completion of the oral defense, students must submit a final publishable dissertation that meets the guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects. If the student fails to defend the dissertation successfully, the student may request a second defense following the same procedures as the initial defense. This request has no time limit, other than the general time limits for the doctoral degree as per Mason policy. An additional predefense is not required; however, the student is strongly advised to consult with the committee before scheduling the second defense. If the student fails on the second attempt to defend the dissertation, the student will be dismissed from the PhD program. If the student does not request to take the exam again within 60 days of the original date, the student will be dismissed from the PhD program. After successful completion of this requirement, the student is formally admitted as a PhD candidate.
program. Following a successful public defense and completion of the final form of the dissertation, the dissertation committee recommends the candidate for the degree of doctor of philosophy.

Center for Real Estate Entrepreneurship
The CEIE Department is the administrative home for the university-wide Center for Real Estate Entrepreneurship, which draws on the resources and expertise of the Volgenau School, the School of Public Policy, and the School of Management. The center is designing undergraduate and graduate programs that encompass the entire real estate development continuum from land use and environmental considerations to acquisition dynamics and construction management. For further details, see the center’s web site at realestate.gmu.edu.

Computer Science

Phone: 703-993-1530
Web: cs.gmu.edu

Faculty
Professors: Barbara, J. Chen, DeJong, Gomaa (chair), Hamburger (emeritus), Kerschberg, Menasce, Motro, Offutt, Pullen, Rine (emeritus), Sibley, Sood, Tecuci, Wechsler
Associate professors: Ammann, Aydin, Baum (emeritus), Brodsky, Carver, Duric, Kosecka, Luke, Richards, Setia, Simon, P. Wang, White, Wijesekera
Assistant professors: S. Chen, Domeniconi, Jiang, Li, Lien, Lin, Malek, Sousa, Stavrou, X. Wang, Zhong
Instructors: Fleck, Heishman, T. Maddox, Nordstrom
Adjunct professors: Ahmed, Armour, Baldo, Claussen, Doughty, Duan, El-Ansary, Ellis, Foxwell, Geldon, Gravatt, Howard, Hwang, M. Maddox, Martin, Mastiyoowski, Nidiffer, Pettit, Redding, Ritchey, Sainju, Sharif, Smeltzer, Smith, Tompkins, Wu

Introduction
Computer science is at the center of the information revolution in the 21st century. Advanced computation tools and techniques are revolutionizing and transforming the way we work, play, communicate, collaborate, and conduct business. In addition, computation is creating new scientific and engineering fields, such as robotics, computational sciences, bioinformatics, astrophysics, and health informatics, to name a few. Computer science is a discipline concerned with the analysis, design, implementation, maintenance, and evolution of computer-based systems used in almost all walks of life.

Computer scientists must be well-grounded not only in the theory of computing, but also in its application to diverse application areas, for example, web-based applications such as e-mail, wireless networking, online group gaming, social networks, and e-commerce. Computer scientists must be capable of working closely with members of other professions associated with computing. Students who pursue this discipline will learn (1) theories of computation, analysis of algorithms, operating systems, and artificial intelligence; (2) communication and coordination via advanced computer networks; (3) storage, retrieval, and management of large databases; and (4) analysis, design, and implementation of reliable software systems.

Course Work
The Department of Computer Science (CS) offers courses designated CS, EC, INFS, ISA, and SWE, as well as some IT courses, in the Course Descriptions chapter of this catalog. The department offers undergraduate programs in computer science and applied computer science. A double major is offered in computer science and computer engineering. Students may also elect a minor in computer science or software engineering. Several accelerated BS Computer Science/MS Programs are offered. Graduate programs offered are an MS in computer science, an MS in information security and assurance, an MS in information systems, an MS in software engineering, an MS in e-commerce, a PhD in computer science, and several graduate certificate programs. The department also participates in the PhD in Information Technology Program with the following concentrations: PhD study in information security and assurance, PhD study in information systems, and PhD study in software engineering. See the descriptions below.

UNDERGRADUATE PROGRAMS

■ Applied Computer Science, BS

This program presents an innovative approach to the integration of computer science with disciplines where knowledge of computation provides the required expertise for an emerging subdiscipline.

Degree Requirements
For the BS-ACS degree, students must complete 120 credits, including the university general education requirements, consisting of humanities, social sciences, synthesis, and basic science requirements (if needed), the program requires foundation, core, and concentration courses as described below. These course requirements provide expertise in programming, computer systems, software engineering, formal methods, and analysis of algorithms.

ACS foundation courses (22 credits):
- CS 101, 105, 112, 211; MATH 113, 114, 125, 203

ACS core (22 credits):
- ECE 301; CS 262, 310, 330, 367, 421, 465, 483

ACS elective (3 credits):
- One CS course numbered above 400

Concentration (36 credits):
- At least 36 additional credits to meet course requirements of one of the concentrations

▲ Concentration in Biology (BIOL)
- Foundation (24 credits): BIOL 213, 303, 304, 305/6; CHEM 211, 212
- Core: BIOL 311, 312, 385, 482, 580
- One BIOL course numbered above 300

▲ Concentration in Computer Game Design (CGDS)
- Foundation (13 credits): CS 225, 325; AVT 104, STAT 344
- Core: CS 425, 426, 451; AVT 382, 383
Two approved electives related to game design
(Natural science requirement will include PHYS 160/161 and 260/261.)

▲ Concentration in Geography (GEOG)
- Foundation (18 credits): GEOG 101, 102, 103, 110, 300; STAT 244
- Core: GEOG 310, 311, 411, 412, 416, 463
- One GEOG course numbered above 300

Students should consult the sample schedules below and ensure that course prerequisites are satisfied. Students should obtain computer-generated audits periodically to ensure that degree requirements are being met.

Sample Schedules

### Biology Concentration

#### First Semester
- BIOL 213 Cell Structure and Function ........................................... 4
- CS 101 Preview of Computer Science ............................................ 2
- CS 112 Introduction to Computer Programming ............................ 4
- ENGL 101 Composition .................................................................. 3
- MATH 113 Analytic Geometry and Calculus I ................................. 4

#### Second Semester
- BIOL 303 Animal Biology .......................................................... 4
- COMM 100 Oral Communications ................................................... 3
- CS 105 Computer Ethics and Society ............................................. 1
- CS 211 Object-Oriented Programming ......................................... 3
- MATH 114 Analytic Geometry and Calculus II ............................... 4

#### Third Semester
- CHEM 211 General Chemistry I .................................................. 4
- CS 262 Low-level Programming ................................................... 1
- CS 310 Data Structures ................................................................ 3
- ECE 303 Digital Electronics ....................................................... 3
- MATH 125 Discrete Mathematics .................................................. 3

#### Fourth Semester
- BIOL 304 Plant Biology .............................................................. 4
- CHEM 212 General Chemistry II .................................................. 4
- CS 367 Computer Systems and Programming................................. 3
- Western civilization course .......................................................... 3

#### Fifth Semester
- BIOL 305/6 Biology of Microorganisms ....................................... 4
- CS 330 Formal Methods and Models ............................................. 3
- CS 465 Computer Systems Architecture ........................................ 3
- MATH 203 Matrix Algebra .......................................................... 3
- Literature course ......................................................................... 3

#### Sixth Semester
- BIOL 311 Genetics ................................................................. 4
- BIOL 482 Introduction to Molecular Biology ................................. 3
- CS 421 Introduction to Software Engineering ................................. 3
- ENGL 302 Advanced Composition ............................................. 3
- Arts course ............................................................................... 3

#### Seventh Semester
- BIOL 385 Biotechnology and Genetic Engineering ....................... 3
- BIOL 312 Biostatistics (or STAT 344) ........................................... 3
- CS 483 Analysis of Algorithms .................................................... 3
- Global understanding course ..................................................... 3
- Social science course ............................................................... 3

#### Eighth Semester
- BIOL 580 Computer Applications in the Life Sciences .................. 3
- BIOL Senior .............................................................................. 3
- CS Senior ............................................................................... 3
- Synthesis course ..................................................................... 3
- Elective ................................................................................... 3

### Computer Game Design Concentration

#### First Semester
- CS 101 Preview of Computer Science ......................................... 2
- CS 112 Introduction to Programming .......................................... 4
- ENGL 101 Composition ............................................................... 3
- MATH 113 Analytic Geometry and Calculus I ............................... 4
- PHYS 160/161 University Physics I ............................................. 4

#### Second Semester
- COMM 100 Oral Communications ............................................. 3
- CS 105 Computer Ethics and Society ......................................... 1
- CS 211 Object-Oriented Programming ...................................... 3
- MATH 114 Analytic Geometry and Calculus II ............................. 4
- PHYS 260/261 University Physics I ............................................. 4

#### Third Semester
- CS 225 Culture of Games ........................................................ 3
- CS 262 Low-Level Programming ............................................. 1
- CS 310 Data Structures ............................................................. 3
- ECE 301 Digital Electronics ....................................................... 3
- MATH 125 Discrete Mathematics ................................................ 3
- Western civilization course ....................................................... 3

#### Fourth Semester
- AVT 104 Introduction to Digital Arts ........................................... 4
- CS 325 Introduction to Computer Game Design ......................... 3
- CS 367 Computer Systems and Programming............................... 3
- MATH 203 Matrix Algebra ........................................................ 3

#### Fifth Semester
- AVT 382 Digital Art and Animation ............................................ 4
- CS 330 Formal Methods and Models ......................................... 3
- CS 465 Computer Systems Architecture .................................... 3
- Natural science course ............................................................ 4

#### Sixth Semester
- AVT 383 Three-Dimensional Digital Art .................................... 4
- CS 421 Introduction to Software Engineering .............................. 3
- CS 451 Computer Graphics ....................................................... 3
- STAT 344 Probability and Statistics for Engineers ...................... 3
- Literature course ................................................................. 3

#### Seventh Semester
- CS 425 Game Programming I ................................................... 3
- CS 483 Analysis of Algorithms .................................................. 3
- ENGL 302 Advanced Composition ............................................ 3
- Game design elective ............................................................... 3
- Elective ................................................................................... 3

#### Eighth Semester
- CS 426 Game Programming II .................................................. 3
- CS Senior ............................................................................... 3
- Synthesis course ..................................................................... 3
- Game design elective ............................................................... 3
- Elective ................................................................................... 2

### Geography Concentration

#### First Semester
- CS 101 Preview of Computer Science ......................................... 2
- CS 112 Introduction to Programming .......................................... 4
- ENGL 101 Composition ............................................................... 3
- GEOG 102 Physical Geography ................................................ 3
- MATH 113 Analytic Geometry and Calculus I ............................. 4

#### Second Semester
- COMM 100 Oral Communications ............................................. 3
The objectives of the BS in Computer Science Program relate to the abilities of the graduates several years after graduation. The objectives include:

- **Foundation for successful careers in industry**: Graduates of the program will have a broad understanding of the fundamental concepts, methodologies, tools, and applications of computer science. They will have the educational foundation that leads to successful careers in the computing industry.
- **Foundation for graduate study**: Graduates of the program will have the academic preparation for successful completion of rigorous graduate programs.
- **Professional preparation**: Graduates will have effective in written, oral, and visual communication skills, and be able to work collaboratively in a professional and ethical manner.

This bachelor’s degree program is accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, Maryland 21202-4012.

**Degree Requirements**

For the BS-CS degree, students must complete 120 credits, including the university general education requirements and all the following:

- **Computer science core (33 credits)**: CS 101, 105, 112, 211, 262, 306, 310, 330, 367, 421, 465, and 483; and ECE 301. Students must take CS 101 within their first year at the university. Students should take CS 105 during their second semester. A grade of C or better must be earned in CS 306 for this course to satisfy the university general education synthesis requirement.
- **Senior computer science (12 credits)**: Any four of the following: CS 440, 450, 451, 455, 468, 471, 475, 480, 482, 484, or 490.
- **Mathematics (23 credits)**: MATH 113, 114, 125, 203, and 213; or 481 or MATH 446 and STAT 344. MATH 105 and 108 cannot be counted toward this degree.
- **Computer science-related courses (6 credits)**: Two courses chosen from STAT 354; OR 335, 441, 442; ECE 280, 431, 442, 447, 501; SWE 432, 437, 443; SYST 371, 470; PHIL 371, 376; and any MATH or CS course numbered above 300 (except MATH 351). Students may need to choose electives to satisfy prerequisites for these courses. Those planning to take MATH 352 may replace STAT 344 with MATH 351.
- **Natural sciences**: 12 credits in courses intended for scientists and engineers. Two of the courses for this requirement must have laboratory components and constitute a sequence. A list of relevant courses can be obtained from the department office.
- **COMM 100 (3 credits)**: Computer science students must make a technical presentation. The course fulfills the general education requirement in oral communication for Volgenau School students.
- **Three credits in arts, humanities, or social science in addition to the general education requirements**

Students should consult the sample schedule below and ensure that course prerequisites are satisfied. Students should obtain computer-generated audits periodically to ensure that degree requirements are being met.

**Sample Schedule**

### First Semester

- **CS 101** Preview of Computer Science .......................... 2
- **CS 112** Introduction to Computer Programming ............ 4
- **ENGL 101** Composition ............................................. 3
- **MATH 113** Analytic Geometry and Calculus I ............... 4
- **Western civilization course** ....................................... 3
- **Total** ........................................................................... 16

### Second Semester

- **CS 105** Computer Ethics and Society .......................... 1
- **CS 211** Object-Oriented Programming ......................... 3
- **MATH 114** Analytic Geometry and Calculus II ............... 4
- **Arts course** ............................................................... 3
- **Literature course** ...................................................... 3
- **Total** ........................................................................... 14
Third Semester
CS 262 Introduction to Low-Level Programming .......... 1
ECE 301 Digital Electronics ........................................ 3
MATH 213 Analytic Geometry and Calculus III .......... 3
Natural science course .............................................. 4
Social and behavioral science course elective .......... 3
Total ....................................................................... 14

Fourth Semester
COMM 100 Oral Communication .................................. 3
CS 310 Data Structures .............................................. 3
MATH 125 Discrete Mathematics I ............................ 3
Natural science course .............................................. 4
General elective ..................................................... 3
Total ....................................................................... 16

Fifth Semester
CS 330 Formal Methods and Models ......................... 3
CS 367 Computer Systems Architecture ..................... 3
ENGL 302 Advanced Composition ............................. 3
MATH 203 Matrix Algebra ........................................ 3
Global understanding course ..................................... 3
Total ....................................................................... 18

Sixth Semester
CS 421 Introduction to Software Engineering ............... 3
CS 465 Computer Systems Architecture ..................... 3
STAT 344 Probability and Statistics for
Engineers and Scientists I .......................................... 3
Humanities course ................................................... 3
Natural science course .............................................. 4
Total ....................................................................... 19

Seventh Semester
CS 483 Analysis of Algorithms .................................... 3
OR 481 Numerical Methods in Engineering ................. 3
Senior computer science course ............................... 3
Senior computer science course ............................... 3
Computer science-related elective ............................ 3
Total ....................................................................... 22

Eighth Semester
Senior computer science courses .............................. 3
Senior computer science courses .............................. 3
Computer science related ......................................... 3
CS 306 (Synthesis) ................................................... 3
General elective ..................................................... 3
Total ....................................................................... 21

Change of Major
Students requesting a change of major to computer science
must have a GPA of at least 2.75 and successfully completed
two of the following: CS 112, 211; MATH 113, 114, or
125.

Advanced Placement, Credit by Exam
Some students may receive credit for CS 112 or 211 by passing
departmentally administered exams. In addition, a score of
3 on the Advanced Placement (AP) computer science exam qualifies the student for credit in CS 112. An AP score of 4,
together with demonstrated competence in the programming language used in CS 211, qualifies students for credit in CS
211. A score of 4 on the International Baccalaureate computer
science exam qualifies students for credit in CS 112, and a score of 5 or more qualifies students for credit in CS
211.

Writing-Intensive Requirement
Computer science majors complete the writing-intensive
requirement through a sequence of projects and reports in CS
306 and 421. Faculty members provide feedback on students’
expository writing.

Grades
Students must earn a C or better in any course intended to
satisfy a prerequisite for a computer science course. Com-
puter science majors may not use more than one course with
grade of C- or lower toward department requirements.

Cooperative Education
Students may participate in the Mason cooperative education
program or a work-study program in the Washington, D.C.,
area.

BS/Accelerated MS in Computer Science
This program is for those interested in immediately continu-
ing on to graduate studies in computer science.

Admission Requirements
Students in a BS program in computer science or a related
area may apply for the BS/accelerated MS program if they
have earned 90 undergraduate credits with an overall GPA
of at least 3.50. Criteria for admission are identical to criteria
for admission to the MS program.

Degree Requirements
Students must complete 144 credits that satisfy requirements
for the BS program and the MS program, with 6 credits overlap.

Students register for 6 credits of CS 500-level basic courses
in place of the corresponding CS 400-level courses required
for the undergraduate degree requirements. That is, students
must register for two of CS 540, 571, 580, and 583 in place
of the corresponding 400-level courses.

Students are permitted to take additional graduate basic
courses in their undergraduate programs. In such cases, those
classes cannot be counted toward requirements for the MS.

Degree Conferral
Students must apply to have the BS degree conferred the
semester before they expect to complete the BS requirements.
At the completion of the MS requirements, a master’s degree
is granted.

BS in Computer Science/Accelerated
MS in Information Security and
Assurance
This program is for students interested in immediately con-
tinuing their undergraduate studies in computer science with
graduate studies in information security and assurance.

Admission Requirements
Students in the BS in Computer Science Program can apply
for this program if they have earned 90 undergraduate cred-
its with an overall GPA of at least 3.30. Criteria for admission
are identical to criteria for admission to the MS in Information
Security and Assurance Program.
Degree Requirements

Students must complete 144 credits that satisfy requirements for the BS in Computer Science Program, as well as those for the MS in Information Security and Assurance Program, with 6 credits overlapping. Students register for two of the following courses (6 credits of 500-level computer science core courses) in place of the corresponding 400-level computer science courses, as part of the undergraduate degree requirements: CS 540, 571, 580, and 583. Students complete all MS in information security and assurance core courses and apply the two courses from the above list toward the MS in information security and assurance requirements.

Degree Conferral

Students must apply to have the BS in computer science degree conferred the semester before they expect to complete the BS requirements. At the completion of the MS in information security and assurance requirements, a master’s degree will be granted.

BS in Computer Science/Accelerated MS in Information Systems

This program is for students interested in immediately continuing undergraduate studies in computer science with graduate studies in information systems.

Admission Requirements

Students in the BS in computer science program can apply to this program if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Criteria for admission are identical to the criteria for admission to the MS in Information Systems Program.

Degree Requirements

Students must complete 144 credits that satisfy requirements for the BS in Computer Science Program, as well as those for the MS in Information Systems Program, with 6 credits overlap. Students register for two of the following courses (6 credits of 500-level computer science core courses) in place of the corresponding 400-level computer science courses, as part of the undergraduate degree requirements: CS 540, 571, 580, and 583.

Students complete all MS in information systems core courses and apply the two courses from above toward the MS in information systems elective requirements.

Degree Conferral

Students must apply to have the BS in computer science degree conferred the semester before they expect to complete the BS requirements. At the completion of the MS in information systems requirements, a master’s degree is granted.

BS in Computer Science/Accelerated MS in Software Engineering

This program is for students interested in immediately continuing undergraduate studies in computer science with graduate studies in software engineering.

Admission Requirements

Students in the BS in Computer Science Program can apply to this program if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Criteria for admission are identical to criteria for admission to the MS in Software Engineering Program.

Degree Requirements

Students must complete 144 credits that satisfy requirements for the BS in Computer Science Program, as well as those for the MS in Software Engineering Program, with 6 credits overlap. Students register for two of the following courses (6 credits of 500-level computer science core courses) in place of the corresponding 400-level computer science courses, as part of the undergraduate degree requirements: CS 540, 571, 580, and 583. Students complete all MS in software engineering core courses and apply the two courses from the above list toward the MS in software engineering elective requirements.

Degree Conferral

Students must apply to have the BS in computer science degree conferred the semester before they expect to complete the BS requirements. At the completion of the MS in software engineering requirements, a master’s degree is granted.

BS in Information Technology/Accelerated MS in Information Security and Assurance

This program is for students interested in immediately continuing on to graduate studies in information security and assurance.

Admission Requirements

Students in the BS in Information Technology Program may apply for this program if they have completed INFS 515 and 519 with a 3.00 or better. Criteria for admission are identical to criteria for admission to the MS program.

Degree Requirements

Students must complete all credits that satisfy requirements for the BS program and those for the MS program, with 6 credits overlapping.

Degree Conferral

Students must apply to have the BS degree conferred the semester before they expect to complete the BS requirements. At the completion of MS requirements, a master’s degree is granted.

BS in Information Technology/Accelerated MS in Information Systems

This program is for students interested in immediately continuing on to graduate studies in information systems.

Admission Requirements

Students in the BS in Information Technology Program may apply if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. In addition, students must have completed INFS 515 and 519 with a 3.00 or better. Criteria for admission are identical to the criteria for admission to the MS program.
Degree Requirements
Students must complete all credits that satisfy requirements for the BS program as well as those for the MS program, with 6 credits overlapping.

Degree Conferral
Students must apply to have the BS degree conferred the semester before they expect to complete BS requirements. At the completion of MS requirements, a master’s degree is granted.

BS in Information Technology/ Accelerated MS in Software Engineering
This program is for students interested in immediately continuing on to graduate studies in software engineering.

Admission Requirements
Students in the BS in Information Technology Program may apply to this program if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. In addition, students must have completed INFS 515 and 519 with a 3.00 or better. Criteria for admission are identical to criteria for admission to the MS in Software Engineering Program.

Degree Requirements
Students must complete all credits that satisfy requirements for the BS program and those for the MS in Software Engineering Program, with 6 credits overlapping with SWE 619 and 622.

Degree Conferral
Students must apply to have the BS degree conferred the semester before they expect to complete the BS requirements. At the completion of MS requirements, a master’s degree is granted.

Minor in Computer Science
The minor requires completion of at least 17 credits. Required courses are CS 105 or 306, 112, 211, and 310.

Two additional computer science courses should be selected from the following: CS 330, 332, 363, 365, 367, 421, 450, 451, 455, 456, 471, 480, 483, and 484. Students should pay careful attention to prerequisites when selecting courses.

Minor in Software Engineering
Candidates for the minor in software engineering must complete 16 credits in software engineering with a minimum GPA of 2.00, comprising CS 112 and either CS 211 or CS 222, and three from CS/SWE 332, CS/SWE 421, SWE 432, SWE 437, and SWE 443. At least 8 credits must be used only for the minor and not for the student’s major.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Computer Science, Computer Engineering Double Major
Computer science majors can earn a double major in computer science and computer engineering if they complete an additional 26 credits of courses beyond the 120 credits required for the computer science degree. The additional 26 credits must be part of an approved plan of study. For more information, visit the department web site.

Certificate in Computer Science (Postbachelor)
This certificate targets students who are working on or possess an undergraduate degree in a technical (science or engineering) field but lack formal certification in the computer science field. The certificate also targets students who have shown an aptitude for graduate study but do not have the academic prerequisites required for admittance into a graduate MS computer science program.

Admissions Requirements
Students must have programming experience at the level of CS 112 and 211, and either a BS in a technical field with a 3.00 GPA or higher, or current enrollment in a technical undergraduate major.

Certificate Requirements
Basic Computer Science: CS 310, 330, 365, 367; and ECE 301
Math: MATH 125, 213
Completion of one of the following: CS 483; and two of CS 421, 440, 450, 451, 455, 468, 471, 480, and 484

GRADUATE PROGRAMS

Computer Science, MS
The graduate program leading to an MS in computer science prepares students for research and professional practice in computer science and related technologies. The program includes both fundamentals and advanced work in the areas of artificial intelligence and databases, programming languages and software engineering, systems and networks, theoretical computer science, and visual computing. Graduate classes are divided into basic classes, which do not have a graduate class as prerequisite, and advanced classes, which have a graduate class as a prerequisite. Graduate classes are generally offered in the late afternoon and evening. Financial aid in the form of graduate assistantships may be available for full-time degree-seeking students.

Plan of Study
Before the end of the second semester, students must have a plan of study approved by their academic advisor. This plan should be kept up to date by regular consultation with the academic advisor. A final signed version of the plan must be included when the student submits a graduation application.

Admission Requirements
In addition to fulfilling Mason’s admission requirements for graduate study, applicants must meet the following requirements:

• Hold a baccalaureate degree that includes Data Structures and Algorithms (CS 310), Automata Theory and Formal Languages (CS 330), and Computer Architecture including Assembly Language (CS 465). Students also must have completed Calculus I and II and a substantial course in discrete mathematics (such as MATH 125). Students with some deficiencies in preparation may be admitted provisionally pending completion of foundation courses in mathemat-
ics or computer science. Undergraduate credit earned for this purpose may not be applied toward the graduate degree.

- Have earned a cumulative GPA of 3.00 for the last two years of undergraduate work, preferably with a major in a technical field such as computer science, mathematics, physical sciences, engineering, or information systems.
- Submit transcripts of all postsecondary education, a self-assessment form (included in the application package or available from the department), three letters of recommendation, and an official GRE report.

### Degree Requirements

In addition to general university requirements, completion of this program requires 30 credits of graduate courses as follows:

- CS 583 Analysis of Algorithms is required.
- At least five classes (15 credits) must qualify as “advanced” by having suitable graduate courses as prerequisites.
- Advanced classes must be taken from three different areas. The list of preapproved classes with the areas they belong to is provided below.
- At least six classes, including two advanced classes, must be designated CS.
- At least eight classes must be taken from the list of preapproved classes. Up to two computer science-related classes that are not on the list of preapproved classes may be taken with Computer Science Department approval.
- All prerequisites must be satisfied. In some cases, basic classes (including CS 583) may be skipped with approval of the Computer Science Department if equivalent undergraduate classes were taken previously.
- Project/Thesis (optional): three to six of the advanced classes may be replaced by a project (3 credits of CS 798) or a thesis (6 credits of CS 799). The project or thesis must be guided and approved by a committee of three appropriate faculty members and presented at an appropriate forum. The thesis must meet relevant university requirements.

### Preapproved MS CS Courses by Area

#### Artificial Intelligence and Databases

- CS 580 Introduction to Artificial Intelligence (basic)
- CS 650 Databases and Knowledge Engineering
- CS 680 Natural Language Processing
- CS 681 Designing Expert Systems
- CS 685/ECE 651/SYST 672 Intelligent Systems for Robots
- CS 687 Advanced Artificial Intelligence
- CS 688 Pattern Recognition
- CS 750/IT 750 Theory and Applications of Data Mining
- CS 771/IT 817 Neural Networks
- CS 775/IT 844 Advanced Pattern Recognition
- CS 780 Data Mining in Multimedia Databases
- CS 782 Machine Learning
- CS 785 Knowledge Acquisition
- INF 614 Database Management (basic)
- INF 740 Database Programming for the Web
- INF 755 Data Warehousing and Mining
- INF 760 Advanced Database Management
- INF 764 Object-Oriented Database Systems
- INF 772 Intelligent Agents and the Semantic Web
- INF 795 Special Topics in Data Mining Applications

### Theoretical Computer Science

- CS 583 Analysis of Algorithms (basic)
- CS 600 Theory of Computation
- CS 633 Computational Geometry
- CS 683 Parallel Algorithms
- CS 684 Graph Algorithms
- CS 735 Concurrency
- CS 753/IT 815 Parallel Computation

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ISA 765 Database and Distributed Systems Security
CS 811/IT 811 Research Topics in Machine Learning and Inference
CS 880/IT 910 Research Topics in Artificial Intelligence
CS 884/IT 940 Advanced Topics in Computer Vision and Robotics

### Programming Languages and Software Engineering

- CS 540 Language Processors (basic)
- CS 631 Object-Oriented Software Development
- CS 640 Advanced Compilers
- CS 645 Programming Language Semantics
- CS 719/IT 809 Scaling Technologies for E-business
- CS 732/IT 822 Software Maintenance and Reuse
- ISA 640 Programming Language Security
- ISA 681 Secure Software Design
- SSE 619 Object-Oriented Software Specification and Construction (basic)
- SSE 620 Software Requirements Analysis and Specification (basic)
- SSE 621 Software Modeling and Architectural Design
- SSE 622 Distributed Software Engineering
- SSE 623 Formal Methods and Models in Software Engineering
- SSE 632 User Interface Design and Development
- SSE 637 Software Testing
- SSE 642 Software Engineering for the World Wide Web
- SSE 645 Component-Based Software Development
- SSE 720 Advanced Software Requirements
- SSE 721 Reusable Software Architectures
- SSE 727 Quality of Service for Software Architectures

### Systems and Networks

- CS 555 Computer Communications and Networking (basic)
- CS 571 Operating Systems (basic)
- CS 635 Introduction to Parallel Computation
- CS 668 Computer Architecture Systems
- CS 671 Advanced Operating Systems
- CS 672 Computer Systems Performance Evaluation
- CS 673 Multimedia Computing and Systems
- CS 675 Distributed Systems
- CS 706 Concurrent Software Systems
- CS 755 Advanced Computer Networks
- CS 756 Performance Analysis of Computer Networks
- CS 758/IT 758 Networked Virtual Environments
- CS 773 Real-time Systems Design and Development
- CS 818/IT 818 Topics in Computer Systems
- ISA 562 Information Security Theory and Practice (basic)
- ISA 564 Security Laboratory (basic)
- ISA 656 Network Security
- ISA 673 Operating System Security
- ISA 674 Intrusion Detection
- ISA 697 Topics in Information Security
- ISA 763 Security Protocol Analysis
- ISA 764 Security Experimentation
- ISA 767 Secure Electronic Commerce
- ISA 785 Digital Forensics

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**Information Technology and Engineering**

Volgenau School of Information Technology and Engineering
Information Systems, MS

CS 850/IT 915 Research Topics in Parallel Computation

Visual Computing
CS 652 Computer Graphics
CS 662 Computer Graphics Game Technologies
CS 682 Computer Vision
CS 686 Image Processing
CS 752 Interactive Graphics Software
CS 774/IT 835 Computational Vision
CS 776/IT 852 Graphical Real-Time Simulation
CS 777 Human-Computer Intelligent Interaction
CS 778/IT 778 Biometrics
CS 884/IT 940 Advanced Topics in Computer Vision and Robotics

These courses are not classified by area. Note that CS 695/CS 795 can be used to satisfy the breadth requirement if the area is listed in the syllabus for the course.

CS 695 Topics in Computer Science
CS 697 Independent Reading and Research
CS 795 Advanced Topics in Computer Science
CS 798 Project Seminar
CS 799 Thesis
CS 895 Research Topics in Computer Science

Foundation Requirements

To ensure students have an adequate background in mathematical methods, computer technology, and business knowledge, the program requires the following foundation courses or their equivalents:

INFS 501 Discrete and Logical Structures for Information Systems
INFS 515 Computer Organization
INFS 519 Program Design and Data Structures

Admission Requirements

Applicants must hold a four-year (120-credit) baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or better in the last 60 credits. They also must meet the following requirements:

- Show proof of a satisfactory score on the GMAT or GRE, if required. The applicable test should have been taken within five years of applying for admission. The department policy is that the GMAT or GRE is required unless the applicant has an undergraduate degree in science or engineering from a U.S. university and graduated with a GPA of 3.00 or better in the last 60 hours; a graduate degree in science or engineering from a U.S. university; or been admitted as a nondegree student and meets all the following requirements: an undergraduate degree from a U.S. university, an undergraduate GPA of 3.00 or better in the last 60 hours, and a B or better grade in all foundation courses taken at Mason or elsewhere.

- Submit the appropriate application forms with three letters of recommendation from people directly knowledgeable of the applicant’s professional and academic competence, a one-page goals statement, and a work résumé.

Submit a department self-evaluation form that is essential for evaluating foundation requirements by the department faculty. This form may be obtained from the department office or the department web page. International students must submit their TOEFL score.

Advising

The department holds orientation meetings in January and August to advise newly admitted and continuing students. Members of the faculty are present to answer questions and offer advice concerning programs of study. Detailed information is available on the department web site.

The department also provides an advising function to students, as outlined in the student advising form available from the department. Each student is assigned a faculty advisor with whom to confer on matters related to degree requirements. A plan of study form for the MS degree should be completed and submitted by the student soon after admission to the program. This plan serves as a guide for the student.
Degree Requirements
Completion of the MS program requires a minimum of 30 approved graduate credits (10 courses). To provide a common background in the fundamentals of information systems, the following four courses are required of all students:

- INFS 612 Principles and Practices of Communication Networks
- INFS 614 Database Management
- INFS 622 Information Systems Analysis and Design
- ISA 562 Information Security Theory and Practice

For students taking the emphasis area and/or graduate certificate in software engineering, SWE 620 should be substituted for INFS 622.

The core courses constitute the technical body of knowledge for the program. The elective courses are organized into the following emphasis areas: database management, data mining, and data warehousing; electronic commerce; software engineering; knowledge management; and information security and assurance.

Elective Courses
Students may take six elective courses within an emphasis area, or they may mix and match electives according to their professional interests. Students may also plan their electives so as to obtain certificates offered by the department. There are also preapproved electives from other programs in the Volgenau School, as well as from university-wide programs. The department’s web site has a list of preapproved electives. Special courses may be used as electives with the approval of the student’s academic advisor and the graduate coordinator.

Listed below are the emphasis areas and the approved courses in each area.

Database Management
- INFS 623 Classical and Web Information Retrieval
- INFS 740 Database Programming for the Web
- INFS 760 Advanced Database Management
- INFS 772 Intelligent Agents and the Semantic Web
- INFS 796 Directed Readings
- ISA 765 Database and Distributed Systems Security

Data Mining and Data Warehousing
- CS 780 Data Mining in Multimedia Databases
- CS 782 Machine Learning
- INFS 755 Data Warehousing and Mining
- INFS 623 Classical and Web Information Retrieval
- INFS 795 Special Topics in Data Mining Applications
- INFS 785 Data Mining for Homeland Security
- INFS 796 Directed Readings

Electronic Commerce
- INFS 640 Introduction to Electronic Commerce
- INFS 770 Knowledge Management for E-Business
- INFS 772 Intelligent Agents and the Semantic Web
- INFS 790 Information Systems Policy and Administration
- INFS 796 Directed Readings
- ISA 656 Network Security
- ISA 767 Secure Electronic Commerce

Software Engineering
- SWE 619 Object-Oriented Software Specification and Construction
- SWE 621 Software Architecture and Design
- SWE 625 Software Project Management
- SWE 632 User Interface Design and Development
- SWE 637 Software Testing
- SWE 642 Software Engineering for the World Wide Web
- SWE 721 Reusable Software Architectures
- SWE 727 Quality of Service for Software Architectures

Knowledge Management
- CS 580 Introduction to Artificial Intelligence
- CS 681 Expert Systems
- CS 785 Knowledge Acquisition
- INFS 623 Classical and Web Information Retrieval
- INFS 650 Microsoft .NET Framework for Information Systems Applications
- INFS 740 Database Programming for the Web
- INFS 755 Data Warehousing and Mining
- INFS 770 Knowledge Management for E-Business
- INFS 772 Intelligent Agents and the Semantic Web
- INFS 774 Enterprise Architecture
- INFS 790 Information Systems Policy and Administration
- INFS 796 Directed Readings

Information Security and Assurance
- ISA 640 Programming Languages Security
- ISA 656 Network Security
- ISA 673 Operating Systems Security
- ISA 674 Intrusion Detection
- ISA 681 Secure Software Design
- ISA 763 Security Protocol Analysis
- ISA 764 Security Experimentation
- ISA 765 Database and Distributed Systems Security
- ISA 767 Secure Electronic Commerce
- ISA 796 Directed Readings in Information Security

Certificates may be also obtained by following the specific instructions for each, available at the department web site: database management, data mining, information engineering, electronic commerce, information security and assurance, software engineering, and web-based software engineering. These certificates are described in the computer science certificates section of this catalog.

Students, with the consent of a faculty sponsor and faculty advisor, may also elect courses in individualized study, special topics, or a 6-credit thesis, which is primarily intended for students planning to pursue a PhD in information technology with a concentration in information systems. The course designations are
- INFS 697 Topics in Information Systems
- INFS 796 Directed Readings in Information Technology
- INFS 797 Advanced Topics in Information Systems
- INFS 798 Research Project
- INFS 799 Thesis

Software Engineering, MS MS-SWE
This program provides specialized knowledge and experience in developing and modifying large, complex software systems. It emphasizes technical and management aspects of software engineering development. Software engineering is an established discipline based on requirements analysis, design, construction, testing, maintenance, economics, and management issues. A pragmatic approach to problem solving is the hallmark of a software engineer. Software engineers are concerned with the theoretical and practical aspects of technology, cost, and social impact of software systems that are effective and efficient.
Software engineers are in demand in every segment of society affected by computing technology. Potential employers include all software vendors and Internet-based companies, electronic business organizations, businesses that build and sell computers, research and development laboratories, aerospace companies, government contractors, banks, insurance companies, and manufacturing organizations. The master’s program is concerned with technical and managerial issues, but primary emphasis is placed on the technical aspects of building and modifying high-quality software systems.

Successful applicants have a broad variety of undergraduate backgrounds, including computer science, science and mathematics, engineering, liberal arts, and business. Many students are working or have worked in the software industry.

The program is revised on a regular basis to stay abreast of the latest developments in information technology (IT). The program introduced a major revision for fall 2005; recent additions include software construction with the object-oriented Java programming language, requirements analysis with use cases and the Unified Modeling Language (UML), object-oriented software design with the UML, graphical user interface design, software engineering for the web, software project management using the spiral life cycle model and the Capability Maturity Model, software architecture, design patterns, system testing and testing of object-oriented components, and formal methods using the Object Constraint Language. All classes are scheduled in the late afternoon and early evening to accommodate employed students.

Foundation Requirements

Students entering the MS program must have course work or equivalent knowledge in the following areas: introductory programming in any language; knowledge of an object-oriented programming language such as Java, C++, or C#; data structures and algorithms; machine organization (such as those given in computer system architecture or assembly language courses); and topics in discrete mathematics, including sets, relations, functions, trees, graphs, and inductive proofs. The level of knowledge required in these areas is equivalent to that taught in undergraduate courses and may be achieved by taking the following foundation courses from Mason:

- INFS 501 Discrete and Logical Structures for Information Systems
- INFS 515 Computer Organization
- INFS 519 Program Design and Data Structures
- SWE 510 Object-Oriented Programming in Java

In addition, it is desirable, though not required, that entering students have at least one year of work experience in building or modifying software systems.

Prospective students are asked to complete a department self-evaluation form, indicating whether previously taken courses may satisfy these foundation requirements. On acceptance, students are advised of the necessary foundation courses to be satisfactorily completed to meet this requirement. Foundation courses do not earn credit toward the MS degree; however, they must be successfully completed with a grade of B or better before enrolling in the core curriculum.

Students may test out to indicate they have the requisite knowledge for those foundation courses. The exams are given before classes begin in January and August, and can only be taken once. Registration is not required; students need only be present at the date, time, and location specified and bring some form of photographic identification. Detailed information is available on the department web site. Students failing any one of the exams must take the equivalent course before enrolling in the core curriculum courses.

Admission Requirements

In addition to general admission requirements of the university, each applicant to the MS program must hold a four-year (120-credit) baccalaureate degree in an appropriate discipline from an accredited institution and have earned a GPA of 3.00 or better in the last 60 credits of undergraduate study. Other requirements are as follows:

- Provide a one- to two-page statement of educational and work experience in the computing field that includes a statement of career goals in software engineering.
- Submit a department self-evaluation form, which can be obtained from the department. This form provides summary information concerning background and preparation for the program.
- Show proof of a satisfactory score on the GRE, if required. The test should have been taken within five years of applying for admission. The department policy is that the GRE is required unless the applicant has an undergraduate degree in science or engineering from a U.S. university and graduated with a GPA of 3.00 or better in the last 60 hours; a graduate degree in science or engineering from a U.S. university; or been admitted as a nondegree student and meets all the following requirements: an undergraduate degree from a U.S. university, an undergraduate GPA of 3.00 or better in the last 60 hours, and a B in all foundation courses taken at Mason or elsewhere.
- Submit the appropriate application form with three letters of recommendation from people directly knowledgeable of the applicant’s professional and academic competence.

Acceptance into the MS program is based on an overall assessment of the applicant’s ability to complete the program of study satisfactorily. Well-qualified students with minor deficiencies may be admitted to the program in provisional status, with specified course work to be completed within a specified time.

Advising

The department holds orientation meetings each January and August to advise incoming and continuing students. Members of the faculty are present to answer questions and offer advice concerning programs of study. Detailed information is available on the department web site.

The department also provides an advising function to students, as outlined in the student advising form available from the department. Each student is assigned a faculty advisor with whom to confer on matters related to degree requirements. A plan of study form for the MS degree should be completed and submitted by the student soon after admission; this plan serves as a guide for the student.

Degree Requirements

In addition to the general requirements of the university, the MS in software engineering requires a minimum of 30 graduate credits. The course work is divided into three categories: a breadth requirement of 12 credits of core courses,
a depth requirement of 9 credits of emphasis courses, and 9
credits of elective courses.

**Four Core Courses (12 credits)**
- SWE 619 Object-Oriented Software Specification and
  Construction
- SWE 620 Software Requirements Analysis and Specifi-
  cation
- SWE 621 Software Modeling and Architectural Design
- SWE 622 Distributed Software Engineering

**Emphasis Courses (9 credits)**
Students may choose an emphasis by taking three courses
from one of the emphasis areas of software design, software
assurance, software management, and web applications. With
permission from the advisor, a student may choose to not take
an emphasis. The emphasis area courses are

**Software Design**
- SWE 626 Software Project Laboratory
- SWE 632 User Interface Design and Development
- SWE 721 Reusable Software Architectures
- SWE 727 Quality of Service for Software Architectures
- SWE 781 Secure Software Design and Programming

**Software Assurance**
- SWE 623 Formal Methods and Models in Software
  Engineering
- SWE 637 Software Testing
- SWE 723 Precise Modeling
- SWE 781 Secure Software Design and Programming

**Software Management**
- SWE 625 Software Project Management
- SWE 626 Software Project Laboratory
- SWE 630 Software Engineering Economics
- SWE 637 Software Testing

**Web Applications**
- SWE 632 User Interface Design and Development
- SWE 637 Software Testing
- SWE 642 Software Engineering for the World Wide
  Web
- SWE 645 Component-Based Software Development

**Elective courses (9 credits)**
Students may select the remaining courses from the list of
approved courses, including other emphasis areas, available
from the department office and department web site. Students
may choose other graduate electives with the consent of their
faculty advisor and the graduate coordinator.

Students, with the consent of a faculty sponsor and faculty
advisor, may also elect courses in individualized study, special
topics, or a 6-credit thesis, which is primarily inten-
ted for students planning to pursue a PhD in information
technology with a concentration in software engineering. The
course designations are
- SWE 699 Special Topics in Software Engineering
- SWE 796 Directed Readings in Software Engineering
- SWE 798 Research Project
- SWE 799 Thesis

**Information Security and Assurance, MS**

The Department of Computer Science’s master of science
degree program in information security and assurance prepares
graduates to fill the current and future need for information
security and assurance professionals. Graduates work in a
wide variety of capacities, protecting the information systems
of different types of organizations and supporting the nation’s
information infrastructure. The master of science in information
security and assurance provides students with the general and
technical knowledge and skills to understand the relationship
between information security and advancing information
systems technology. The program gives graduates a theoretical
understanding of the science and methodologies for ensuring
the secrecy and integrity of data, as well as the availability and
legitimate use of data and information systems.

Students focus on the technical and management aspects of
information security and examine ways to provide secure
information processing systems by investigating operating
systems security, distributed secure system architectures,
database security, software applications security, security
policies, secure e-commerce, network and distributed systems
security, cryptography, and security protocols. Graduates of
the program are actively recruited by federal, state, and local
governments, as well as the private sector. Typical employers
include Internet-based companies, software companies, banks
and insurance companies, and in general any organization
that depends heavily on the use of IT. All classes are sched-
uled in the late afternoon and early evening to accommodate
employed students.

**Foundation Requirements**
To ensure that students have an adequate background in
mathematical methods and computer technology, the program
requires the following four foundation courses, or their
equivalents:
- INFS 501 Discrete and Logical Structures for Information
  Systems
- INFS 515 Computer Organization
- INFS 519 Program Design and Data Structures
- SWE 510 Object-Oriented Programming in Java

Prospective students are asked to complete a department self-
evaluation form, indicating whether previously taken courses
may satisfy these foundation requirements. On acceptance,
students are advised of the necessary foundation courses to be
satisfactorily completed to meet this requirement. Foundation
courses do not earn credit toward the MS degree; however,
they must be successfully completed with a grade of B or bet-
ter before enrolling in the core curriculum.

Students may test out to indicate that they have the requisite
knowledge for those foundations of INFS 501, 515, and 519.
The exams are given before classes begin in January and
August, and can only be taken once. Registration is not re-
quired; students need only be present at the date, time, and
location specified with some form of photographic identifica-
tion. Detailed information is available on the department web
site. Students failing any one of the exams must take the
equivalent course before enrolling in the core curriculum
courses.

**Admission Requirements**
Applicants must hold a four-year (120-credit) baccalaureate
degree from an accredited institution and have earned a GPA
of 3.00 or better in the last 60 credits. Other requirements are
as follows:
- Show proof of a satisfactory score on the GMAT or GRE,
  if required. The applicable test should have been taken
  within five years of applying for admission. The department
  policy is that the GMAT or GRE is required unless the ap-
Completion of the degree program requires a minimum of 30 approved graduate credits (10 courses). To provide the necessary background and fundamentals of information systems security and assurance, the program has three [Please check: four courses listed] courses that are required of all students:

- CS 555 Computer Communications and Networking
- CS 571 Operating Systems
- ISA 562 Information Security Theory and Practice
- ISA 563 Fundamentals of Systems Programming

To continue in the program, students are required to obtain a B- or better grade in the required courses. Students are allowed to repeat the required classes. Students are encouraged to complete the required courses before pursuing the electives.

Elective Courses

Security Electives

To provide breadth and depth of knowledge in information security and assurance, the degree program requires four electives to be taken from the following list of ISA courses:

- ISA 564 Security Laboratory
- ISA 640 Programming Languages Security
- ISA 650 Security Policy
- ISA 652 Security Audit and Compliance Testing
- ISA 656 Network Security
- ISA 673 Operating Systems Security
- ISA 674 Intrusion Detection
- ISA 681 Secure Software Design
- ISA 763 Security Protocol Analysis
- ISA 764 Security Experimentation

ISA 765 Database and Distributed Systems Security
ISA 767 Secure Electronic Commerce
ISA 785 Digital Forensics
IT 862 Security Models

Other Electives

The remaining two courses may be chosen from any combination of (1) courses at the ISA 600 and 700 level, including ISA 697, ISA 796, ISA 797, and ISA 798; (2) courses at the CS 500, 600, and 700 level; and (3) a list of preapproved qualified electives available from the department office or department web site. A thesis option is available whereby a student may elect to complete a 6-credit thesis.

Certificates

The department offers certificates in biometrics, computer games technologies, computer networking, database management, data mining, electronic commerce, foundations of information systems, information security and assurance, information engineering, intelligent agents, software architecture, software engineering, and web-based software engineering.

Course work toward these certificates can be used for credit toward the department MS programs or PhD in computer science or PhD in information technology. Note also that the certificates also may be pursued independently, as well as concurrently with any of the graduate degree programs in the Volgenau School.

Certificate in Biometrics CERG-BMCS

Biometrics, the science of recovering or verifying a person’s identity, measures the physical characteristics that make people unique (including fingerprints, an eye’s retina or iris, face, hand geometry, signature, and voice) and uses those measurements for person recognition or authentication. Biometrics are related to the science of forensics, which uses and interprets physical evidence for legal purposes. The importance of biometrics lies in the fact that traditional means of identification and verification are often unreliable or cumbersome. Passwords are difficult to remember and easy to steal. Keys, driver’s licenses, and passports can be lost or forged. The human body and its behavior, on the other hand, can’t be forgotten, stolen, forged, or misplaced. Practical uses for such biometrics are widespread and include maintaining the security for physical space and cyberspace. In particular, biometrics aids in controlling access to an office, computer network or an ATM, smart cards, and wireless communication; confirming the identity of buyers and sellers to make electronic commerce safe and reliable; confirming student identity for distant learning; and safeguarding electronic records related to health care services.

The certificate requires completion of 15 credits and consists of two required courses and three courses of choice. Projects (3 credits) can substitute for one of the choice courses. One of the three courses of choice can be taken from another department, with the advisor’s approval, provided that it belongs to the certificate’s area.

Required Courses (6 credits)

- CS 688/IT 688 Pattern Recognition
- CS 778 Biometrics

Choose from the following elective courses (9 credits)

- BINF 739 Signal and Image Processing for Bioinformatics
- CS 580 Introduction to Artificial Intelligence
Certificate in Computer Games Technology

Admission Requirements
The certificate program in computer games technology is open to all students who are eligible for entrance into the master’s degree program in computer science or any scientific or engineering discipline at Mason. To obtain the certificate, candidates must complete the following courses for a total of 15 credits. Transfer credit may substitute for at most one of these courses, subject to department approval:

Certificate Requirements
Required courses (12 credits):
- CS 652 Computer Graphics
- CS 662 Computer Graphics Game Technologies
- CS 758 Networked Virtual Environments
- CS 777 Human Computer Interaction

Plus one courses from the following (3 credits):
- AVT 616 Networked Art Practice
- AVT 676 Sound and Music for Video and Animation
- AVT 686 Three-Dimensional Video Art
- AVT 688 Digital Animation
- CS 633 Computational Geometry
- CS 673 Multimedia Computing and Systems
- CS 686 Image Processing and Applications
- CS 687 Advanced Artificial Intelligence
- CS 752 Interactive Graphics Software

Certificate in Computer Networking

When brought together to form computer networks, the technologies of computing and communications exhibit a synergy that is revolutionizing our world. In-depth knowledge of the new discipline of computer networking increasingly is in demand as a basis for design and deployment of new information systems ranging from aspects of the global Internet to distributed systems in a variety of application domains. The courses for this certificate have been selected to provide a solid basis for understanding the core software and communications technologies on which today’s networks are based and how they may be combined to create effective computer networks. Courses cover mainstream and leading-edge technology considerations, ensuring that students are prepared to function at the professional level in this fast-moving and technologically challenging field.

Admission Requirements
The certificate program is open to all students who are eligible for entrance into the master’s degree program in computer science or any scientific or engineering discipline at Mason.

Certificate Requirements
Students must complete the following courses, for a total of 15 credits:

Required courses (6 credits):
- CS 555 Computer Communications and Networking
- CS 571 Operating Systems

At least one of the following (3-6 credits):
- CS 755 Advanced Computer Networks
- CS 756 Performance Analysis of Computer Networks

One or two of the following electives (3 or 6 credits):
- ECE 542 Computer Network Architectures and Protocols
- ECE 642 Design and Analysis of Computer Communication Networks
- ECE 742 High-Speed Networks
- ISA 656 Network Security
- ISA 666 Internet Security Protocols
- IT 657 Advanced Network Science

Certificate in Foundations of Information Systems

This certificate program is designed primarily for students who earned an undergraduate degree in an area other than information systems and are willing to acquire solid foundations to pursue further education and career in information systems, software engineering, information security and assurance, or a related discipline.

Admission Requirements
The admission requirements for the certificate in foundations of information systems is a four-year bachelor’s degree with a GPA of 3.00 or higher. Also, the admission to the MS in Information Systems Program allows automatic admission to the certificate program.

Application forms may be obtained from the Computer Science Department or from the department web site.

Certificate Requirements
Certificate candidates must complete five courses, with an average grade of B or better, for a total of 15 credits of graduate study. To obtain the certificate, a student needs to complete the following:

Required courses (12 credits)
Take each one of the following foundation courses (no replacement is allowed):
- INFS 501 Discrete and Logical Structures for Information Systems
- INFS 515 Computer Organization
- INFS 519 Program Design and Data Structures
- SWE 510 Object-Oriented Programming in Java

Elective (3 credits)
Take any one course from the INFS, SWE, or ISA programs that do not require any prerequisites other than the above foundation courses.

Certificate in Database Management

This graduate certificate program provides comprehensive coverage that includes theoretical foundations, practical experience, and recent advances. The area of databases is considered by most experts to be a fundamental area of computer and information science.
**Admission Requirements**

Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or better in the last 60 credits. Applicants must complete a self-assessment form, which can be obtained from the Computer Science Department. The form provides information concerning background and preparation for the program.

Applicants must possess knowledge equivalent to that provided by the following courses:

INFS 501 Discrete and Logical Structures for Information Systems
INFS 515 Computer Organization
INFS 519 Program Design and Data Structures
SWE 510 Object-Oriented Programming in Java

Students not enrolled in a graduate degree program at Mason should apply for the database management certificate program through the Volgenau School Graduate Admissions Office. Students enrolled in a graduate degree program at Mason should contact the department for admission to the certificate program. Admission to the certificate program does not guarantee acceptance into any MS program.

**Certificate Requirements**

Students must complete five courses in information systems and IT with an average grade of B or higher, for a total of 15 credits of graduate study. To obtain the certificate, students must take the following:

**Required courses (6 credits):**
INFS 614 Database Management
INFS 760 Advanced Database Management

**Three from the following (9 credits):**
INFS 623 Classical and Web Information Retrieval
INFS 740 Database Programming for the Web
INFS 755 Data Warehousing and Mining
INFS 764 Object-Oriented Database Systems
INFS 795 Special Topics in Data Mining Applications
INFS 797 Advanced Topics in Database Management
ISA 765 Database and Distributed Systems Security
IT 861 Distributed Database Systems
IT 864 Scientific and Statistical Databases

For more information, contact the department or visit the department web site.

■ **Certificate in Data Mining**  CERG-DTM

This graduate certificate program is intended for people interested in the analysis and knowledge discovery from large and diverse data sources. The goal of the program is to study data mining concepts and successful applications. The certificate in data mining may be pursued concurrently with any of the graduate programs in the Volgenau School.

**Admission Requirements**

Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or better in the last 60 credits. In addition, applicants must complete a self-assessment form, which can be obtained from the Computer Science Department. This form provides summary information concerning background and preparation for the program.

Each applicant must possess knowledge equivalent to that provided by the following courses:

CS 310 Computer Science III
STAT 344 Probability and Statistics for Engineers and Scientists

Students not enrolled in a graduate degree program at Mason should apply for the data mining certificate program through the Volgenau School Graduate Admissions Office. Students enrolled in a graduate degree program at Mason should apply to the department for admission into the certificate program. Admission into the certificate program does not guarantee acceptance into any MS program.

**Certificate Requirements**

Students must complete five courses, with an average grade of B or better, for a total of 15 credits of graduate study. At least one course from three of the following groups must be taken to obtain the certificate:

**Group I**
CS 750 Theory and Applications of Data Mining
CS 780 Data Mining in Multimedia Databases
ISA 785 Digital Forensics
IT 844 Pattern Recognition

**Group II**
IT 875/CIS 703 Scientific and Statistical Visualization
IT 871 Statistical Data Mining
STAT 663/CSI 773 Statistical Graphics and Data Exploration
STAT 753 Computer Intrusion Detection

**Group III**
INFS 755 Data Warehousing and Mining
INFS 795 Data Mining Applications

**Group IV**
SYS/STAT 664 Bayesian Inference and Decision Analysis

■ **Certificate in E-Commerce**  CERG-ECOM

The Internet is having a significant effect on the way people interact with each other, government, and business. This graduate certificate program is for people who are interested in the use of Internet-based technology by people, government, and industry. We are witnessing the emergence of e-tailing, e-government, e-business, and business-to-business applications that are transforming society. The influence of electronic commerce is also being felt across international boundaries where it affects the management and administration of international business. The goal of the certificate in electronic commerce is to study the concepts, tools, policies, and underlying technology that enable Internet-based applications.

**Admission Requirements**

Applicants must hold a BS degree with a 3.00 or higher in the last 60 credits. They also must possess knowledge equivalent to the following four Mason courses, which are considered foundation courses: INFS 501 Discrete and Logical Structures for Information Systems, INFS 515 Computer Organization, INFS 519 Program Design and Data Structures, and SWE 510 Object-Oriented Programming in Java. Applicants also must possess equivalent knowledge of INFS 612 and 614; SWE 619, 620, and 621; or the prerequisite courses required for the selected electives.

Applicants must submit a one- to two-page statement of educational and work experience in the computing field. Applicants also need to complete a self-assessment form.
form provides summary information concerning background and preparation for the program.

For those students not enrolled in a Mason graduate degree program, application for the certificate program is made through the Volgenau School Graduate Admissions Office. Students enrolled in a Mason graduate degree program should contact the department for admission to the certificate program. Admission to the certificate program does not guarantee admission into any MS program.

Certificate Requirements

Students must complete five courses, with an average grade of B or better, for a total of 15 credits of graduate study. To obtain the certificate, a student must complete the following:

Two courses (6 credits):
INFS 640 Introduction to Electronic Commerce
INFS 770 Knowledge Management for E-Business

Three additional courses (9 credits) from the following:
Electives have been organized into emphasis areas, but students may also mix and match elective courses subject to satisfying course prerequisites:

Information Security
ISA 562 Information Security Theory and Practice
ISA 656 Network Security
ISA 767 Secure Electronic Commerce

Database Management
INFS 740 Database Programming for the Web
INFS 755 Data Warehousing and Mining
INFS 760 Advanced Database Management
INFS 772 Intelligent Agents and the Semantic Web
INFS 774 Enterprise Architecture

Internet Software Engineering
SWE 632 User Interface Design and Development
SWE 642 Software Engineering for the World Wide Web
SWE 645 Component-Based Software Development

Health Medical Information Systems
HAP 678 Introduction to the U.S. Health System*
HAP 714 Tele-Health Applications
HAP 740 Management of Health Information Systems

Note: Course may be waived for a person with experience in health care systems management and permission of the instructor.

Students enrolled in the MS in E-commerce program who wish to obtain the certificate in electronic commerce should consult the interdisciplinary programs, E-Commerce, MS in this catalog for details.

Certificate in Information CERG-INFE Engineering

This graduate certificate program is tailored for people involved in the specification, design, implementation, and management of data- and knowledge-intensive information systems. The certificate program prepares students for research, development, and professional practice in information engineering by offering a hands-on set of courses providing theoretical knowledge and practical experience with methods and tools associated with database management systems, data modeling, knowledge acquisition, data and knowledge representation, and software engineering.

Admission Requirements

Applicants must have a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or higher in the last 60 credits. In addition, applicants must complete a self-assessment form, which can be obtained from the Computer Science Department. This form provides summary information concerning background and preparation for the program.

Applicant must possess knowledge equivalent to that provided by the following courses:
INFS 501 Discrete and Logical Structures for Information Systems
INFS 515 Computer Organization
INFS 519 Program Design and Data Structures
SWE 510 Object-Oriented Programming in Java

Students not enrolled in a Mason graduate degree program should apply for the information engineering certificate program through the Volgenau School Graduate Admissions Office. Students enrolled in a Mason graduate degree program should apply to the department for admission into the certificate program. Admission into the certificate program does not guarantee acceptance into any MS program.

Certificate Requirements

Students must complete five courses, with an average grade of B or better, for a total of 15 credits of graduate study. To obtain the certificate, students must complete the following:

Four required courses (12 credits):
INFS 612 Principles and Practices of Communication Networks
INFS 614 Database Management
SWE 620 Software Requirements Analysis and Specification
SWE 621 Software Modeling and Architectural Design

One of the following courses (3 credits):
INFS 770 Knowledge Management for E-Business
SWE 625 Software Project Management

Note: Students enrolled in the MS in Information Systems Program must substitute SWE 620 for INFS 622 to obtain this certificate. Credit is not given for taking both INFS 622 and SWE 620; only 3 credits will be awarded. For more information, contact the department or visit the department web site.

Certificate in Information CERG-ISA Security and Assurance

This graduate certificate program is for people who are interested in science and methods for ensuring secrecy, integrity, availability, and legitimate use of information systems. The certificate may be pursued concurrently with any of the graduate programs in the Volgenau School.

Admission Requirements

Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or higher in the last 60 credits. In addition, applicants must complete a self-assessment form, which can be obtained from the Computer Science Department. This form provides summary information concerning background and preparation for the program.

Applicants must possess knowledge equivalent to that provided by the following courses:
Certificate Requirements

Students must complete five courses with an average grade of B or better for a total of 15 credits of graduate study.

Two required courses (6 credits):
ISA 562 Information Security Theory and Practice
ISA 656 Network Security

Three additional courses (9 credits):
Three electives to be taken from ISA 564 and courses at the ISA 600 and 700 level, excluding ISA 697, ISA 796, ISA 797, and ISA 798.

Certificate in Intelligent Agents

This certificate concentrates on the theory and practice of designing and developing systems that rely on knowledge and reasoning, generically called intelligent agents: expert systems, knowledge-based systems, knowledge-based decision support systems, expert database systems, intelligent tutoring systems, and so on. Capturing, using, preserving, transferring, and sharing knowledge is of critical importance to any organization as society evolves from an information society to a knowledge society. Therefore, the ability to design and develop intelligent agents for a wide variety of domains is becoming a highly valuable expertise. The courses in this certificate program cover the basics of knowledge engineering and intelligent agents, as well as advanced research topics. Basic topics include knowledge representation, knowledge acquisition, heuristic search, problem solving and planning, uncertainty reasoning, machine learning, natural language processing, design of expert systems, human-computer interaction, data mining, knowledge discovery, and knowledge management. Advanced topics include the development of multiagent systems, mixed-initiative intelligent systems, web-based intelligent agents, and distributed ontologies.

Admission Requirements

The program is open to all students who are eligible for entrance into the master’s degree program in computer science or any scientific or engineering discipline at Mason.

Certificate Requirements

Students must complete the following courses for a total of 15 credits:

Required (3 credits):
CS 580 Introduction to Artificial Intelligence

Plus four of the following elective courses (12 credits):
CS 680 Natural Language Processing
CS 681 Designing Expert Systems
CS 685 Intelligent Systems for Robots
CS 687 Advanced Artificial Intelligence
CS 750 Theory and Applications of Data Mining
CS 777 Human-Computer Intelligent Interaction
CS 780 Data Mining in Multimedia Databases
CS 782 Machine Learning
CS 785 Knowledge Acquisition and Problem Solving
CS 798 Project Seminar
CS 811/IT 811 Research Topics in Machine Learning and Inference
CS 880/IT 910 Research Topics in Artificial Intelligence
INFS 772 Intelligent Agents and the Semantic Web

One of the four courses may be taken from another MS or PhD program in the Volgenau School with advisor approval, provided it belongs to the certificate area.

Certificate in Software Architecture

This graduate certificate program provides knowledge, tools, and techniques to those who are working or planning to work in software architecture but do not want to complete the requirements for a master’s degree in the field. The certificate may be pursued concurrently with any of the graduate degree programs in the Volgenau School.

Software architecture is an essential part of a software system and can be considered the backbone for such a system. Many industrial organizations recognize the important role of software architecture and have requested specific courses and graduate certification in this area. This proposed graduate certificate program addresses this industrial need. Mason is well-positioned to address this need because the university already offers several relevant courses and has the faculty with the necessary expertise to teach them.

Admission Requirements

Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or higher in the last 60 credits. In addition, applicants must complete a self-assessment form, which can be obtained from the department. This form provides summary information concerning background and preparation for the program.

Applicants must possess knowledge equivalent to the following undergraduate courses: structured programming in a modern programming language, data structures, discrete mathematics, and machine organization. The level of knowledge may also be achieved by taking the following foundation courses at Mason: INFS 501 Discrete and Logical Structures for Information Systems, SWE 510 Object-Oriented Programming in Java, INFS 515 Computer Organization, and INFS 519 Program Design and Data Structures. In addition, it is desirable, but not necessary, for applicants to have at least one year of appropriate work experience in building or modifying software systems.

Applicants must submit a one- to two-page statement of educational and work experience in the computing field that includes a statement of career goals in software engineering. Students not enrolled in a Mason graduate degree program should apply for the certificate program through the Volgenau School Graduate Admissions Office. Students enrolled in a Mason graduate degree program should apply to ISE for...
admission into the certificate program. Admission into the certificate program does not guarantee acceptance into any MS program.

Certificate Requirements
Students must complete five courses with an average grade of B or better for a total of 15 credits of graduate study.

Required courses (9 credits):
SWE 621 Software Modeling and Architectural Design
SWE 721 Reusable Software Architectures
SWE 727 Quality of Service for Software Architectures

Optional courses (minimum of two courses must be selected) (6 credits):
CS 672 Computer Systems Performance Evaluation
CS 732/IT 822 Software Maintenance and Reuse
CS 773 Real-Time Systems Design and Development
IT 823 Software for Critical Systems
SWE 620 Software Requirements Analysis and Specification
SWE 622 Distributed Software Engineering
SWE 625 Software Project Management
SWE 631/CS 631 Object-Oriented Design Patterns
SWE 637 Software Testing
SWE 641/SYST 621 Systems Architecture for Large-Scale Systems
SWE 781/ISA 681 Secure Software Design and Programming
SWE 645 Component-Based Software Development

Certificate in Software Engineering CERG-SWE

This graduate certificate program provides knowledge, tools, and techniques to those who are working in or planning to work in software engineering but do not want to complete requirements for a master’s degree in the field. The certificate may be pursued concurrently with any of the graduate degree programs in the Volgenau School.

Admission Requirements
Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or higher in the last 60 credits. In addition, applicants must complete a self-assessment form, which can be obtained from the Computer Science Department. This form provides summary information concerning background and preparation for the program.

Applicants must possess knowledge equivalent to the following undergraduate courses: structured programming in a modern programming language, data structures, discrete mathematics, and machine organization. The level of knowledge may also be achieved by taking the following foundation courses at Mason: INFS 501 Discrete and Logical Structures for Information Systems, SWE 510 Object-Oriented Programming in Java, INFS 515 Computer Organization, and INFS 519 Program Design and Data Structures. In addition, it is desirable, but not necessary, for applicants to have at least one year of appropriate work experience in building or modifying software systems.

Applicants must submit a one- to two-page statement of educational and work experience in the computing field that includes a statement of career goals in software engineering. Students not enrolled in a Mason graduate degree program should apply for the certificate program through the Volgenau School Graduate Admissions Office. Students enrolled in a Mason graduate degree program should apply to the Computer Science Department for admission into the certificate program. Admission into the certificate program does not guarantee acceptance into any MS program.

Certificate Requirements
Students must complete five courses with an average grade of B or better for a total of 15 credits of graduate study.

Three required courses (9 credits):
SWE 619 Object-Oriented Software Specification and Construction
SWE 620 Software Requirements Analysis and Specification
SWE 621 Software Modeling and Architectural Design

Two additional courses (6 credits): (subject to satisfying their prerequisites) from the following:
CS 706 Concurrent Software Systems
CS 707 Distributed Software Systems
CS 735 Concurrency
SWE 622 Distributed Software Engineering
SWE 623 Formal Methods and Models in Software Engineering
SWE 625 Software Project Management
SWE 630 Software Engineering Economics
SWE 631 Object-Oriented Design Patterns
SWE 632 User Interface Design and Development
SWE 637 Software Testing
SWE 641/SYST 621 Systems Engineering of Information Architectures
SWE 642 Software Engineering for the World Wide Web
SWE 645 Component-Based Software Development
SWE 699 Special Topics in Software Engineering
SWE 720 Advanced Software Requirements
SWE 721 Reusable Software Architecture
SWE 723 Precise Modeling
SWE 763 Software Engineering Experimentation
SWE 781 Secure Software Design and Programming
SWE 724 Model-Driven Software Development
SWE 727 Quality of Service for Software Architectures
SWE 798 Research Project

Note: Students enrolled in the MS in Information Systems Program may substitute SWE 620 for INFS 622 to obtain this certificate. Credit is not given for taking both INFS 622 and SWE 620; only 3 credits will be awarded.

Students enrolled in the MS in Computer Science Program may obtain a certificate in software engineering by taking any five SWE courses. If CS/SWE 706 is included, it is possible to complete the MS in computer science and the certificate in software engineering within 30 hours.

Certificate in Web-Based Software Engineering CERG-WBSE

This graduate certificate program provides knowledge, tools, and techniques to those who are working in or planning to work in web and distributed software applications. Graduate students in the Volgenau School may pursue a specialization in web-based software engineering leading to this certificate.
Admission Requirements

Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or better in the last 60 credits. Applicants must complete a self-assessment form, which can be obtained from department or the department web site. The form provides information concerning background and preparation for the program.

Applicants must possess knowledge equivalent to that provided by the following courses: INFS 501 Discrete and Logical Structures for Information Systems, SWE 510 Object-Oriented Programming in Java, INFS 515 Computer Organization, and INFS 519 Program Design and Data Structures.

Students not enrolled in a Mason graduate degree program should apply to the certificate program through the Volgenau School Graduate Admissions Office. Students enrolled in a Mason graduate degree program should contact the department for admission to the certificate program. Admission to the certificate program does not guarantee admission to any MS program.

Certificate Requirements

Students must complete five courses with an average grade of B or higher for a total of 15 credits of graduate study.

Three required courses (9 credits):
SWE 622 Distributed Software Engineering
SWE 632 User Interface Design and Development
SWE 642 Software Engineering for the World Wide Web

One of the following courses (3 credits):
CS 656 Computer Communications and Networking
ECE 542 Computer Network Architectures and Protocols
INFS 612 Principles and Practices of Communication Networks

One of the following courses (3 credits):
CS 707 Distributed Software Systems
INFS 614 Database Management
ISA 666 Internet Security Protocols
SWE 619 Object-Oriented Software Specification and Construction
SWE 621 Software Modeling and Architectural Design
SWE 637 Software Testing
SWE 645 Component-Based Software Development

For more information, please consult the department web site.

■ Computer Science, PhD PHD-CS

The PhD program requires course work, qualifying and comprehensive examinations, and a doctoral dissertation that is first proposed and eventually defended. Mason's general doctoral requirements apply to this program.

Admission Requirements

All applicants must have an undergraduate degree, and their prior academic work must show a strong academic background in computer science. In addition, they must have taken the GRE exams: the General Test is required from every applicant; the Subject Test in Computer Science is not required but is recommended. Finally, each applicant must provide a brief statement of career goals and personal aspirations, as well as three letters of reference. Each application receives careful consideration from the PhD Admission Committee.

Qualifying Exams

Students must demonstrate breadth of knowledge in computer science by passing written qualifying exams. The exams are offered once every semester (usually in the week before the semester begins). To qualify, each student must pass exams in four areas, one of which is foundations of computer science. The other three areas are chosen from these eight areas: operating systems, networks, compilers and languages, object-oriented software specification and construction, software modeling and architectural design, artificial intelligence, database systems, and information systems security. The four exams must be attempted in the same semester, and a failed exam may be retaken once only in the next semester. A student who fails to pass the four exams in two consecutive semesters is subject to termination from the program. Each student must take a set of four exams no later than the first opportunity following the completion of 24 credits. If a student enters the program without a master's degree in computer science or a related area, then the exams must be taken no later than the first opportunity following the completion of 36 credits.

Course Requirements

The course requirement for the degree is 72 credits. Of these, 30 credits at most may be granted for an approved MS degree. The following courses, totaling 30 credits, are required from all students: CS 700 Quantitative Methods and Experimental Design in Computer Science (3 credits); CS 800 Computer Science Colloquium (2 credits); CS 990 Dissertation Topic Presentation (1 credit); CS 998 Doctoral Dissertation Proposal (12 credits); and CS 999 Doctoral Dissertation (12 credits). The remaining 12 credits must be obtained in advanced graduate courses chosen from a list maintained by the program.

Dissertation Committee Selection

Each student must form a dissertation committee, comprising four or five individuals. Three members of the committee must be tenured or tenure-track faculty in the Computer Science Department. The fourth member must be from outside the department. The chair of the dissertation committee, who must also be the dissertation director, must be tenured or tenure-track faculty in the Volgenau School. The committee must be approved by the chair of the Computer Science Department and the associate dean for graduate studies of the Volgenau School.

Comprehensive Exam

Students must pass an oral comprehensive exam, in which they demonstrate depth of knowledge in their intended area of research, and ability to perform original research in that area. The scope of the oral exam is defined by a reading list prepared by the student and the dissertation director. The list should include research papers and textbooks that adequately cover the basic tools used in the research area, the fundamentals of the research area, and state-of-the-art knowledge in the specific focus of research. The reading list must be accompanied by a one-page description of the intended research. This document must be approved by the dissertation committee prior to the exam and becomes part of the student’s record. The duration of the oral exam is typically two hours. Students who fail the exam are allowed to retake it once. Failure in the second attempt results in dismissal from the program.
Dissertation Proposal

Each student must prepare a written dissertation proposal. While preparing this proposal, the student enrolls in CS 998 Doctoral Dissertation Proposal. The proposal must be presented to and approved by the dissertation committee. The committee determines whether the proposal has merit and can lead to significant contributions to the area and whether the student has the knowledge and skills to complete the proposed work successfully and in a timely manner. On completing this requirement successfully, the student is advanced to candidacy for the PhD degree.

Dissertation Preparation and Defense

While preparing the dissertation, the candidate enrolls in CS 999 Doctoral Dissertation. When the work is deemed complete, the dissertation is defended. The public defense is preceded by a predefense meeting in which only the candidate, the dissertation committee members, and possibly the director of the PhD in Computer Science Program (or his or her representative) are present. If the committee approves, the candidate may then schedule the final public defense. There should be at least one month between the predefense meeting and the defense, and the defense must be announced at least two weeks in advance. The dissertation must be made available to the committee at least two weeks in advance of the defense. The entire dissertation committee must be present at the defense, unless an exception is approved by the director of the PhD in Computer Science Program in advance of the defense. The dissertation must make significant contributions to its area and be publishable in refereed journals or conferences. If the candidate defends the dissertation successfully, the dissertation committee recommends that the final form of the dissertation be completed under the supervision of the dissertation director and the graduate faculty of Mason accept the candidate for the PhD degree. If the candidate fails to defend the dissertation, the candidate may request a second defense, following the same procedures as for the initial defense. There is no time limit for this request, other than general time limits for the doctoral degree, and an additional predefense is not required. A candidate who fails a second attempt to defend the dissertation is dismissed from the program.

PhD Study in Information Technology with CS Concentrations

Doctoral study in information systems, software engineering, and information security is available through the PhD in Information Technology Program, which offers advanced courses in these disciplines. The doctoral program allows students to take a broad range of courses and research options. Students can specialize in various areas including information systems, software engineering, and information security.

Information Technology, PhD

▲ Concentration in Information Security and Assurance (ISA)

Students who pursue a concentration in this doctoral program will have the concentration noted on their transcript. The degree conferred on a graduating student is the PhD in information technology with concentration in information security. Students may also pursue such doctoral studies without designating a concentration.

Requirements

Students seeking this concentration must satisfy all requirements for the PhD in information technology. In addition, the following requirements must be met.

Plan of Study

All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of Computer Science doctoral coordinator.

Doctoral Supervisory Committee

The dissertation director must be a faculty member of the Volgenau School. The composition of the doctoral supervisory committee is to be approved by the Computer Science doctoral coordinator and department chair, and the Volgenau School associate dean for research and graduate studies. Permission for the comprehensive exam and dissertation defense is requested from the Volgenau School associate dean on the basis of a written request and plan that has been approved by the supervisory committee and the Computer Science doctoral coordinator.

For information regarding qualifying exams and emphasis areas, please consult the department web site.

Information Technology, PhD

▲ Concentration in Information Systems (ISYS)

Students pursing a concentration in this doctoral program will have the concentration noted on their transcript. The degree conferred on a graduating student is the PhD in information technology with concentration in information systems. Students may also pursue such doctoral studies without designating a concentration.

Requirements

Students seeking this concentration must satisfy all the requirements for the PhD in information technology. In addition, the following requirements must be met.

Plan of Study

All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of the Computer Science doctoral coordinator.

Doctoral Supervisory Committee

The dissertation director must be a Computer Science faculty member. The composition of the doctoral supervisory committee must be approved by the Computer Science doctoral coordinator, the Computer Science chair, and the Volgenau School associate dean for research and graduate studies. Permission for the comprehensive exam and dissertation defense is requested from the Volgenau School associate dean on the basis of a written request and plan approved by the supervisory committee and the Computer Science doctoral coordinator.

For information regarding qualifying exams and emphasis areas, please consult the department web site.
**Information Technology, PhD**

▲ Concentration in Software Engineering (SWE)

Students who pursue a concentration in this doctoral program will have the concentration noted on their transcript. The degree conferred on a graduating student is the PhD in information technology with concentration in software engineering. Students may also pursue such doctoral studies without designating a concentration.

**Requirements**

Students seeking this concentration must satisfy all requirements for the PhD in information technology. In addition, the following requirements must be met.

**Plan of Study**

All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of the Computer Science doctoral coordinator.

**Doctoral Supervisory Committee**

The dissertation director must be a faculty member of the Computer Science Department. The composition of the doctoral supervisory committee is to be approved by the Computer Science doctoral coordinator, the Computer Science chair, and the Volgenau School associate dean for research and graduate studies. Permission for the comprehensive exam and dissertation defense is requested from the Volgenau School associate dean on the basis of a written request and plan that has been approved by the supervisory committee and the Computer Science doctoral coordinator.

For information regarding qualifying exams and emphasis areas, please consult the department web site.

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**Electrical and Computer Engineering**

Phone: 703-993-1569  
Web: ece.gmu.edu

**Faculty**

**Professors:** Allnutt, Cook, Ephraim, Gertler, Griffiths, Ioannou, Jabbari, Katona, Levis, Manitius (chair), Mulpuri

**Associate professors:** Berry, Chang, Gaj, Hintz, Mark, Paruchowitz, Paris, W. Sutton, Wage

**Assistant professors:** Hwang, Kaps, Li, Nelson, Peixoto, Sikdar

**Adjunct professors:** Bales, Beatty, Gharay, Holdener, Lazarevich, Mital, Rader, Shackelford, Storey, Watson, West

**Course Work**

The Electrical and Computer Engineering (ECE) Department offers all courses designated ECE and BENG in the Course Descriptions chapter of this catalog. The department also offers most of the courses designated TCOM and some ENGR courses.

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**UNDERGRADUATE PROGRAMS**

The undergraduate education mission of the ECE Department is to provide a quality education for electrical engineering, computer engineering, and electronics and communications engineering students to support the needs of Virginia and the nation.

The objectives of undergraduate programs within the ECE Department relate to the abilities of our graduates three to five years after graduation. These objectives include:

- **Technical knowledge:** Graduates will be able to apply the fundamentals in the appropriate engineering discipline as demonstrated by success as productive engineers in industry, government, or graduate school.

- **Preparation for further study:** Graduates will have the knowledge and skills to engage in lifelong learning.

- **Professionalism:** Graduates will have the skills and understanding needed to fulfill their professional responsibilities as engineers, including written and oral communication, ethics, and teamwork.

**Computer Engineering, BS**

The field of computer engineering can be described as a blend of electrical engineering and computer science. It is an amalgam of the computer hardware orientation of an electrical engineering program and the operating systems and languages of a computer science program. Computer engineers are involved in research, development, design, production, and operation of a wide variety of digital systems, from integrated circuits to computer systems and large-scale computer networks. Reflecting the industry trend to integrate hardware and software development, the computer engineering program is built around software running on advanced hardware that can simulate and assist in the design of new digital systems. Advanced software, such as VHDL, and software tools, such as logic and system design tools by Mentor Graphics and Cadence Design Systems, can be used to model hardware and hardware functionality from the system and architecture level down to the gate level and include relations to integrated circuit fabrication technology. Design and testing methodology involving these tools is taught in the program.

Career opportunities exist in engineering research and development, product design, digital system design and integration, engineering management, engineering consultancy, technical sales, and patent law, among others. The program provides a strong preparation for graduate study.

The bachelor’s program in computer engineering at Mason is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, Maryland 21202-4012; 410-347-7700. The computer engineering program is staffed by 25 full-time professors, including five fellows of IEEE or other professional societies.

The curriculum provides a strong background in the fundamentals of computer engineering. A number of technical elective concentrations are offered, ranging from strongly hardware-oriented concentrations to strongly software-oriented ones. A major project with appropriate planning, documentation, and oral and written reports is required.

The requirements for the degree may be satisfied on a part-time or co-op basis. Cooperative education provides students the opportunity to integrate paid career-related work experience.
with classroom learning. In addition to the usual financial aid available to all students through the Office of Student Financial Aid, computer engineering majors are eligible to apply through the ECE Department for several scholarships provided by professional societies and industrial organizations, including the Armed Forces Communications and Electronics Association, the Association of Old Crows, the Institute of Electrical and Electronics Engineers, and Rockwell International.

**Degree Requirements**

All computer engineering students are strongly encouraged to see their major advisor each semester before course registration. Students interested in computer engineering who have not declared a major are also invited to obtain advising at the ECE Department office. Students are strongly encouraged to follow the sample schedule below to ensure that course prerequisites are satisfied.

Students must complete each ECE, ENGR, and CS course presented as part of the required 120 credits for the degree with a grade of C or better.

The 120 credits required for the BS in computer engineering are as follows:

- Electrical and computer engineering: ECE 201, 220, 280, 331, 332, 333, 334, 445, 447, 448, 465, 491, 492, 493
- Computer science: CS 112, 211, 262, 367, 471
- Technical electives (9 credits)
- Engineering: ENGR 107
- English: ENGL 101, 302; COMM 100
- Literature general education course (3 credits)
- Economics: ECON 103
- Western civilization: HIST 100 (3 credits)
- Arts general education course (3 credits)
- Global understanding general education course (3 credits)
- Mathematics: MATH 113, 114, 125, 203, 213, 214; STAT 346
- Physics: PHYS 160, 161, 260, 261, 262
- Synthesis general education course: ECE 492/493

**Note:** General education courses should be selected from the department’s list of approved courses. All students must submit at least 24 credits of social science and humanities course work, which is normally satisfied by the 24 credits of university general education social science and humanities courses listed above. Technical electives should be selected from the department’s list of approved technical elective concentrations. Students are also encouraged to propose additional technical elective concentrations for approval.

### Sample Schedule

The following presents a sample schedule that undergraduate computer engineering majors would pursue to obtain a bachelor’s degree.

#### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 112 Computer Science I</td>
<td>4</td>
</tr>
<tr>
<td>ECON 103 Contemporary Microeconomic Principles</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 101 Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 107 Engineering Fundamentals</td>
<td>2</td>
</tr>
<tr>
<td>MATH 113 Analytic Geometry and Calculus I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

#### Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 211 Computer Science II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 114 Analytic Geometry and Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 125 Discrete Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

#### Third Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 201 Introduction to Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>MATH 203 Matrix Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 213 Analytic Geometry and Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 260 University Physics II</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 261 University Physics II Laboratory</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

#### Fourth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 220 Signals and Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 280 Electric Circuit Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECE 331 Digital System Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 332 Digital Electronics and Logic Design Lab</td>
<td>3</td>
</tr>
<tr>
<td>MATH 214 Elementary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

#### Fifth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 333 Linear Electronics I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 334 Linear Electronics I Lab</td>
<td>1</td>
</tr>
<tr>
<td>ECE 445 Computer Organization</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 302 Advanced Composition for natural sciences</td>
<td>3</td>
</tr>
<tr>
<td>STAT 346 Probability for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CS 262 Introduction to Low-Level Programming</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

#### Sixth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 100 Oral Communications</td>
<td>3</td>
</tr>
<tr>
<td>CS 367 Computer Systems and Programming</td>
<td>3</td>
</tr>
<tr>
<td>ECE 465 Computer Networking Protocols</td>
<td>3</td>
</tr>
<tr>
<td>ECE 448 FPGA and ASIC Design with VHDL</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 262 Physics III</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

#### Seventh Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 447 Single-Chip Microcomputers</td>
<td>4</td>
</tr>
<tr>
<td>ECE 491 Engineering Senior Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ECE 492 Senior Advanced Design Project I</td>
<td>1</td>
</tr>
<tr>
<td>HIST 100 History of Western Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding course</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

#### Eighth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 471 Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 493 Senior Advanced Design Project II</td>
<td>2</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
<tr>
<td>Arts course</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

#### Change of Major

Students who want to change their majors to computer engineering must have at least a 2.75 GPA in all math, physics, engineering, and computer science courses, and should have successfully completed MATH 114.

#### Writing-Intensive Requirement

Mason’s writing-intensive requirement is satisfied by completion of ECE 492 and 493 Senior Advanced Design Project I and II, in which various aspects of project documentation and reports are prepared and critiqued. The faculty provides feedback on student writing. Drafts and revisions are required.
Double Major in Computer Engineering and Computer Science

Computer engineering majors can earn a double major in computer engineering and computer science if they complete an additional 26 credits of courses according to an approved plan of study. Details are available in the department brochures or at the Volgenau School website ite.gmu.edu.

Electrical Engineering, BS - BS-ELEN

Electrical engineering is a major field of modern technology. Electrical engineers are involved in research, development, design, production, and operation of a wide variety of devices and systems, from integrated circuits and microwave and laser devices, communication systems, control systems, radar, robots, large telecommunication networks, and power networks.

The bachelor’s program in electrical engineering at Mason is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, Maryland 21202-4012; 410-347-7700. The electrical engineering program is staffed by 25 full-time professors, including five fellows of IEEE or other professional societies. The curriculum provides a strong background in the fundamentals of electrical engineering and senior-level courses in the important areas of electronics, networks, communications and signal processing, computer engineering, and controls and robotics. Further, the curriculum includes 9 credits of senior technical electives, 2 credits of advanced engineering labs, and 3 credits of senior advanced design project, which may be used for further concentration in one of these areas.

Career opportunities exist in engineering research and development, system design, system integration, engineering management, engineering consultancy, technical sales, and patent law, among others. The program provides a strong preparation for graduate study.

Degree requirements may be satisfied on a part-time or co-op basis. Cooperative education provides students with the opportunity to integrate paid career-related work experience with classroom learning. In addition to the usual financial aid available to all students through the Office of Student Financial Aid, electrical engineering majors are eligible to apply at the ECE Department for several scholarships provided by professional societies and industrial organizations, including the Armed Forces Communications and Electronics Association, the Association of Old Crows, the Institute of Electrical and Electronics Engineers, and Rockwell International.

Degree Requirements

All electrical engineering students are strongly encouraged to see their major advisor before course registration each semester. Students interested in electrical engineering who have not declared a major also are invited to obtain advising from the ECE Department. Students are strongly encouraged to follow the sample schedule below to ensure that course prerequisites are satisfied.

Students must complete each ECE and ENGR course presented as part of the required 120 credits for the degree with a grade of C or better.

The 120 credits required for the BS in electrical engineering are as follows:

Electrical and computer engineering: ECE 101, 201, 220, 280, 305, 320, 331, 332, 333, 334, 421, 433, 445, 460, 491, 492, 493

Computer science: CS 112, 222

Advanced ECE labs (2 credits)

ECE technical electives (9 credits)

Engineering: ENGR 107

English: ENGL 101, 302; COMM 100

Literature general education course (3 credits)

Economics: ECON 103

Western civilization: HIST 100 course (3 credits)

Arts general education course (3 credits)

Global understanding course (3 credits)

Mathematics: MATH 113, 114, 203, 213, 214; STAT 346

Physics: PHYS 160, 161, 260, 261, 262, 263

Synthesis general education course: ECE 492/493

Note: General education courses should be selected from the department’s list of approved courses. All students must submit at least 24 credits of social science and humanities course work, which is normally satisfied by the 24 credits of university general education social science and humanities courses listed above. Technical electives should be selected from the department’s list of approved courses. The required design content must be satisfied by the technical electives.

Concentrations

Concentrations are available within the electrical engineering baccalaureate program. Completion of specific science courses and senior-level courses leads to one of these designations on the student’s transcript on graduation.

Concentration in Bioengineering (BIOE)

In place of 13 credits of PHYS 262, PHYS 263, ECE 460, ECE 492, ECE 493, and one 3-credit technical elective as listed under the Degree Requirements section above, take 13 credits of BIOI 213 (4 credits), BENG 401 (4 credits), BENG 402 (1 credit), BENG 492 (2 credits), and BENG 493 (2 credits).

Concentration in Communications and Signal Processing (CSP)

Students must complete

• ECE 461
• ECE 492/493, Senior Advanced Design Project, with a communications and signal processing topic
• Three courses from ECE 410, 462, 463, 464, 465, 499 (communications and signal processing topic only), 528, 535, 567, 590 (communication and signal processing topic only), and PHYS 306

Concentration in Computer Engineering (CPE)

Students must complete

• ECE 447
• ECE 492/493, Senior Advanced Design Project, with a computer engineering topic
• Two courses from ECE 431, 437, 448, 450, 499 (computer engineering topic only), 548, 590 (computer engineering topic only), and CS 471

Concentration in Control Systems (CON)

Students must complete

• ECE 429
• ECE 492/493, Senior Advanced Design Project, with a control systems topic
• Three courses from ECE 422, 447, 450, 499 (control systems topic only), 511, 521, 528, 549, and 590 (control systems topic only)

▲ Concentration in Electronics (ELE)
Students must complete
• ECE 434 or ECE 435
• ECE 492/493 Senior Advanced Design Project, with an electronics topic
• Three courses from ECE 430, 431, 437, 447, 448, 499 (electronics topic only), 513, 520, 563, 565, 567, 584, 586, 587, 590 (electronics topic only), PHYS 306, and PHYS 308

Sample Schedule
The following is a sample schedule that an undergraduate electrical engineering major would follow to obtain a bachelor's degree.

First Semester
CS 112 Computer Science I .................................................. 4
ECON 103 Contemporary Microeconomic Principles ............. 3
ENGR 107 Introduction to Engineering .................................. 2
ENGL 101 Composition ....................................................... 3
MATH 113 Analytic Geometry and Calculus I ....................... 4
Total ................................................................................. 16

Second Semester
CS 222 Computer Programming for Engineers .................... 3
ECE 101 Information Technology for Electrical Engineers .... 3
MATH 114 Analytic Geometry and Calculus II ..................... 4
PHYS 160 University Physics I ............................................ 3
PHYS 161 University Physics I Laboratory ............................ 1
Total ................................................................................. 14

Third Semester
ECE 201 Introduction to Signal Analysis .............................. 3
MATH 213 Analytic Geometry and Calculus III ...................... 3
MATH 203 Matrix Algebra ................................................. 3
PHYS 260 University Physics II ........................................... 3
PHYS 261 University Physics II Laboratory .......................... 1
Literature course ............................................................... 3
Total ................................................................................. 16

Fourth Semester
ECE 280 Electric Circuit Analysis ........................................ 5
ECE 220 Signals and Systems I ............................................ 3
MATH 214 Elementary Differential Equations ....................... 3
PHYS 262 University Physics III .......................................... 3
PHYS 263 University Physics III Laboratory ........................ 1
Total ................................................................................. 15

Fifth Semester
ECE 320 Signals and Systems II ......................................... 3
ECE 331 Digital System Design .......................................... 3
ECE 332 Digital Electronics and Logic Design Lab .............. 1
ECE 333 Linear Electronics I ............................................. 3
ECE 334 Linear Electronics I Lab ....................................... 1
STAT 346 Probability for Engineers .................................... 3
Arts course ................................................................. 3
Total ................................................................................. 17

Sixth Semester
COMM 100 Oral Communication ........................................ 3
ECE 421 Classical Systems and Control Theory .................... 3
ECE 433 Linear Electronics II ............................................ 3
ECE 445 Computer Organization ........................................ 3
ECE 460 Communication and Information Theory ............... 3
Total ................................................................................. 15

Seventh Semester
ECE 305 Electromagnetic Theory ........................................ 3
ECE 491 Engineering Senior Seminar .................................. 1
ECE 492 Senior Advanced Design Project I ........................ 1
ENGL 302 Advanced Composition (for natural sciences) ..... 3
Advanced engineering lab .................................................. 1
Technical elective ............................................................ 3
Global understanding course ............................................. 3
Total ................................................................................. 15

Eighth Semester
ECE 493 Senior Advanced Design Project II ....................... 2
HIST 100 History of Western Civilization ........................... 3
Advanced engineering lab .................................................. 1
Technical elective ............................................................ 3
Technical elective ............................................................ 3
Total ................................................................................. 12

Change of Major
Students who want to change their major to electrical engineering must have at least a 2.75 GPA in all math, physics, engineering, and computer science courses, and should have successfully completed MATH 114.

Writing-Intensive Requirement
Mason’s writing-intensive requirement is satisfied by completing ECE 492 and 493 or BENG 492 and 493, Senior Advanced Design Project I and II. Faculty members provide feedback on student writing. Drafts and revisions are required.

Electronics and Communications Engineering, BS (Ras Al Khaimah Campus only)
The bachelor’s program in electronics and communications engineering will be offered only at Mason’s Ras Al Khaimah Campus in the United Arab Emirates. This program will provide quality education in electronics and communications engineering to meet the emerging needs of many employers in the region. The program emphasizes learning of fundamental engineering knowledge in subjects, such as signals and systems; digital logic; circuits and electronics; and theory and applications of digital communications, including a specific emphasis in the areas of networks and wireless communications. Several credits of engineering test and measurement and computer-based laboratory work are included in the program. The graduation requirements also include an engineering seminar and a capstone senior design project. It is expected that graduates of the program will have competitive skills in the areas of computer networking, wireless communications, and satellite communications. This program is not accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Degree Requirements
All electronics and communications engineering students are required to see their major advisor before course registration each semester. Students are strongly encouraged to follow the sample schedule below to ensure that course prerequisites are satisfied.

Students must complete each ECE and ENGR course presented as part of the required 120 credits for the degree with a grade of C or better.
The 120 credits required for the BS in electronics and communications engineering are as follows:

Engineering: ENGR 107; ECE 101, 201, 220, 280, 305, 320, 331, 332, 333, 334, 431, 433, 434, 460, 461, 462, 463, 491, 492, 493

Information technology: IT 300, 481, 488

Computer science: CS 112

English: ENGL 101, 302; COMM 100

Literature general education course (3 credits)

Economics: ECON 103

Western civilization: HIST 100 course (3 credits)

Arts general education course (3 credits)

Global understanding general education course (3 credits)

Mathematics: MATH 113, 114, 203, 213, 214; STAT 346

Physics: PHYS 160, 161, 260, 261, 262, 263

Synthesis general education course: ECE 492/493

Note: General education courses should be selected from the department’s list of approved courses. All students must submit at least 24 credits of social science and humanities course work, which is normally satisfied by the 24 credits of university general education social science and humanities courses listed above.

Concentrations

In addition to the general ECE Program, a concentration in information technology (INFT) is also offered. Students will follow the basic ECE Program but do not take certain required courses and instead take a set of alternative required courses. See the note preceding the sample schedule for a listing of courses that are not part of the INFT concentration and a listing of the alternative courses, required for the INFT concentration.

▲ Concentration in Information Technology (INFT)

In place of 24 credits of ECE 305, 320, 431, 433, 434 and 461, and IT 300 and 481, and PHYS 262 and PHYS 263 as listed under the Degree Requirements section above, take 24 credits of CS 211 (3); and IT 341 (3), 342 (3), 441 (3), 445 (3), 455 (3), 462 (3); and IT 484 (3).

Sample Schedule

The following is a sample schedule that an undergraduate electronics and communications engineering major would follow to obtain a bachelor’s degree.

First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 112 Computer Science I</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 103 Contemporary Microeconomic Principles</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 107 Introduction to Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MATH 113 Analytic Geometry and Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
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</table>

Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 101 Information Technology for Electrical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ECE 201 Introduction to Signal Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 114 Analytic Geometry and Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 160 University Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 161 University Physics I Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

Third Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>IT 300 Modern Telecommunications</td>
<td>3</td>
</tr>
<tr>
<td>MATH 203 Matrix Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 213 Analytic Geometry and Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

Fourth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 220 Signals and Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 280 Electric Circuit Analysis</td>
<td>5</td>
</tr>
<tr>
<td>MATH 214 Elementary Differential Equations</td>
<td>3</td>
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<tr>
<td>PHYS 262 University Physics II</td>
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<tr>
<td>PHYS 263 University Physics III Laboratory</td>
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</tr>
<tr>
<td>Total</td>
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</tr>
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</table>

Fifth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 320 Signals and Systems II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 331 Digital System Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 332 Digital Electronics and Logic Design Lab</td>
<td>1</td>
</tr>
<tr>
<td>ECE 333 Linear Electronics I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 334 Linear Electronics I Lab</td>
<td>1</td>
</tr>
<tr>
<td>HIST 125 Introduction to World History</td>
<td>3</td>
</tr>
<tr>
<td>STAT 346 Probability for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
</tr>
</tbody>
</table>

Sixth Semester

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>COMM 100 Oral Communication</td>
<td>3</td>
</tr>
<tr>
<td>ECE 431 Digital Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 433 Linear Electronics II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 460 Communication and Information Theory</td>
<td>3</td>
</tr>
<tr>
<td>IT 481 Concepts of Multimedia Processing and Transmission</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

Seventh Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 305 Electromagnetic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECE 434 Linear Electronics II Lab</td>
<td>1</td>
</tr>
<tr>
<td>ECE 462 Data and Computer Communications</td>
<td>3</td>
</tr>
<tr>
<td>ECE 491 Engineering Senior Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ECE 492 Senior Advanced Design Project I</td>
<td>1</td>
</tr>
<tr>
<td>ENGL 302 Advanced Composition (for natural sciences)</td>
<td>3</td>
</tr>
<tr>
<td>Arts course</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

Eighth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 461 Communications Engineering Lab</td>
<td>1</td>
</tr>
<tr>
<td>ECE 463 Digital Communications</td>
<td>3</td>
</tr>
<tr>
<td>ECE 493 Senior Advanced Design Project II</td>
<td>2</td>
</tr>
<tr>
<td>IT 488 Fundamentals of Satellite Communications</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding course</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

Writing-Intensive Requirement

Mason’s writing-intensive requirement is satisfied by completing ECE 492 and 493 Senior Advanced Design Project I and II. Faculty members provide feedback on student writing. Drafts and revisions are required.

BS/Accelerated MS in Electrical Engineering or Computer Engineering

This program is for highly capable students who are interested in immediately continuing their undergraduate academic program in electrical or computer engineering into a graduate program in their respective discipline. It allows for the completion of both bachelor’s and master’s degrees in electrical engineering or computer engineering in five years with 144 credits.
Admission Requirements
Students can apply for the program during the semester in which they expect to complete 90 undergraduate credits applicable toward the BS degree. An overall GPA of at least 3.50 at the time of application is required. Criteria for admission are identical to criteria for admission to the MS in Electrical Engineering Program or the MS in Computer Engineering Program. Application is made using the accelerated graduate program application forms, and all usual requirements must be met. The accelerated program application form specifies the overlapping courses and details the 3.50 undergraduate GPA.

Degree Requirements
Students must complete 144 credits that satisfy all the requirements for the BS and MS degrees, with 6 credits overlap. Students take 6 credits of 500-level courses as part of their technical electives or substitutes for required courses as part of their 120-credit undergraduate program. The specific courses that may be taken and applied to the accelerated program will be specified by the ECE Department. Students may take additional graduate-level courses as part of their BS technical electives with advisor approval. These additional graduate-level courses will not count toward the MS degree. Students admitted to the accelerated program must maintain an overall GPA of at least 3.50 during the entire BS/MS program and present a GPA of at least 3.50 for the 24 credits of graduate work submitted for the MS degree.

Degree Conferral
Students must apply to have the BS in electrical engineering or computer engineering conferred the semester before they expect to complete the BS requirements. At the completion of the MS requirements, the MS degree will be awarded.

GRADUATE PROGRAMS
Graduate programs leading to MS and PhD degrees in engineering prepare students for careers in industry, government, and academia. Graduate certificate programs provide well-defined targets for students who want to advance or update their knowledge in selected areas. ECE offers the PhD in electrical and computer engineering, MS degrees in computer engineering and electrical engineering, and certificates in communications and networking, signal processing, and very large-scale integration design and manufacturing. The PhD in information technology is offered by the Volgenau School and includes a number of courses with an electrical engineering or computer engineering emphasis. Details about these programs are available at the gm.edu.

ECE is committed to high standards of teaching and research excellence in communications, digital systems design, computer networks, microprocessor and embedded systems, distributed computing, signal and image processing, control systems, intelligent systems, microelectronics, electromagnetics, and optoelectronics. The department recognizes the need to augment and enhance these areas through the use of modern IT. Graduate students are offered a progressive environment with ample opportunities for the type of advanced engineering research needed to confront the complex realities of the 21st century.

The courses in these programs are offered during the evening or late afternoon hours to accommodate students who are employed full time. For those who enter the programs on a full-time basis, some financial aid may be available in various forms, such as teaching assistantships, research assistantships, and work-study and co-op agreements with local industry.

Admission
Admission is very competitive. The department’s policy is to admit only those students who have demonstrated a potential for outstanding performance in their graduate work.

Admission Categories
Each student may be admitted into one of the following categories: degree, provisional, or nondegree. Provisional admission is for anyone whose past performance provides reasonable, but not strong, evidence of ability to pursue graduate work. To advance to degree status, a provisional student must achieve a 3.00 GPA after 12 credits, remove all undergraduate deficiencies by completing the corresponding courses with grades of B or better, and receive Bs or better in two core courses specific to the student’s selected program and emphasis. The nondegree category is used primarily by students who want to take courses but not necessarily pursue a degree. Nondegree students seeking to enter degree programs must formally apply for admission.

Admission Requirements
To be considered for admission to the master’s program, applicants should have a baccalaureate degree in electrical engineering, computer engineering, or a closely related discipline from an accredited program with a reputation for high academic standards, and have earned a GPA of B or better during the last 60 credits. Other requirements are as follows:

• Three letters of recommendation, preferably from academic references or references in industry or government who hold advanced degrees and are familiar with the applicant’s professional accomplishments
• Detailed statement of career goals and aspirations
• For students who have not earned a bachelor’s degree from a U.S. university, satisfactory performance on the GRE
• For students whose native language is not English, a minimum TOEFL score of 575 for the paper-based exam or 230 for the computer-based exam. A minimum score of 600 for the paper-based exam or 250 for the computer-based exam is required for applicants who wish to be considered for a graduate teaching assistantship.

Non-ECE Students
Students with BS or MS degrees in ECE-related disciplines (for example, computer science, mathematics, mechanical engineering, physics, or electrical engineering technology) are encouraged to apply for admission. They may initially be admitted into the provisional category and advance to degree status by satisfying requirements described in the Admissions Categories section. Such students may also be advised to take some courses from the undergraduate electrical or computer engineering curriculum, according to their intended areas of emphasis and specific backgrounds.

Computer Engineering, MS

The computer engineering field is at the interface of the computer science and electrical engineering disciplines because it involves knowledge of hardware and software de-
velopment. The major distinction between computer engineering and computer science is that the computer engineer is more concerned with the physical implementation of computing devices, the interaction between hardware and software, and the methodologies for designing digital systems. The major distinction between computer engineering and electrical engineering is that the computer engineer is more concerned with the computational aspects of electrical engineering problems and the implementation of these solutions in digital devices. The computer engineering program offers the following emphases: digital systems design, computer networks, distributed computing systems, microprocessor and embedded systems, and network and system security.

**Course Work**

Students must complete a minimum of 30 graduate credits beyond the bachelor’s degree. This work must represent a cohesive set of courses leading to comprehensive knowledge in one area of computer engineering; it cannot be a set of disjointed courses. The plan of study for the degree must include the following:

- **Two core courses** (with a B or better in each) from the following:
  - CS 571 Operating Systems
  - ECE 511 Microprocessors
  - ECE 542 Computer Network Architectures and Protocols
  - ECE 545 Introduction to VHDL
  - ECE 548 Sequential Machine Theory
  - Minimum of three courses, with a grade of B or better in each, at the 600 level and above (not including ECE 798 or 799), including approved doctoral courses (800 and 900 levels)

The remaining courses must be taken from the list of approved computer engineering courses (available through the ECE and Computer Science Department offices and on the web), which includes selected courses offered by both departments.

The plan of study usually has no fewer than 15 credits of courses designated ECE.

Lists of courses appropriate for emphases areas, such as digital systems design, computer networks, network and system security, and microprocessor and embedded systems, are available from the department office. A self-defined emphasis may be created when appropriate, with the approval of the computer engineering graduate program coordinator. This emphasis must include components of hardware and software development and the corresponding plan of study must comprise courses from ECE and the Computer Science Departments.

**Electrical Engineering, MS**  **MS-ELEN**

The electrical engineering program offers the following emphases: bioengineering, communications, signal processing, control and robotics, microelectronics, electromagnetics, and optoelectronics. Computer engineering remains a valid emphasis within the electrical engineering program; however, students interested in this emphasis are encouraged to pursue the MS in computer engineering instead.

**Course Work**

Students must complete a minimum of 30 graduate credits beyond the bachelor’s degree. This work must represent a cohesive set of courses leading to comprehensive knowledge in one area; it cannot be a set of disjointed courses. The plan of study for the degree must include the following:

- **Minimum of two core courses**, with a B or better in each, from the following:
  - ECE 521 Modern Systems Theory
  - ECE 528 Introduction to Random Processes in Electrical and Computer Engineering
  - ECE 548 Sequential Machine Theory or ECE 546 Parallel Computer Architectures
  - ECE 584 Semiconductor Device Fundamentals or ECE 565 Introduction to Optical Electronics
- **Minimum of three courses**, with a B or better in each, at the 600 level or above (not including ECE 798 or 799) from a chosen emphasis, including approved doctoral courses (800 and 900 levels)
- **Maximum of 6 credits of non-ECE courses**, subject to prior department approval. Approved IT courses (including doctoral 800- and 900-level courses) that cover ECE topics may be taken for credit toward an MS in electrical engineering, subject to prior department approval, in addition to the 6 credits of non-ECE courses.

**Common Degree Requirements for CPE or ELEN Master’s Program**

The following policies apply to students pursuing the MS in computer engineering or the MS in electrical engineering.

**Student Advising**

Newly admitted graduate students must consult with the ECE graduate coordinator before they register for classes. Students should make an appointment by calling the ECE office. Students are expected to select an emphasis from those available in each MS degree program. Students then are assigned an academic advisor from that area.

**Plan of Study**

Before the end of the second semester, each student must submit to the graduate coordinator’s office a plan of study that has been approved by the academic advisor. This plan should be kept up to date by regular consultation with the academic advisor. A final, signed version of the plan must be turned in when the student submits a graduation application.

**Seminar Requirement**

All degree candidates must attend a minimum of 10 graduate seminars approved for the given degree program.

**GPA Requirements**

A maximum of 6 credits of courses with grades of C or B- may be applied toward the degree. The student must present a GPA of at least 3.00 for all courses submitted for the degree.

**Graduation Requirements**

To complete requirements for graduation, students may select one of the following options:

**Thesis Option**

Students must complete ECE 799 Master’s Thesis (6 credits) and 24 credits of course work. The thesis is particularly recommended for those students who wish to develop and document their research skills or contemplate subsequent enrollment in a PhD program. The thesis involves a research effort, which is conducted under the guidance of a faculty advisor. In some
cases, permission may be granted to complete a portion of the work at the student’s place of employment. The final written thesis and oral defense are approved by the student’s advisory committee.

For the electrical engineering program, this committee consists of at least three full-time faculty members, including two from the student’s major area, and one from outside the area. For the Computer Engineering Program, this committee includes faculty members from the ECE and the Computer Science Departments, including at least two affiliated with the MS in Computer Engineering Program, one of whom must be from ECE and one from outside the MS in Computer Engineering Program. Thesis students may not register for ECE 798 Research Project. Students must register for at least 3 credits of thesis for their first thesis semester. Following their first thesis semester, they must register for at least 1 credit of thesis each fall and spring semester until graduation.

Scholarly Paper Option

Students who select this option must complete 30 credits of course work or 27 credits of course work plus ECE 798 Research Project, and must present a scholarly paper. The scholarly paper, with the theme selected under the guidance of a faculty advisor, can be a technical report on an independent study or laboratory or computer experimentation; a literature search on a current scientific or technological topic, such as a survey of new technologies or new methodologies; or a case study of new applications. Students must demonstrate knowledge of the topic and make a satisfactory technical presentation of the paper in the graduate seminar. The scholarly paper and final presentation must be approved by the student’s advisory committee. When a student elects to submit an ECE 798 final report as a scholarly paper, it is expected that the 3 credits of effort in ECE 798 will result in a much more substantial paper than a scholarly paper submitted in addition to 30 credits of regular course work.

Certificate in Communications and Networking

This certificate provides graduate students with the opportunity to reach a demonstrated level of competence in communications and networking. Course work toward the graduate certificate may be used for credit toward the MS in electrical engineering or computer engineering; however, the certificate’s primary purpose is to provide a well-defined target for students who want to advance their knowledge of modern communications but do not necessarily want to complete requirements for the MS degree. The certificate may be pursued concurrently with any of the graduate degree programs in the Volgenau School.

Admission Requirements

The certificate program in communications and networking is open to all students who hold BS degrees in scientific and engineering disciplines from accredited universities.

Certificate Requirements

The certificate is awarded on completion of five graduate courses (15 credits) in communications and networking. A cumulative GPA of 3.00 is required and one course with a grade of C at most may be applied toward the certificate. The certificate courses comprise two required foundation courses and three elective courses.

Foundation courses (6 credits):
ECE 528 Introduction to Random Processes in Electrical and Computer Engineering
ECE 542 Computer Network Architectures and Protocols
or CS 656 Computer Communications and Networking

Elective courses (9 credits):
After completing the foundation courses, students choose electives by taking three courses from the following:
ECE 535 Digital Signal Processing
ECE 565 Introduction to Optical Electronics
ECE 567 Optical Fiber Communications
ECE 630 Statistical Communication Theory
ECE 633 Coding Theory
ECE 635 Adaptive Signal Processing
ECE 642 Design and Analysis of Computer Communication Networks
ECE 643 Telecommunications Switching Systems
ECE 646 Cryptography and Computer Network Security
ECE 663 Fourier Optics and Holography
ECE 731 Digital Communications
ECE 732 Mobile Communication Systems
ECE 734 Detection and Estimation Theory
ECE 735 Data Compression
ECE 737 Spread Spectrum Communications
ECE 738 Advanced Digital Signal Processing
ECE 739 Satellite Communications
ECE 741 Wireless Networks
ECE 742 High-Speed Networks
IT 834 Telecommunications Networks
IT 886 Information Theory
OR 635 Discrete System Simulation
OR 643 Network Modeling
OR 647 Queuing Theory

Certificate in Signal Processing

This certificate provides graduate students with a concise sequence of courses and laboratory experiences within the wide field of signal processing. Course work toward the graduate certificate may be used for credit toward the MS in electrical engineering, computer engineering, or statistical science; however, the certificate’s primary purpose is to provide a well-defined target for students who want to advance or update their knowledge in this fast-moving field, but who do not necessarily wish to complete requirements for the MS degree. The certificate may be pursued concurrently with any of the graduate degree programs in the Volgenau School.

Admission Requirements

The program is open to all students who hold BS degrees in scientific and engineering disciplines from accredited universities and hold graduate status (either degree or nondegree) in the Volgenau School.

Certificate Requirements

The certificate is awarded on completion of five graduate courses (15 credits) in signal processing. A cumulative GPA of 3.00 is required, and one course with a grade of C at most may be applied toward the certificate. The certificate courses comprise two foundation courses taken by all students and three elective courses.
Admission Requirements

The program is open to all students who hold a BS degree in scientific and engineering disciplines and hold graduate student status (degree or nondegree) in the Volgenau School. Students with nonscientific and nonengineering degrees are required to take remedial courses before being admitted into the certificate program.

Certificate Requirements

The certificate is awarded on completion of five graduate courses (15 credits): a required foundation course, a compulsory core course, and three electives. A cumulative GPA of 3.00 is required, and only one course with a grade of C may be applied toward the certificate. At most, one course may be transferred from graduate course work at other accredited universities.

After completing the foundation course (ECE 684), students choose one of the two emphases, VLSI design or VLSI manufacturing, by taking four courses in that emphasis, one of which will be the core course in that area.

Foundation course (3 credits):

ECE 684 MOS Device Electronics

VLSI Design Emphasis (12 credits)

Core course:

ECE 586 Digital Integrated Circuits

Electives

Take 9 credits from the following:

ECE 545 Introduction to VHDL
ECE 587 Design of Analog Integrated Circuits
ECE 645 Computer Arithmetic: Hardware and Software Implementations
ECE 680 Physical VLSI Design
ECE 681 VLSI Design Automation
ECE 682 VLSI Test Concepts

VLSI Manufacturing Emphasis (12 credits)

Core course

ECE 689 VLSI Processing

Electives

ECE 586 Digital Integrated Circuits
ECE 680 Physical VLSI Design
ECE 745 ULSI Microelectronics

PhD in Electrical and Computer Engineering

This program, offered by ECE, is the only combined electrical engineering and computer engineering doctoral program in Virginia. The program prepares students for leadership positions in research and development in industrial, government, and academic settings. It includes course requirements; a qualifying exam testing fundamental concepts and the ability to think creatively; a teaching requirement; a research competency exam; and dissertation proposal defense, dissertation research, and dissertation defense. Students may choose an emphasis in such areas as communications, networking, computer engineering, control and robotics, signal processing, electronics, photonics, and electromagnetics. These emphasis areas may include biological or medical applications. Mason’s general doctoral requirements apply to this program.

Admission Requirements

All general Mason and specific Volgenau School admission requirements apply. In addition, all applicants, including Mason undergraduates, must submit official transcripts (undergraduate and graduate) and official results of the GRE General Test. Applicants whose native language is not English must submit official TOEFL results showing a minimum score of 575 for the paper-based exam or 230 for the computer-based exam. A minimum score of 600 for the paper-based exam or 250 for the computer-based exam is required.
for applicants who wish to be considered for a graduate teaching assistantship. Students typically admitted to the program hold MS degrees in electrical engineering, computer engineering, and other related areas. Students holding European (or equivalent) diploma degrees may also be considered for admission. The application material for each student is reviewed by the department doctoral committee, which makes a recommendation to the department chair.

**Advisor and Dissertation Director**

On admission to the program, each student is assigned a faculty member as advisor. On passing the qualifying exam, the advisor is replaced by or becomes the dissertation director. All decisions concerning the student’s course requirements and selections must be approved by the PhD advisor with the consent of the ECE Department chair.

A dissertation committee is formed within a year after the student has passed the qualifying exam. The committee is headed by the dissertation director and includes two more graduate faculty members from ECE Department and one from outside the department. One more member, from outside the university, may be added to the dissertation committee if justified by the subject of the dissertation. The composition of the dissertation committee must be approved by the ECE Department chair.

**Course Requirements**

After the BS degree, 72 credits are required; dissertation research is usually 24 credits. Students entering with an MS degree may use up to 30 credits of course work from their MS program, subject to approval. Students entering with European diploma degrees may use some course credit, subject to individual consideration, but not more than 30 credits.

Of the required 42 credits of course work, a maximum of 6 credits may be at the 500 level and at least 9 credits must be at the 700 level or higher. For courses taken elsewhere, the equivalent levels are to be determined by the PhD advisor, subject to approval by the ECE Department chair. Individualized reading courses at any level cannot account for more than 6 credits.

ECE 798 Research Project is primarily an MS course and is not intended to be part of the PhD course work. Research in the PhD program should be included in ECE 998 and ECE 999 courses.

Students are required to take one graduate course (3 credits) at the 600 level outside the department in a subject considered foundational for their area of specialization. Typical examples are advanced mathematics or statistics courses for those pursuing an emphasis in signal processing or control, physics courses for those desiring an emphasis in electronics, and computer science courses for those pursuing the computer engineering emphasis. Because such courses are usually not taken for MS degrees, this requirement can rarely be satisfied with a course taken previously.

Students are required to take two courses (6 credits) within the department but outside their area of emphasis. This requirement may be satisfied with courses taken during previous studies, subject to approval. Candidates must complete a minimum of 12 credits of doctoral proposal (ECE 998) and doctoral dissertation research (ECE 999). A maximum of 24 credits of ECE 998 and ECE 999 may be applied to the degree.

Students who choose to take fewer than 24 credits of ECE 998 and ECE 999 may earn the remaining credits from approved course work. Students cannot enroll in ECE 999 before their research proposal is accepted and approved by the dissertation committee.

**Qualifying Exam**

The department offers a doctoral qualifying exam once each year. The exam is primarily for testing the student’s familiarity with fundamental concepts and the ability to think creatively.

Students must take the exam within the first year after they have entered the program with an MS degree. Students in the MS-PhD track must take the exam within the first year after they have completed 24 credits beyond the BS degree. The qualifier consists of a written in-class exam and an oral interview. Students must select one area from the list below for their qualifying exam. The qualifying exam may be repeated once. A student failing the exam twice is removed from the program. The qualifying exam is not tied to any particular course. It is offered in the following areas, and each area consists of four subjects:

- Area A: Communications, Controls, and Signal Processing
- Area B: Computer Engineering
- Area C: Electronics and Devices

The written exam consists of two problems in each subject. Students must solve five problems from no more than three subjects in their selected area. Subject to ECE Department approval, students with a non-ECE background may substitute one subject compatible with their background and relevant to their planned research in the ECE PhD program. Information technology PhD transfer students are required to take the ECE qualifying exam.

**Teaching Requirement**

To acquire lecturing and teaching experience, each doctoral student is required to participate in the department’s teaching activity. This typically takes the form of working as a recitation instructor. The minimum requirement is one full semester of such activity in one course or equivalent arrangements approved by the doctoral coordinator.

**Research Competency Exam, Dissertation Proposal, Advancement to Candidacy**

On completing all course work requirements, students take an oral research competency exam to demonstrate their preparation for dissertation research. The exam comprises a presentation of the research dissertation proposal and competency in the knowledge derived from higher-level courses relevant to the student’s research and familiarity with technical literature. The exam is administered by the student’s dissertation committee.

The student prepares a written dissertation proposal outlining the contents of the dissertation and the research activities leading up to it. The dissertation proposal is submitted to the dissertation committee for approval. The proposal is orally presented as part of the research competency exam. Upon passing this exam, the student is advanced to candidacy.

**Dissertation Research and Defense**

Students conduct dissertation research under the guidance of their dissertation director, with regular consultation with other members of the dissertation committee. During this
period, students must present research results at least once in the form of a department seminar. The dissertation must represent an achievement in research, must be a significant contribution to its field, and should be deemed publishable in refereed journals or at highly selective conferences. On completion of the dissertation, a public defense is administered by the dissertation committee, which may be preceded by a predefense in the presence of the committee members only at the committee’s discretion. A copy of the dissertation must be placed in the University Libraries four weeks prior to the public defense. After a successful public defense and completion of the final form of the dissertation, the dissertation committee recommends the candidate for the degree of doctor of philosophy.

**Interdisciplinary Programs**

### E-Commerce, MS  
**MS-ECOM**  
**Phone:** 703-993-1640  
**Web:** ite.gmu.edu/msecom

Managed by the Computer Science Department within the Volgenau School, the MS in E-commerce Program is a joint degree program with the School of Management (SOM), the School of Public Policy (SPP), the School of Law, the College of Humanities and Social Sciences (CHSS), and the College of Health and Human Services (CHHS). The program provides graduates with depth and breadth knowledge required to apply electronic-commerce (e-commerce) concepts, tools, and methods to problems faced by industry, government, and nonprofit organizations in the digital economy. They will study the management, public policy, and information technology (IT) viewpoints, and effectively integrate them in developing e-commerce solutions to a wide variety of applications, such as electronic government, electronic banking, digital content management, and health information systems. More important, they will respond to the demand for professionals to work in various capacities in digital age organizations in Northern Virginia and elsewhere. This program is composed of a few new courses, with the designation EC in the Course Descriptions chapter of this catalog, as well as existing courses as indicated in the Degree Requirements section that follows.

**Format**

Completion of the degree program requires 36 credits. All students complete an e-commerce core (the breadth requirement) comprising six courses from four interdisciplinary foundation disciplines totaling 18 credits. Following completion of these core courses, students take specialized courses, for a total of 15 credits, in one of four chosen fields of specialization: IT, business and economics, public policy and law, and health care and services industry. Students deepen their theoretical and practical knowledge through courses in their specialization (the depth requirement), building on a common core of knowledge.

One of the unique features of the degree program is an e-commerce capstone project course (3 credits), taken by all students at the completion of all course work. The capstone project is an interdisciplinary course that reinforces and integrates material covered in core and specialization courses. It allows students to pursue a mixed-team-based practical project related to e-commerce in an identified area of opportunity. This capstone project gives students an integrative experience in response to digital age challenges and opportunities. It also allows them to work with other students having diverse backgrounds.

### Admission Requirements

Applications must be submitted to the Volgenau School Graduate Admissions Office. Applicants must fulfill all admission requirements for graduate study at Mason; hold a baccalaureate degree with a satisfactory GPA from an accredited college or university; and demonstrate programming experience in at least one block-structured programming language such as Java, C, C++, Visual Basic, or Pascal, or in a scripting language such as JavaScript, used in web design. This experience can be obtained through courses or work experience. Course descriptions and syllabi, as well as copies of transcripts and grades obtained, must be provided. If only work experience is available, a statement describing the work experience in programming must be submitted. This statement should include the name of the organization, the type of programs the applicant was responsible for developing, years of experience in each job, and the programming languages used.

Applicants must submit transcripts of all postsecondary education; a self-assessment form (usually included in the application package or available online); a one- to two-page statement of educational and work experience; three letters of recommendation; and official reports of the GRE, GMAT, or LSAT. TOEFL scores are required from non-native English speakers who did not use English as the official language in their college education.

### Degree Requirements

In addition to meeting the general requirements that apply to all master’s degrees at the university, completion of this program requires the following:

**Core courses (21 credits):**  
- EC 511 E-commerce Basic IT Infrastructure  
- EC 512 E-commerce Software Services  
- EC 521/MBA 603 Managerial Economics and Decisions of the Firm  
- EC 522/MBA 613 Financial Reporting and Decision Making  
- EC 531 Law and Public Policy in E-commerce or PUBP 710 Special Topics  
- MBA 734 Electronic Commerce or HAP 601 Electronic Commerce and Online Marketing for Health Services  
- EC 600 Group Project in Electronic Commerce (3 credits)

**Concentration or specialization (15 credits):**  
An IT concentration and three specializations in business and economics, public policy and law, and health care and services industry are offered. Take 15 credits in one of the four areas.

#### Information Technology Concentration (INFT)

Students who select this specialization must take 15 credits, which must include the following three courses (3 credits each):  
- CS 650 Database Engineering or INFS 614 Database Management  
- CS 555 Computer Communications and Networking, ECE 542 Computer Network Architectures and Protocols, or INFS 612 Principles and Practices of Communication Networks
ISA 562 Information Security Theory and Practice
Also, students must take at least one course from List A that follows and at most one course from Lists B, C, or D to complete the five courses required for this specialization.

The Computer Science Department has created a special certificate program in electronic commerce for MS in e-commerce students that may be used for the IT concentration, which consists of the following courses:
INFS 612 Principles and Practices of Communication Networks
INFS 614 Database Management
ISA 562 Information Security Theory and Practice
ISA 767 Secure Electronic Commerce

Business and Economics Specialization
Students must take MBA 623 Marketing Management, and select four additional courses from the following:
MBA 712 Project Management
MBA 725 Leadership
MBA 731 Business Systems Analysis and Design
MBA 732 Knowledge Management
MBA 733 Business Data Communications
MBA 734 Electronic Commerce and E-Business
MBA 735 Systems Thinking and Business Simulation

Public Policy and Law Specialization
Students must take 15 credits by choosing, in consultation with their advisor, a coherent set of courses from List C below.

Health Care and Services Industry Specialization
Students must take 15 credits: 12 required and 3 elective credits. Electives are selected, in consultation with the advisor, from List D below. The required courses are as follows:
HAP 601 Electronic Commerce and Online Marketing for Health Services
HAP 678 Introduction to the U.S. Health System
HAP 709 Health Care Databases
HAP 740 Management of Health Information Systems
HAP 760 can be waived for students who have prior, broad health care experience. HAP 709 can be waived for students with prior experience with database design and structured query language. Electives may be used to substitute for HAP 678 and 709. Suggested electives are HAP 720 Health Data Integration, HAP 745 Health Care Security Policy, and those from List D below.

Courses in Concentrations and Specializations
A description of these courses can be found in the Course Descriptions chapter of this catalog. Students must satisfy the prerequisites for these courses or obtain permission from the instructor.

List A (Information Technology)
CS 571, 671, 672, 673, 719/IT 809, 750/INF 750, CS 755; ECE 646, 741; INF 601, 623, 640, 750, 755, 760, 770, 772, 774; ISA 562, 564, 650 656, 674, 681, 763, 765, 767; OR 635; SWE 619/CS 619, SWE 620/CS 620, SWE 621/CS 621, SWE 632/CS 632, SWE 642; SYST 781/INF 781/STAT 781. Note: CS 571 and INF 601 are mutually exclusive; only one can be used for the MS in E-Commerce Program. CS 650 and INF 614 are mutually exclusive; only one can be used for the MS in E-Commerce Program.

List B (Business and Economics)
MBA 623, 712, 725, 731, 732, 733, 734, 735

List C (Public Policy and Law)
ITRN 604, 612, 712, 730, 731, 742, 756, 759, 772, 773; LRNG 762; PUBP 710 (special topics with approval) 736, 737, 760

List D (Health Care and Services Industry)
HAP 586, 601, 678, 709, 712, 715, 720, 730, 740, 745

Engineer Degree in
Information Technology

The engineer degree is a post-master’s degree but does not confer a doctorate. Students in the engineer degree can take advanced PhD courses and complete a project of an applied nature to fulfill program requirements.

Admission Requirements
Admission requirements for the engineer degree are the same as for the PhD in information technology.

Plan of Study
The program is made up of specialized course work followed by completion of an applied project summarized in a project report. Under the guidance of the supervisory committee, students prepare a tentative plan of study. The plan lists the intended courses and their expected timing. The plan should also contain a tentative subject for the applied project.

Specialized Course Work
Students must include in the plan of study a well-defined advanced concentration area. Successful completion of this requirement should enable students to conduct applied research in a significant contemporary area in IT.

The supervisory committee and the Volgenau School associate dean for research and graduate studies must approve a plan of study. These approvals must occur before a student completes the courses in the area of concentration. There is no guarantee that a course taken before this approval will be accepted. Students must take 30 credits of graduate-level course work. A GPA of 3.50 is required in these credits.

Students may waive up to 6 credits of course work by passing two of the qualifying exams (3 credits for each exam) from any of the PhD programs offered by the Volgenau School. The plan of study may include at most 3 credits of directed reading course work. At least 12 credits must be in courses numbered 700 or higher, and these 12 credits cannot include directed reading, a project, or thesis courses.

Courses that cannot be included in any plan of study are any INF 500-level courses; IT 500 and 599; OR 540; STAT 510, 512, and 530; and SYST 500. The associate dean must approve exceptions to any of these rules in advance.

Supervisory Committee
On admission to the program, students are assigned a temporary advisor. Students are responsible for working with the temporary advisor until they select a project director and a
supervisory committee. It is recommended that a student form a supervisory committee as soon as feasible.

The supervisory committee includes the project director plus at least two additional members. The committee must contain at least two graduate faculty members from the Volgenau School. It is strongly recommended that the committee include at least one person from outside the university who is knowledgeable in the subject area of the project. The supervisory committee supervises the project proposal presentation and the project defense.

Project Proposal Presentation

Near the end of the course work, each student prepares a written project proposal, which is presented to the supervisory committee. Students may enroll in IT 996 Engineer Project Proposal to complete this effort. During the term students expect to present the project proposal to the committee, they should enroll in IT 991 Engineer Project Presentations. After successfully completing this requirement, students are formally admitted as candidates for the engineer degree. The application for candidacy is submitted to the Office of the Associate Dean on a standard form.

Project and Final Defense

With the concurrence of the supervisory committee, students proceed with the project research, during which time they must continuously enroll in IT 997 Engineer Project. Students must complete a minimum of 12 credits from among IT 991, 996, and 997, with a minimum of 6 credits of IT 997. When the central portions of the project work have been completed to the point that students are able to describe the contributions of the project effort, they submit the written project report to the supervisory committee. Once the committee believes the student is ready, a final public oral defense may be scheduled; the application for the defense must be submitted to the associate dean at least one month in advance of the defense so that the announcement is posted for at least two weeks.

Following a satisfactory evaluation of the oral defense of the project by the supervisory committee, the student must submit, with supervision from the project director, a final project that the supervisory committee supervises the project proposal presentation and the project defense.

Project Proposal Presentation

Near the end of the course work, each student prepares a written project proposal, which is presented to the supervisory committee. Students may enroll in IT 996 Engineer Project Proposal to complete this effort. During the term students expect to present the project proposal to the committee, they should enroll in IT 991 Engineer Project Presentations. After successfully completing this requirement, students are formally admitted as candidates for the engineer degree. The application for candidacy is submitted to the Office of the Associate Dean on a standard form.

Project and Final Defense

With the concurrence of the supervisory committee, students proceed with the project research, during which time they must continuously enroll in IT 997 Engineer Project. Students must complete a minimum of 12 credits from among IT 991, 996, and 997, with a minimum of 6 credits of IT 997. When the central portions of the project work have been completed to the point that students are able to describe the contributions of the project effort, they submit the written project report to the supervisory committee. Once the committee believes the student is ready, a final public oral defense may be scheduled; the application for the defense must be submitted to the associate dean at least one month in advance of the defense so that the announcement is posted for at least two weeks.

Following a satisfactory evaluation of the oral defense of the project by the supervisory committee, the student must submit, with supervision from the project director, a final project that represents a definitive contribution to applied knowledge in IT. This document must meet format guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects and must be submitted to the library. If the candidate successfully defends the project, the supervisory committee recommends that the final form of the project be completed and Volgenau School faculty and the graduate faculty of Mason accept the candidate for the engineer degree.

Applying and Completing a PhD Program

Students who are awarded an engineer degree are able, at a later date, to work toward a PhD in information technology. Some restrictions and limitations apply. After applying and being accepted into the PhD in Information Technology Program, students will be able to apply for a reduction of up to 12 credits in course requirements. The request must satisfy the rules for transfer credit at Mason, and courses must be relevant to the student’s planned dissertation research. In addition, the qualifying exams for the doctoral program will be waived for such students. All other requirements for the doctoral program must be satisfied.

| Information Technology, PhD |

PHD-INFT

The general doctoral requirements of Mason apply to this program.

When the term “information technology (IT) and engineering” is used at Mason to describe the school and its activities, it is intended to mean information technology and the branches of engineering most closely associated with information use and management. These aspects of technology are emphasized in this geographic region, and the relevance of the IT doctoral program has grown with the increasing dependence of the nation’s commerce on the effective use of information. Our focus on the science and technology of information processing complements and enhances the more traditional approaches to engineering that are more strongly based on the physical and material sciences.

Course Work

The PhD in Information Technology Program offers courses designated IT in the Course Descriptions section of this catalog.

Admission Requirements

Students are selected on the basis of scholarship and potential from among applicants with appropriate degrees from institutions of high standing. Generally, a master’s degree in an information technology-related area, such as engineering, computer science, operations research, statistics, mathematics, physical sciences, economics, and psychology, is required for admission to the program.

In addition, well-qualified students without an appropriate master’s degree may apply directly to the PhD program. Such students will have to complete the equivalent of an appropriate Mason master’s degree as part of their program of study. In some cases, it may be possible to obtain transfer credit for graduate course work taken elsewhere, subject to meeting requirements for transfer credit imposed by the university. (The description here assumes that a student has already received an appropriate master’s degree.)

An undergraduate GPA of 3.00 and a graduate GPA of 3.50 scale are basic requirements for applicants. The admission process involves submitting the following materials: application for admission, undergraduate and graduate transcripts from previous colleges and universities attended, GRE test results when available or if required by the specific concentration, three letters of reference, a résumé, a short statement of career goals and aspirations, and a self-assessment of past background. Translations of international credentials must be provided if they are not in English. In some cases, applicants will be required to have documents evaluated by an external agency. An applicant’s entire background is examined before an admission decision is made.

Students who wish to be considered for Mason’s President Scholarship, which provides a stipend and tuition support for three years, must submit GRE scores with a score of at least 1,200 with their application. One President Scholarship is awarded per PhD program per year.

To ensure a common ground of fundamentals, students should have a background in such topics as calculus, differential equations, linear algebra, discrete structures, probability, and statistics. In addition, students entering the PhD in Information Technology Program must have a sound working knowl-
edge in computing as demonstrated by examples of programs or applications developed and tested in at least one high-level programming language environment. Because much of the course work within this program requires computational proficiency, experience with a variety of languages and computer hardware is useful as is an understanding of computer architecture. Highly qualified students who do not present evidence of appropriate course work may be admitted and then required to take appropriate articulation courses.

Plan of Study
The program is made up of a breadth requirement (assessed via qualifying exams) and specialized course work (assessed via the comprehensive exam), followed by preparation of a dissertation. Generally, students have already obtained a master’s degree in a field appropriate to IT, which prepares them for the qualifying exams.

Under the guidance of the doctoral supervisory committee, students prepare a tentative plan of study. The plan lists the intended courses and expected timing. The plan should also contain the intended dates of the qualifying and comprehensive exams, and a tentative subject of the dissertation research.

Qualifying Exams
To satisfy the breadth requirement of the PhD degree, students must pass a set of written qualifying exams designed to test fundamental knowledge. These exams correspond to a set of disciplines related to the individual master’s programs in the Volgenau School. Each exam is based on a reading list posted on the school’s web site. The qualifying exams are not associated with specific courses, although some courses may help students prepare for these exams. The qualifying exams are offered twice a year at specified locations on campus, typically near the beginning of the fall and the spring semesters. Each exam is allocated two hours. The exams are graded on a pass or fail basis.

Students must indicate which exams are being requested through an appropriate form signed by the student and the supervisor and submitted to the office of the associate dean.

Each student must pass a set of four different exams in two consecutive offerings of the exams. Four exams must be attempted in the first offering. Thus, the following passing scenarios are allowed: (1) pass all four on the first attempt, (2) pass three in the first attempt and one in the next, (3) pass two in the first attempt and two in the next, (4) pass one in the first attempt and three on the second, and (5) pass all four on the second attempt. The exams attempted on the second offering need not be the same as in the first. A student who fails to pass the qualifying exams under any of these scenarios is subject to termination from the program.

Students must take the qualifying exams within two years of enrolling in the program, unless fewer than 24 credits of course work have been completed in that time. Otherwise, the exams must be taken no later than the first opportunity after completion of 24 credits. If a student enters the program without a master’s degree, these time limits are measured from the date when the student completes the equivalent of an appropriate Mason master’s degree.

Advanced Emphasis Requirement
Students must include in the plan of study a well-defined set of advanced courses in a focused area. Successful completion of this requirement should enable the student to do basic or applied research in a significant contemporary area in IT.

The doctoral supervisory committee and the Volgenau School associate dean for graduate studies and research must approve the plan of study. These approvals must occur before a student completes courses in the area of concentration or specialization. There is no guarantee that courses taken before this approval will be accepted.

Students must take a set of 24 credits of graduate-level course work independent of the qualifying exams they take. That is, if a student takes a qualifying exam related to OR 541, then OR 541 cannot be counted as 3 credits of specialty course work. A GPA of 3.50 is required in these 24 credits. The plan of study may include a maximum of 3 credits of directed reading course work. At least 12 of the 24 credits must be in courses numbered 700 or higher, and these 12 credits cannot include directed reading, project, or thesis courses.

The following courses cannot be included in any plan of study: any INFS 500-level courses; IT 500 and 599; OR 540; STAT 510, 512, and 530; and SYST 500. Exceptions must be approved in advance by the associate dean.

Each PhD student is allowed to designate an emphasis from among the titles of the MS degree programs offered by the Volgenau School. For more information, see department sections.

Concentrations
Within the PhD in Information Technology Program, several concentrations are offered. For more information on the concentrations, please see the corresponding department sections of the catalog.

▲ Civil and Infrastructure Engineering (CEIE)
▲ Information Security and Assurance (ISA)
▲ Information Systems (ISYS)
▲ Operations Research (OPRS)
▲ Software Engineering (SWE)
▲ Systems Engineering (SYST)

Choosing a concentration narrows program flexibility, so it is not necessary to choose a concentration. In particular, a concentration may be inappropriate for students doing interdisciplinary research. Students who do declarate a concentration will have the concentration noted on their transcript.

Doctoral Supervisory Committee
On admission to the program, students are assigned a temporary advisor. Students are responsible for working with the temporary advisor until they choose a dissertation director and an advisory committee. Students should make this selection as soon after admission as possible. This is especially important for students who have completed a considerable amount of graduate work elsewhere.

Students work collaboratively with the program director and faculty to form the dissertation committee, with the understanding that some areas of research may be impossible to support due to available faculty expertise. Program personnel
will facilitate the formation of the dissertation committee to the extent possible, but there can be no guarantee of successful formation.

The doctoral supervisory committee includes the dissertation director, who must be a member of the Mason graduate faculty, and at least three other people from the Mason graduate faculty. At least three committee members must be from the Volgenau School and at least two of the departments of the Volgenau School must be represented on this committee.

In addition, industrial representatives and faculty members from departments outside the school are highly desirable, but not required, on the committee. The doctoral supervisory committee administers the comprehensive exam, dissertation proposal presentation, and the dissertation predefense and defense. Permission for the comprehensive exam and dissertation defense are requested from the Volgenau School associate dean on the basis of a written request and plan that has been approved by the supervisory committee.

**Comprehensive Exam**

The comprehensive exam is an oral exam taken after students have satisfactorily completed all course work requirements in their approved plan of study. To initiate the exam process, the student meets with the advisor to prepare a memorandum, which has to be approved by the entire supervisory committee, to be forwarded to the associate dean for research and graduate studies requesting the comprehensive exam and the appointment of an exam committee. The exam committee consists of the doctoral supervisory committee plus any outside examiners considered appropriate. The requesting memorandum should contain a list of all courses taken by the student that form the plan of study for the PhD, a one-page description of the intended area of research, and a reading list on which the student will be examined. The reading list should include articles or books that cover the fundamentals, state-of-the-art knowledge, and tools needed to perform research in the intended area. This exam is to be taken at a designated place on campus.

The objective of the comprehensive exam is to allow the exam committee to assess the student’s readiness to complete doctoral research in an area of concentration. The result of the comprehensive exam is a grade of pass or fail with recommendations for removing any deficiencies. Students must pass the comprehensive exam before being advanced to candidacy, i.e., passing the dissertation proposal exam. The comprehensive exam must be attempted for the first time no later than one year after completing all course work requirements.

Students who fail the comprehensive exam may request reexamination within 60 days of receiving notice of the exam result. The request should be made in writing to the associate dean. A student may request a new exam in a different format if the intended area of research has changed, but the request must comply with the rules specified above. If the student fails again or does not request reexamination within 60 days, the student will be dismissed from the program. Appeals on any of the two attempts must be submitted in writing to the associate dean within 15 days of the date the decision was communicated to the student.

**Dissertation Proposal Presentation**

Near the end of the course work, doctoral students prepare a written dissertation proposal, which is presented to the doctoral supervisory committee. Students may enroll in IT 998 Doctoral Dissertation Proposal to complete this effort. During the term the student expects to present the dissertation proposal to the committee, the student should enroll in IT 999 Dissertation Topic Presentations. After successfully completing this requirement, the student is formally admitted as a candidate for the PhD degree. The application for candidacy is submitted to the associate dean on a standard form.

**Dissertation and Final Defense**

With the concurrence of the advisory committee, students proceed with the doctoral research, during which time they must be continuously enrolled in IT 999 Doctoral Dissertation. Students must complete a minimum of 24 credits from among IT 990, 998, and 999, with a minimum of 12 credits of IT 999. When the central portions of the research have been completed to the point that students are able to describe the original contributions of the dissertation effort, they submit the written dissertation to the supervisory committee and schedule an oral defense for the committee. The predefense is to be held no sooner than one month after members of the committee have copies of the dissertation. Once the committee believes the student is ready, a final public oral defense may be scheduled no sooner than one month after the conclusion of the predefense so that the announcement is posted for at least two weeks. The entire dissertation committee must be present at the defense, unless an exception is approved by the associate dean in advance of the defense.

Following satisfactory evaluation of the oral defense of the dissertation by the supervisory committee, the student must prepare, with supervision from the dissertation director, a final publishable dissertation that represents a definitive contribution to knowledge in IT. This document must meet format guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects. If the candidate successfully defends the dissertation, the dissertation defense committee recommends that the final form of the dissertation be completed and the Volgenau School faculty and the graduate faculty of Mason accept the candidate for the PhD degree.

If the student fails to successfully defend the dissertation, the student may request a second defense, following the same procedures as for the initial defense. There is no time limit for this request, other than general time limits for the doctoral degree. An additional predefense is not required, but students are strongly advised to consult with the committee before scheduling a second defense. If the student fails on the second attempt to defend the dissertation, the student will be dismissed from the program.

### Telecommunications, MS

**MS-TCOM**

Phone: 703-993-3810
Web: telecom.gmu.edu

The innovative, interdisciplinary MS in Telecommunications Program provides a blend of cutting-edge engineering-oriented courses in wireless and fiber communications systems, networks, computers, and Internet protocols, combined with courses on telecommunications policy, law, business, international aspects, and other fields. The interdisciplinary program is designed for students who wish to enter the field of telecommunications or are working in the field and want to advance their knowledge of telecommunications. It concentrates on practical applications of telecommunications rather than on the theoretical approach. It focuses on the engineer-
ing and IT aspects of telecommunications, in combination with the interdisciplinary knowledge offered by some of the courses in the former MA in Telecommunications Program, now incorporated in the School of Public Policy’s new master’s in telecommunications policy. More than 30 new engineering and IT courses have been designed specially for this program, including five certificate programs that may be incorporated into, and taken concurrently with, the MS in telecommunications. Two of the certificates are at an advanced level: the telecommunications forensics and security certificate and the advanced networking protocols for telecommunications certificate.

A novelty of the program is its structure, which consists of five specialty modules corresponding to areas of emphasis. The program offers a mix of 3-credit full-semester courses together with 1.5-credit half-semester courses. This structure allows students to identify more clearly the various specialties in telecommunications technology. Students enjoy considerable flexibility because they are able to design their master’s programs to fit their technical preferences, including the option of taking courses in other programs at Mason.

A majority of the course material comes from the Electrical and Computer Engineering (ECE) Department and the Systems Engineering and Operations Research (SEOR) Department. Courses offered by ECE focus on network technologies, such as fiber optics, ATM, and Internet protocols; network applications, such as networked multicomputer systems, client-server architectures, and network management; and wireless communications, such as digital communications, satellite communications, mobile communications, PCS, and GPS.

Unique courses in the telecommunications program, such as Border Gateway Protocols, Interior Gateway Protocols, MPLS, GPS, and Advanced Link Design, complement courses given in ECE programs. In addition to the many new telecommunications courses developed for this program, ECE already offers a number of other graduate courses in communications as part of the graduate electrical engineering and computer engineering programs. Those courses may also be taken for credit under the MS in Telecommunications Program, provided students have the prerequisite background. Courses related to systems engineering, project management, capacity modeling, and business of telecommunications (including the design and optimization of large, complex communication networks) are offered by SEOR. Both SEOR fields, systems engineering and operations research, play significant roles in all aspects of the design, operation, and business of telecommunications, and this knowledge is important for students of telecommunications.

The blend of in-depth knowledge of specific elements of telecommunications technology, combined with knowledge of broader issues in telecommunications, is increasingly necessary for people who intend to work in a management or decision-making position within the telecommunications industry, telecommunications-related businesses, or government institutions dealing with telecommunications. The MS in telecommunications provides that blend.

Course Work

The program offers courses designated TCOM in the Course Descriptions chapter of this catalog and some of the other disciplines’ courses listed below.

Format

The program consists of 9 credits of mandatory engineering and technology core courses (TCOM 500, 501, 502, and 521); 6 credits of electives drawn from an interdisciplinary group of core courses common with the former MA in telecommunications (PUBP 726, LAW 181, and TELE 750 or TCOM 750), and a basic switching lecture and laboratory course (TCOM 514) or an Internet protocol routing lecture and laboratory course (TCOM 515); and five specialty modules (areas of emphasis). Students who enter the program with an undergraduate degree that shows evidence of successfully completing LAN and WAN technologies may substitute TCOM 509 and TCOM 529 for TCOM 501 and TCOM 502 in their mandatory core program, respectively.

Students must complete 30 credits of course work through a combination of core courses and specialty modules. The core consists of 15 credits, with the remaining 15 credits earned in specialty modules. The specialty modules are subareas of telecommunications that provide the necessary depth in the selected areas of emphasis.

Students are usually expected to take courses from at least two specialty modules. Up to 6 credits from the core program may be carried forward into the specialty modules, thus permitting up to 6 credits of electives to be taken inside or outside the prime specialty module chosen by the student. TCOM 501/502 may be carried forward into specialty module 1, 2, or 3; TCOM 521 may be carried forward into specialty module 4 or 5. Double counting is not permitted, but the courses carried forward into a given module may permit that module’s credit requirement to be satisfied, thus allowing elective courses to be taken outside that module. Usually, a minimum of 6 credits is needed to satisfy one specialty module. Credit for each specialty module can be obtained by taking an appropriate combination of full-semester courses (3 credits) and half-semester courses (1.5 credits). In many cases, a pair of coordinated, half-semester courses (for example, TCOM 503/513) on fiber optic communications and networks permits students to take a half-semester course to get an introduction to the field or a full-semester course for a more complete knowledge of that topic.

Admission Requirements

Courses are open to students who hold a BS or BA degree from an accredited college or university in engineering, math, science, computer science, business (with a quantitative background), economics, or other analytical disciplines, and students who have equivalent work experience indicating analytical aptitude. Depending on their background, some applicants may be required to complete 3 to 6 credits of preliminary course work before they are allowed to enroll in any of the core courses or specialty courses in the program. Applicants who have not studied mathematics beyond the equivalent of algebra II/trigonometry at high school or introductory calculus classes (such as those offered in business or database management programs) will be required to take TCOM 575, the foundation course that prepares students for TCOM 500, prior to being allowed to take TCOM 500. A minimum undergraduate GPA of 3.00 is usually required.

Students may be admitted to the MS program as degree-seeking students, or they may be admitted for nondegree study within the program, which allows them to take individual courses. Students in the nondegree program may apply to the regular program, provided their GPA within the MS in Telecommunications Program is 3.00 or above. Up to 12 credits
earned in nondegree study may be transferred into the regular program, provided each of the courses to be transferred was passed with a grade of B or above.

Degree Requirements
Students must complete a minimum of 30 graduate credits with a GPA of 3.00 or higher. Students must earn a B (3.00) or above in core courses TCOM 500, 501, 502, and 521. Up to 6 credits of a combination of C or B- grades may be carried within the program from the remaining core courses or from the specialty module courses, provided the overall GPA is 3.00 or higher.

The plan of study includes the following:

15 credits from the following 21 credits of core courses:

Mandatory courses:
- TCOM 500 Modern Telecommunications (3 credits)
- TCOM 501 Data Communications and Local Area Networks (1.5 credits) or TCOM 509 Internet Protocols (1.5 credits)*
- TCOM 502 Wide Area Networks and Internet (1.5 credits) or TCOM 529 Advanced Internet Protocols (1.5 credits)*
- TCOM 521 Systems Engineering for Telecommunications Management (3 credits)

*Students must receive prior permission to make the substitution(s).

Elective courses (6 credits selected from the following):
- LAW 181 Telecommunications Law and Regulation (3 credits)
- PUBP 726 Telecommunications Policy and International Strategies (3 credits)
- TCOM 514 Basic Switching Lecture/Laboratory (3 credits) or TCOM 515 Internet Protocol Routing Lecture/Laboratory (3 credits)*
- TELE 750 Coordinating Seminar (3 credits) or TCOM 750 Coordinating Seminar (3 credits)**

*Both may be taken for credit, but only one may be used to satisfy the core elective requirement.

Minimum of 15 credits of courses listed under the following specialty modules:

Students usually take 15 credits from at least two of the five specialty modules, or they may elect to take all 15 credits from the systems engineering of telecommunications module (module 5). Students electing to carry forward a core course (TCOM 501/502 or TCOM 521) into an appropriate specialty module have the option of taking an elective course in that module or another module to bring the total number of credits in the specialty modules to 15.

A specialty module (group of courses in an area of emphasis) can be completed by a combination of full-segment courses and half-segment courses listed under the module or considered applicable to that module for a total of at least 6 credits in that module. Some specialty module courses, are in more than one module; for example, TCOM 509 Internet Protocols is in module 1, network technologies, and module 2, network applications. Half-segment 1.5-credit courses may only be counted in one module, even if they apply to more than one. Full-segment 3-credit courses may be counted in one module or split between two modules. For example, TCOM 551 Digital Communication Systems, which is in modules 1 and 3, may be counted as 3 credits in either module, or 1.5 credits in each module.

Basic courses in each module have been specially designed for the telecommunications program. These courses do not require completion of prerequisites from other MS programs in the Volgenau School. Other courses, which are marked with asterisks, are from other MS programs in the Volgenau School and represent viable options for students who have appropriate prerequisites in some technical areas. Although these courses assume certain prerequisites from their specific MS programs, advanced students who already know the prerequisite material can seek instructor permission to enroll in those courses.

Alternatives to completing each specialty module by using appropriate combinations of courses not listed under a given module may be admissible subject to prior approval by the program director. In addition, independent study, reading, and research courses may be taken in all five modules. These courses permit students to make use of their work experiences to undertake nonclassroom courses for credit within the program.

Mason has negotiated an articulation agreement with the University of Virginia that allows up to 12 credits of the Informational Systems Management certificate program from the University of Virginia to be transferred into modules 4 and 5 of the TCOM Program. In addition, graduate students from the National Defense University (NDU) may transfer up to 9 credits from NDU’s Information Security Certificate Program.

A capstone project course, TCOM 699, is required under the systems engineering of telecommunications module (module 5) should the student elect to take all 15 credits in this specialty module. Students taking only 7.5 credits in modules 4 or 5 have the option of taking TCOM 699, but the course is not required unless the student takes all 15 credits in module 5.

Specialty Modules
Courses marked with asterisks are courses from other graduate programs in the Volgenau School that can be taken for credit in this program if the student has the appropriate prerequisites. Other courses from other programs may be taken for credit, with prior approval.

Module 1. Network Technologies
- TCOM 503, 504, 505, 509, 510, 513, 515, 519, 529, 539, 548, 551, 556, 562, 609, 610, 660, 661, 663; ECE 513*, 542*, 565*, 642*, 643*, CS 571*, 656*, 756*

Module 2. Network Applications
- TCOM 505, 509, 510, 513, 515, 519, 529, 539, 540, 541, 548, 555, 556, 562, 603, 609, 610, 611, 660, 662, 663; ECE 646*; CS 656*, 756*; INFS 612*, 640*, 762*

Module 3. Wireless Communications
- TCOM 506, 516, 517, 518, 526, 551, 552, 562, 606, 607, 707; ECE 732*, 739*, 763*, 741*

Module 4. Modeling of Telecommunications Systems
- TCOM 540, 541, 542, 545, 546, 547, 548, 562, 699; OR 641*, 642*, 644*

Module 5. Systems Engineering of Telecommunications
This module may be taken as one of two specialty modules or as one 15-credit module. No more than two SYST courses can be taken within this module.
- TCOM 520, 546, 548, 699; SYST 510*, 513*, 520*, 542*, 562; INFS 612*, 614*, 640*; ITRN 772*
Applicable BS/Accelerated MS in Telecommunications Programs

This degree program may be taken as part of an accelerated MS in Telecommunications Program with four undergraduate degree programs: BS in systems engineering, computer science, information technology, and integrative studies. The four accelerated MS/BS programs are described below.

BS in Systems Engineering/Accelerated MS in Telecommunications

Students in the BS in Systems Engineering Program may elect to enter an accelerated MS in Telecommunications Program while they are undergraduate students. The program is designed for qualified undergraduate students in the systems engineering program who would like to proceed directly into the MS program, completing the two degrees with 144 credits. Students must satisfy requirements for the BS (120 credits) and the MS (30 credits), with 6 credits of overlap permitted. The MS is on an accelerated track, with 6 credits taken as an undergraduate and 24 credits completed as a graduate student. The 6 undergraduate credits must be selected from those given in the listing that follows.

Applicants must be Mason undergraduate students who preferentially have chosen to take the systems engineering of telecommunications elective sequence. Other students will be considered on their individual merit. Students may apply for the accelerated program during a semester after which they will have completed 90 or more credits applicable toward the BS in systems engineering as an undergraduate. Students must have an overall GPA of at least 3.25 to apply for the program. Students who have not yet finished 90 credits may be accepted provisionally subject to satisfactory completion of 90 credits. Criteria for admission are identical to criteria for admission into the MS in Telecommunications Program, except that students do not need to have completed an undergraduate degree prior to admission into the accelerated program.

Accepted students must maintain a minimum 3.25 GPA in the undergraduate segment of the accelerated program and a 3.00 GPA in the graduate segment. That is, students who have been accepted into the program must maintain a 3.25 average until they have satisfied all requirements for the BS in systems engineering. They must then maintain a minimum 3.00 GPA in the graduate segment. Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program. Those graduate telecommunications courses taken and applied to the BS program will no longer be admissible for the MS in telecommunications. Students must satisfy requirements for the BS in systems engineering and those graduate telecommunications courses taken and applied to their BS in Computer Science Program will no longer be admissible for the MS in telecommunications. If students are dropped from the accelerated program and have taken and applied telecommunications core courses toward their BS degree, they do not need to repeat those courses for the regular MS in Telecommunications Program if they obtained a grade of B or above in those courses; however, they will need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in telecommunications.

BS in Computer Science/Accelerated MS in Telecommunications

Students seeking a BS in computer science may elect to enter an accelerated MS in Telecommunications Program while they are undergraduate students. The accelerated program is designed for qualified undergraduate students in the computer science program who would like to proceed directly into the MS in Telecommunications Program, completing the two degrees with 144 credits. Accelerated students must satisfy the requirements for the BS in computer science (120 credits) and the MS in telecommunications (30 credits), with 6 credits of overlap permitted. The MS degree is on an accelerated track, with 6 credits taken as an undergraduate and 24 credits as a graduate student. The 6 undergraduate credits must be selected from those given in the listing that follows.

Applicants must be Mason undergraduate students in the computer science program. Students may apply for the accelerated program during a semester after which they will have completed 90 or more credits applicable toward the BS degree. Students must have an overall GPA of at least 3.25 to apply for the program. Students who have not yet finished 90 credits may be accepted provisionally subject to satisfactory completion of 90 credits. Criteria for admission into the accelerated program are identical to criteria for admission into the MS in Telecommunications Program, with the exception that students do not need to have completed an undergraduate degree prior to admission.

Accepted students must maintain a minimum 3.25 GPA in the undergraduate segment of the accelerated program and a 3.00 GPA in the graduate segment. That is, they must maintain a 3.25 average until they have satisfied all the requirements for the BS in computer science. They must then maintain a minimum 3.00 average in the graduate segment of the accelerated program. Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program, and those graduate telecommunications courses taken and applied to their BS in Computer Science Program will no longer be admissible for the MS in telecommunications. If students are dropped from the accelerated program and have taken and applied telecommunications core courses toward their BS degree, they do not need to repeat those courses for the regular MS in Telecommunications Program if they obtained a grade of B or above in those courses; however, they will need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in telecommunications.
Similarly, if students are dropped from the accelerated program and they have taken and applied noncore telecommunications courses toward the BS in computer science, they do not need to repeat those courses for the regular MS in Telecommunications Program if they obtained a C or higher for those courses. Elective courses will be required to replace telecommunications courses already taken and dropped from the program. **Note:** Up to two C grades may be carried in the regular telecommunications program in noncore courses. A minimum GPA of 3.00 is required to graduate with an MS in telecommunications.

Students must complete all requirements for the BS in computer science. Students in the accelerated program must apply to have the BS in computer science conferred the semester before they expect to complete the BS requirements. The MS in telecommunications is granted on completion of all requirements for the accelerated program.

Telecommunications courses that computer science undergraduate students may take as part of the accelerated program are noted below. All of the prerequisite courses indicated below must be passed with a grade of B or higher.

**Telecommunications courses:**
- TCOM 500 Modern Telecommunications
- TCOM 502 Wide Area Networks and Internet (prerequisite: TCOM 501 or CS 455, or equivalent)
- TCOM 503 Fiber Optic Communications (prerequisite: TCOM 500 or equivalent)
- TCOM 504 Asynchronous Transfer Mode Network (prerequisites: TCOM 501 and TCOM 502, or equivalent)
- TCOM 505 Networked Multicomputer Systems (prerequisites: TCOM 501, CS 455, ECE 462, or equivalent)
- TCOM 509 Internet Protocols (prerequisite: TCOM 501 and 502, or equivalent)
- TCOM 510 Client Server Architectures and Applications (prerequisite: TCOM 505)
- TCOM 513 Optical Communications Networks (prerequisite: TCOM 503)
- TCOM 519 Voice Over IP (prerequisites: TCOM 509, CS 455, or equivalent)
- TCOM 529 Advanced Internet Protocols (prerequisite: TCOM 509)
- TCOM 539 Advanced Voice Over IP (prerequisite: TCOM 519)
- TCOM 551 Digital Communication Systems (prerequisite: TCOM 500 or equivalent)
- TCOM 607 Satellite Communications (Prerequisite: TCOM 551, ECE 463, or equivalent)

**Note:** Students in the Accelerated BS in Computer Science/MS in Telecommunications Program who have passed CS 455 with a grade of B will not be required to take TCOM 501 in the MS in telecommunications core and may take an elective 1.5-credit course instead.

**BS in Information Technology/Accelerated MS in Telecommunications**

Students in the BS in Information Technology Program may elect to enter the Accelerated MS in Telecommunications (MS in TCOM) Program while they are undergraduate students. The accelerated program is designed for qualified undergraduate students in the information technology program who would like to proceed directly into the MS in TCOM Program, with the two degrees with 144 credits. Students must satisfy requirements for the undergraduate degree (120 credits) and the MS degree (30 credits), with 6 credits of overlap permitted. The MS in TCOM is on an accelerated track, with 6 credits taken as an undergraduate and 24 credits as a graduate student. The 6 undergraduate credits must be selected from those given in the listing that follows and will be substituted for BS degree concentration electives, subject to prior approval by an advisor. **Note:** Students in the accelerated program must take ECE 301 as one of their BS in information technology concentration electives.

Applicants must be Mason undergraduate students in the BS in Information Technology Program. Students may apply for the accelerated program during the semester after which they will have completed 90 or more credits applicable toward the BS degree. Students must have an overall GPA of at least 3.25 to apply for the program. Students who have not yet finished 90 credits may be accepted provisionally subject to satisfactory completion of 90 credits. Criteria for admission into the accelerated program are identical to criteria for admission into the MS in TCOM Program, except that students do not need to have completed an undergraduate degree prior to admission.

Accepted students must maintain a minimum 3.25 GPA in the undergraduate segment of the accelerated program and a 3.00 GPA in the graduate segment. That is, after students have been accepted into the accelerated program, they must maintain a 3.25 GPA and have satisfied requirements for the undergraduate degree. They must then maintain a minimum 3.00 GPA in the graduate segment of the accelerated program. Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program, and those graduate TCOM courses taken and applied to the BS in information technology will no longer be admissible for the MS in TCOM. If students are dropped from the accelerated program and have taken and applied TCOM core courses toward the BS degree, then they need not repeat those courses for the regular MS in TCOM Program if they obtained a grade of B or higher in those courses. But they will need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in TCOM.

Similarly, if students are dropped from the accelerated program and have taken and applied noncore TCOM courses toward the BS degree, then they do not need to repeat those courses for the regular MS in TCOM Program if they obtained a grade of C or higher for those courses. Elective courses will be required to replace TCOM courses already taken and dropped from the program. **Note:** Up to two C grades may be carried in the regular TCOM Program in nonmandatory core courses. A minimum GPA of 3.00 is required to graduate with an MS in TCOM.

Students must complete all requirements for the BS degree. Students in the accelerated program must apply to have the BS degree conferred the semester before they expect to complete the BS requirements. The MS in TCOM is granted on completion of all requirements for the accelerated degree.

TCOM courses that may be taken as an undergraduate student as part of the Accelerated BS in Information Technology/MS in TCOM Program are noted in the listing below. **Note:** All of the prerequisite courses indicated below must be passed with a grade of B or higher.

**Telecommunications courses:**
- TCOM 500 Modern Telecommunications
- TCOM 501 Data Communications and LANs (prerequisite: acceptance into the Accelerated BSIT/MS TCOM Program)
BIS/Accelerated MS in Telecommunications

Students who are in the Bachelor of Individualized Study (BIS) Program may elect to enter an Accelerated MS in TCOM Program while they are undergraduate students. The accelerated program is designed for qualified undergraduate students in the BIS Program who would like to proceed directly into the MS in TCOM Program, completing the two degrees with 144 credits. Accelerated students must satisfy requirements for the BIS (including 120 credits) and the MS (30 credits), with 6 credits of overlap permitted. The MS in TCOM is on an accelerated track, with 6 credits taken as an undergraduate and 24 credits as a graduate student. The 6 undergraduate credits must be selected from those given in the table that follows and will be substituted for BIS concentration courses, subject to prior approval by a BIS advisor. Note: Accelerated students must take ECE 301 or 303 as one of their BIS concentration courses.

Applicants must be Mason undergraduate students in the BIS Program. Students may apply for the accelerated program during the semester after which they will have completed 90 or more credits and 15 Mason resident credits applicable toward the BIS as an undergraduate. Students must have an overall GPA of at least 3.25 to apply for the program. Students who have not yet finished 90 credits may be accepted provisionally subject to satisfactory completion of 90 credits. Criteria for admission are identical to criteria for admission into the MS in TCOM Program, except that students do not need to have completed an undergraduate degree prior to admission into the accelerated program.

Students who have been accepted into the accelerated program must maintain a minimum 3.25 GPA in the undergraduate segment of the accelerated program and a 3.00 GPA in the graduate segment. That is, after students have been accepted into the accelerated program, they must maintain a 3.25 GPA until they have satisfied all requirements for the BIS degree. They must then maintain a minimum 3.00 GPA in the graduate segment of the accelerated program. Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program, and those graduate TCOM courses taken and applied to their BIS Program will no longer be admissible for their MS in TCOM degree. If students are dropped from the accelerated program and they have taken and applied TCOM core courses toward their BIS degree, then they do not need to repeat those courses for the regular MS in TCOM Program if they obtained a grade of B or above in those courses. But they need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in TCOM.

Similarly, if students are dropped from the accelerated program and they have taken and applied noncore TCOM courses toward their BIS degree, they do not need to repeat those courses for the regular MS in TCOM Program if they obtained a C grade or above for those courses. Elective courses will be required to replace TCOM courses already taken and applied to the BIS Program. Note: Up to two C grades may be carried in the regular TCOM Program in nonmandatory core courses. A minimum GPA of 3.00 is required to graduate with an MS in TCOM.

Students must complete all requirements for the BIS degree. Students in the accelerated program must apply to have the BIS degree conferred the semester before they expect to complete BIS requirements. The MS in TCOM is granted on completion of all requirements for the accelerated degree. TCOM courses that may be taken by a BIS undergraduate student as part of the accelerated program are given in the table below. Note: All of the prerequisite courses indicated below must be passed with a grade of B or higher.

Telecommunications courses:
- TCOM 500 Modern Telecommunications
- TCOM 501 Data Communications and LANs (prerequisite: acceptance to accelerated program)
- TCOM 502 Wide Area Networks and Internet (prerequisites: TCOM 501, IT 341, or equivalent)
- TCOM 503 Fiber Optic Communications (prerequisite: TCOM 500 or equivalent)
- TCOM 504 Asynchronous Transfer Mode Network (prerequisites: TCOM 501 and 502, IT 341, or equivalent)
- TCOM 505 Networked Multicomputer Systems (prerequisites: TCOM 501, IT 341, or equivalent)
- TCOM 509 Internet Protocols (prerequisites: TCOM 501 and 502, IT 341, or equivalent)
- TCOM 510 Client Server Architectures and Applications (prerequisite: TCOM 505)
- TCOM 513 Optical Communications Networks (prerequisite: TCOM 503)
- TCOM 519 Voice Over IP (prerequisites: TCOM 509, IT 341, or equivalent)
- TCOM 529 Advanced Internet Protocols (prerequisite: TCOM 509)
- TCOM 539 Advanced Voice Over IP (prerequisite: TCOM 519)
- TCOM 607 Satellite Communications (prerequisites: ECE 463, TCOM 551, or equivalent)
Note: Accelerated students who have passed IT 341 with a grade of B or higher will not be required to take TCOM 501 in the MS in TCOM core. They may take a 1.5-credit elective instead. Other TCOM courses may be approved on a case-by-case basis.

BIS Concentration ..................................................... 34–46
Credits
BIS 300/390/490/491 .................................................. 10
ECE 301 Digital Electronics or ECE 303 ......................... 3
IT 212 How Computers Work ..................................... 3
IT 341 Network/Operating ......................................... 3
TCOM 500 Modern Telecommunications ...................... 3
TCOM 504 Asynchronous Transfer Mode Networks ........ 1.5
TCOM 509/529 Internet Protocols/Advanced Internet Protocols (1.5 credits each) or TCOM 515 Internet Protocol Routing (3 credits)
TCOM 609 Interior Gateway Protocols (IGP) (3 credits)
TCOM 610 Border Gateway Protocols (BGP) (3 credits)

Elective Courses
Choose 6 credits from following:
TCOM 509/529 Internet Protocols/Advanced Internet Protocols (1.5 credits each)
TCOM 515 Internet Protocol Routing (3 credits)
TCOM 519/539 Voice Over IP/Advanced Voice Over IP (1.5 credits each)
TCOM 611 Multiple Protocol Label Switching (MPLS) (3 credits)
TCOM 662 Advanced Secure Networking (3 credits)
Note: TCOM 509/529 and TCOM 515 cannot be taken twice for credit. If any of these courses is taken in the core element, it cannot be taken again in the elective element.

Certificate in Network Technologies and Applications
The certificate provides a broad understanding of the technologies used in telecommunications networks and the various applications of telecommunications networks. To obtain the certificate, students must complete the following, for a total of 15 credits:

Core Courses
Choose 9 credits from the following:
TCOM 304 Asynchronous Transfer Mode Networks (1.5 credits)
TCOM 505 Networked Multicomputer Systems (1.5 credits)
TCOM 509 Internet Protocols (1.5 credits)
TCOM 510 Client-Server Architectures and Applications (1.5 credits)
TCOM 519 Voice Over IP (1.5 credits)
TCOM 529 Advanced Internet Protocols (prerequisite: TCOM 509)
TCOM 539 Advanced Voice Over IP (prerequisite: TCOM 519)
TCOM 555 Network Management (3 credits)

Elective Courses
Six credits are required. Students may elect to take any additional 6 credits from specialty modules 1, 2, and 3, including those in the mandatory course list that are not part of the 9 credits of core courses for the certificate.

Certificate in Information Technology Forensics and Security
The objective of this certificate is to provide an in-depth understanding of security and forensics as they apply to networks and digital storage media. Students must complete the following for a total of 15 credits:

Core Courses
Choose 9 credits from the following:
TCOM 548/556 Security Issues in Telecom/Cryptography and Network Security (1.5 credits each) or TCOM 515 Internet Protocol Routing (3 credits)
TCOM 562 Network Security Fundamentals (3 credits) or ISA 562 Information Systems Security (3 credits)
TCOM 660 Network Forensics (3 credits), TCOM 661 Digital Media Forensics (3 credits), or TCOM 663 Operations of Intrusion Detection for Forensics

Elective Courses
Choose 6 credits from the following:
ISA 562 Information Systems Security (formerly ISA 662, and prior to that INFS 762; 3 credits)
TCOM 660 Network Forensics (3 credits)
Certificate in Wireless Communications  
**CERG-WIRE**

This certificate provides a broad understanding of the technologies, applications, and systems used in all forms of wireless communications. Students must complete the following, for a total of 15 credits:

**Core Courses**

*Choose 9 credits from the following:*

- TCOM 516 Global Positioning System (GPS) (1.5 credits)
- TCOM 526 Advanced GPS (1.5 credits)
- TCOM 551 Digital Communications Systems (3 credits)
- TCOM 552 Introduction to Mobile Communication (3 credits)
- TCOM 606 Advanced Mobile Communications
- TCOM 607 Satellite Communications (3 credits)

**Elective Courses**

Six credits are required. Students may earn the credits from specialty modules 1, 2, and 3, including those in the mandatory course list that are not part of the 9 credits of core courses for the certificate.

Certificate in Telecommunications Systems Modeling  
**CERG-TESM**

This certificate provides a broad understanding of the end-to-end systems engineering approach to telecommunications projects. Students must complete the following, for a total of 15 credits:

**Core Courses**

*Choose 9 credits from the following:*

- TCOM 521 Systems Engineering for Telecommunications Management (3 credits)
- TCOM 540 Telecommunications Network Optimization: Routing, Flow Management, and Capacity Modeling (1.5 credits)
- TCOM 541 Network Design and Pricing (1.5 credits)
- TCOM 545 Reliability and Maintainability of Networks (3 credits)
- TCOM 546 Financial Models of Telecommunications Systems (3 credits)

**Elective Courses**

Six credits are required. Students may earn the credits from specialty modules 4 and 5, including those in the mandatory course list that are not part of the 9 credits of core courses for the certificate.

Statistics

Phone: 703-993-3645  
Web: statistics.gmu.edu

Faculty

**Professors:** Carr, Gentle, Rosenberger (chair), Wegman  
**Associate professors:** Bell, Bolstein, Davis (associate chair), Habib, Miller, Sutton  
**Assistant professors:** Diao, Tang  
**Instructors:** Sims (visiting)  
**Adjunct professors:** Cohen, Jang, Kamocsai, Keller, McFadden, Srigany, Sullivan

Course Work

The Statistics Department offers all courses designated STAT in the Course Descriptions chapter of this catalog. Statistical methods and methods for data analysis are crucial for researching and exploring the life sciences, natural sciences, social sciences, business, nursing, education, and engineering. The Statistics Department offers a variety of introductory courses and more advanced course work in specialized statistical methodology and applications. The focus of the department’s offerings is applied, with special emphasis on biostatistics, graphics and visualization, federal and survey statistics, and engineering applications of statistics and data analysis.

Introductory courses are targeted for undergraduates in the College of Humanities and Social Sciences and the College of Health and Human Services, as well as in the Volgenau School. The STAT 250–350 sequence is targeted for general audiences, while the STAT 344–354 sequence is targeted for technical and scientific audiences. STAT 362 deals with computer statistical packages and is appropriate as a second or third course for students from a wide variety of backgrounds. It is strongly recommended for students who elect to minor in data analysis.

Although the department does not offer an undergraduate degree in statistics, it does offer a certificate program in applied statistics and a minor in data analysis. Also, a variety of advanced undergraduate courses is available for inclusion in other degree programs.

UNDERGRADUATE PROGRAMS

Certificate in Applied Statistics  
**CERB-ASTA**

This program complements undergraduate degree programs in computer science, systems engineering, electrical engineering, civil and infrastructure engineering, and mathematics. Undergraduates majoring in other discipline areas may be admitted to the certificate program at the discretion of the department.

The program expands career options available to students because the demand is great in the Washington, D.C., metropolitan area for people with interdisciplinary training, which includes a background in statistics and data analysis. Inquiries should be directed to the Statistics Department. Students who plan to work toward the certificate should seek advice from the department’s undergraduate coordinator.
Certificate Requirements
This certificate program requires 24 credits: STAT 344 or 346; 354; 362; and 474 or 574, along with four courses chosen from STAT 435, 455, 457, 463, 498, 499; ECON 445; OR/SYST 335; OR/MATH 441, 442; OR 481/MATH 446; and SYST 473.

Minor in Data Analysis
The minor provides students with a background in data analysis and statistical methodology. It is intended to complement undergraduate degree programs in the Volgenau School and the College of Science, especially computer science, economics, environmental engineering, geography, mathematics, public administration, sociology, and systems engineering.

Requirements
The minor requires 15 credits: a core sequence of 6 credits, plus 9 credits of electives. Grades of C or better are required in all courses. At least 9 of the 15 credits must be in STAT courses. At least 8 credits must be in courses not required by the student’s major.

To satisfy the core requirement, students must complete one of these sequences with grades of C or better: STAT 250–350 or STAT 344–354. Mathematics majors may substitute MATH 351–352 for STAT 344–354, provided the 9 elective credits are all STAT courses. The 9 elective credits must be chosen from a list of courses approved by the department’s undergraduate coordinator. Courses currently approved for the minor are STAT 362, 435, 455, 457, 463, 474, 499; CEIE 410; CS 450; ECON 445; GEOG 300; GOVT 400; OR/SYST 335; SOCI 405; and SYST 473.

BS/Accelerated MS in Statistical Science
This degree option allows Mason students to earn an MS in statistical science in less time than if they had first graduated from a suitable Mason BS program and then applied to the MS program.

Admission Requirements
Students must begin MS work within six months following completion of a BS degree in any one of the Volgenau School major areas or a BS in mathematics from the College of Science. Admission is guaranteed to any student with an overall GPA of 3.00 in courses taken after the first two undergraduate years (60 credits) with grades of B or better in the two 500-level STAT courses selected from STAT 544, 554, and 574.

Degree Requirements
The program consists of a minimum of 144 credits that satisfy the requirements for both the BS in the undergraduate major and the MS in statistical science with 6 credits of overlap. Twenty-four credits are required for the MS, provided that students have taken two of STAT 544, 554, and 574 as part of their BS course work.

GRADUATE PROGRAMS
- Statistical Science, MS MS-STAT

Statistical science is regarded as one of the oldest and most successful information technology (IT) subjects. It focuses on the conversion of raw data into information. In this graduate program, students are trained in the theory and practice of statistical methodology, particularly as it impinges on high-technology applications.

The MS program offers a choice of the following subject matter emphases: applied statistics, computational statistics, engineering statistics, federal statistics, and statistical signal processing. Students usually select one of these emphases or design a customized curriculum in conjunction with a faculty advisor. Students also select the research or the professional option. The research option is for students planning to continue with a PhD degree or begin or continue careers in statistical methodology research. The professional option provides MS degree qualifications to those seeking an expanded knowledge base in modern statistical theory and practice but do not wish to pursue a research career. Such students might plan to work in statistics, go on to professional schools, teach statistics at a secondary level, or pursue other careers in which advanced work in statistical methodology is necessary or advantageous but in which independent research is not involved.

Admission Requirements
In addition to satisfying general admission requirements for graduate study, all applicants must demonstrate basic computer literacy. They also must hold a bachelor’s degree from an accredited institution in a field that includes course work in calculus or real analysis, matrix or linear algebra, and calculus-based probability and statistics. Applicants with degrees in such fields as mathematics, computer science, statistics, and engineering automatically meet this requirement. For applicants with degrees in other fields, this requirement is normally satisfied if students have successfully completed courses equivalent to the following Mason courses: MATH 113, 114, 213; 203 or 322; and STAT 344 or MATH 351. Course work taken to correct deficiencies in undergraduate preparation is not counted toward the degree.

While the GRE is not required for admission, it is recommended for students competing for graduate teaching assistantships, fellowships, and research assistantships. International students from non-English-speaking countries who seek a graduate teaching assistantship should take the Test of Spoken English in addition to the TOEFL, which is required for admission.

Degree Requirements
In addition to meeting general requirements that apply to master’s degrees at Mason, all students must complete the 12-credit core requirements for the degree:

- STAT 544 Applied Probability
- STAT 554 Applied Statistics
- STAT 652 Statistical Inference
- STAT 656 Regression Analysis

The core course work covers the basic elements of statistics at the graduate level. STAT 544 covers the major mathematical framework for statistical theory and practice. STAT 652 provides basic statistical theory. After completing this course, students have the theoretical basis from which statistical methods are derived.

STAT 554 is a survey of statistical methods that have become the backbone of statistical practice. Focus in this course is on techniques that quantify random behavior. The final core course is STAT 656, which focuses on determining the rela-
Information Technology and Engineering

Essay.

Students opting not to write an essay must take 30 credits of course work.

Elective courses may be chosen from any graduate STAT courses except STAT 535, 700, 701, and STAT courses numbered 876 or higher.

Elective courses may be chosen from any graduate STAT courses except STAT 535, 700, 701, and STAT courses numbered 876 or higher.

Each emphasis area requires students to select four courses from a specific list and two approved electives. The lists are as follows:

- **Applied statistics:** STAT 574, 655, 660, 662, 665, 668, 760
- **Computational statistics:** STAT 657, 663, 751, 875; CS 652
- **Engineering statistics:** STAT 645, 655, 658, 758; OR 635
- **Federal statistics:** STAT 574, 634, 660, 663, 665, 673, 674
- **Statistical signal processing:** STAT 658, 662, 758; ECE 535

Elective courses may be chosen from any graduate STAT courses except STAT 535, 700, 701, and STAT courses numbered 876 or higher. STAT 779 and 789 may be repeated for credit with prior written approval of the department’s graduate coordinator. Also, certain courses from other departments may be chosen with prior written approval of the department’s graduate coordinator, generally not to exceed 6 credits.

A student enrolled in the Certificate in Actuarial Sciences Program and the MS in Statistical Sciences Program may count MATH 555 and 556 as approved non-STAT elective courses and can count MATH 653 and 654 as STAT electives when designing a curriculum for this degree. Credit toward the MS in statistical sciences will not be given for both MATH 654 and STAT 668. The full curriculum should be designed with the approval of the student’s statistics academic advisor and the statistics graduate coordinator.

Students select either the professional or research option, depending on career ambitions. This choice should be made no later than the end of the semester in which 15 credits have been completed.

**Professional Option**

The professional option focuses on completing course work in modern statistical theory and practice. Thirty credits are required for the degree; 12 credits must be in core courses taken by all MS students, with 18 additional credits taken from the approved list or with advisor approval. Students electing this option are encouraged to pursue a broad background in statistical science, and they may seek to concentrate on applications of statistical methodology to other disciplines.

Students who select the professional option may elect to write a master’s essay. This piece is not an original research report but a scholarly essay on a topic of current interest in the statistical science discipline. The essay is usually about 20 to 25 pages long and demonstrates the student’s ability to read and synthesize current technical literature into a scholarly essay. The essay is evaluated by the student’s advisor, taking into account the comprehensiveness of the coverage of the scientific literature, the accuracy of presentation and interpretation, and the literary style. Students are notified of their evaluations, and they may be required to revise their essay to develop their skills in preparing reports on technical subjects. The essay is usually written in the context of STAT 798 Master’s Essay. Students who complete the essay take 27 credits of course work and 3 credits of STAT 798 Master’s Essay. Students opting not to write an essay must take 30 credits of course work.

**Research Option**

The research option requires 30 credits, including 6 credits that must be in independent research (thesis). Research is done under the guidance of a faculty member. Research may be carried out at Mason or, if appropriate, at nearby facilities. For example, students may pursue research at their place of employment on topics of interest to their employer, provided the research meets the standards of the university. The remaining 24 credits must include the 12 core credits and elective courses taken from the approved list or added with the consent of the thesis advisor.

In addition to satisfying general university requirements for a master’s degree, candidates with the research option must submit a thesis or report based on the research to the student’s thesis committee, which must give preliminary approval. The composition and appointment of this committee follows graduate program policies.

Candidates also must pass a final oral exam that concentrates on, but is not limited to, the area on which the thesis or report is written. The exam is administered by the student’s thesis committee, and all interested members of the graduate faculty are invited to attend and participate in the questioning. The thesis committee makes the final decision on whether the candidate passes or fails.

### Dual-Degree MS in MS-OPRS, MS-STAT Operations Research and Statistical Science

This program allows students to earn an MS in operations research and an MS in statistical science by completing 48 credits of course work in both areas instead of the 60 that would be required if the degrees were sought independently.

**Admission Requirements**

Applicants must satisfy admission requirements for the MS in Operations Research Program and the MS in Statistical Science Program. A joint faculty committee from the Statistics and Systems Engineering and Operations Research Departments make final admission decisions into the dual-degree program.

**Degree Requirements**

The dual-degree program requires a total of 48 credits as specified below:

- 12 elective credits in OR courses at the 600 level, including at least one deterministic methods course chosen from OR 641, 642, 643, 644 and at least one stochastic methods course chosen from OR 645, 647, 648, 675, 677
- 12 elective credits in STAT courses numbered 574 or higher, excluding STAT 700 and 701. Courses must be approved in advance by the student’s statistics academic advisor and the statistics graduate coordinator.

A maximum of 6 credits across the two disciplines may be in independent research (thesis). The requirements for independent research are the same as detailed for the associated MS program.

Students in either the BS/Accelerated MS in Operations Research Program or the BS/Accelerated MS in Statistics Program cannot get a reduction of 6 credits toward this dual
degree. Students who want to proceed to a PhD degree will only be able to waive the number of credits specified in the associated PhD degree requirements, even though they will have 48 credits at the MS level.

If a student decides not to complete the required 48 credits, a single MS degree will not be granted unless the student fulfills the requirements for the MS in operations research or the MS in statistical science.

### Dual-Degree MS in MS-MATH, MS-STAT Mathematics and Statistical Science

This program allows students to earn an MS degree in mathematics and an MS degree in statistical science by completing 48 credits of course work in both areas instead of the 60 that would be required if the degrees were sought independently.

#### Admission Requirements

Applicants must satisfy admission requirements for both the MS in Mathematics Program and the MS in Statistical Science Program. A joint faculty committee from the Mathematical Sciences and Statistics Departments make final admission decisions into the dual-degree program.

#### Degree Requirements

The dual-degree program requires a total of 48 credits as specified below:

- **Core Requirements** ......................................................... 12
  - GCH 712 Introduction to Epidemiology .................................3
  - GCH 726 Advanced Seminar in Epidemiology .......................3
  - STAT 554 Applied Statistics ..............................................3
  - STAT 660 Biostatistical Methods .......................................3

- **Epidemiology and Biostatistics** Requirements ........................9
  - Select a minimum of three courses from the following:
    - GCH 605 Social Epidemiology ..........................................3
    - GCH 680 International Research Ethics and Methods .............3
    - GCH 722 Infectious Disease Epidemiology ..........................3
    - GCH 732 Chronic Disease Epidemiology ............................3
    - GCH 752 Nutritional Epidemiology ...................................3
    - GCH/NURS 804 Advanced Quantitative Data Analysis for Healthcare Research I ..................3
    - GCH/NURS 805 Advanced Quantitative Data Analysis for Healthcare Research II ...............3
    - GCH/NURS 807 Measurement Theories and Applications in Healthcare Research ................3

- **Statistics Requirements** .................................................. 9
  - Choose three from the following list of statistics courses:
    - STAT 544 Applied Probability .........................................3
    - STAT 574 Survey Sampling I ..........................................3
    - STAT 652 Statistical Inference .........................................3
    - STAT 655 Analysis of Variance .......................................3
    - STAT 656 Regression Analysis ......................................3
    - STAT 657 Nonparametric Statistics ..................................3
    - STAT 662 Multivariate Statistical Methods ..........................3
    - STAT 665 Categorical Data Analysis .................................3
    - STAT 668 Survival Analysis ...........................................3
    - STAT 673 Statistical Methods for Longitudinal Data Analysis ....3

- **Electives** ......................................................................... 6
  - Choose two electives (6 credits) in consultation with advisor.

#### MS in Epidemiology HH-MS-EBST and Biostatistics

This joint program with the College of Health and Human Services (CHHS) prepares participants to apply epidemiological and statistical principles to quantitative analysis of health care issues. It is aimed at health scientists and professionals in government agencies such as the National Institutes of Health, as well as in pharmaceutical companies, research hospitals, public health agencies, and other medical research organizations with the need to design experiments for medical and health services research. Graduates are also expected to analyze and interpret increasingly complex nonexperimental health care data. The degree is taught jointly by faculty from Volgenau School's Department of Statistics and CHHS' Department of Global and Community Health.

#### Admission Requirements

A bachelor’s degree from an accredited institution of higher education in a discipline related to health science or statistics with a GPA of 3.00 in the last 60 credits is required. Such fields include medicine, biology, nursing, health science, biostatistics, statistics, mathematics, and psychology. Courses in calculus at the undergraduate level through multivariate calculus equivalent to MATH 113, 114, and 213 with a grade of B or better are required for admission to the program. Applications to the degree program are made through CHHS. A joint faculty committee from the Volgenau School’s Department of Statistics and CHHS’ Department of Global and Community Health make admission decisions.

#### Program of Study

The degree requires 36 credits, as specified below:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Core Requirements</td>
<td>12</td>
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<td>STAT 660 Biostatistical Methods</td>
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<td>3</td>
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<tr>
<td>GCH 752 Nutritional Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>GCH/NURS 804 Advanced Quantitative Data Analysis for Healthcare Research I</td>
<td>3</td>
</tr>
<tr>
<td>GCH/NURS 805 Advanced Quantitative Data Analysis for Healthcare Research II</td>
<td>3</td>
</tr>
<tr>
<td>GCH/NURS 807 Measurement Theories and Applications in Healthcare Research</td>
<td>3</td>
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</tr>
<tr>
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<td>3</td>
</tr>
<tr>
<td>STAT 673 Statistical Methods for Longitudinal Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

Choose two electives (6 credits) in consultation with advisor.

#### Certificate in Biostatistics CERG-BSTA

This certificate, a joint program with CHHS, prepares participants to apply statistical methods to quantitative analysis
of health care issues. It is aimed at health scientists and professionals in government agencies such as the National Institutes of Health, pharmaceutical companies, research hospitals, public health agencies, and other medical research organizations that design medical experiments and analyze and interpret increasingly complex health care data. The program will also help prepare students begin careers in such organizations. The certificate is taught jointly by faculty from the Department of Statistics and Department of Global and Community Health.

Admission Requirements
Applicants must hold a bachelor’s degree from a regionally accredited institution of higher education in a discipline related to health science or statistics, with a GPA of 3.00 in the last 60 credits. Such fields include medicine, biology, nursing, health science, biostatistics, statistics, mathematics, and psychology. A course in college algebra with a grade of B or higher is required for admission to the program.

Certificate Requirements
Students must complete one course from each of the five groups.

- STAT 535 or 554
- STAT 660
- GCH/NURS 804 or STAT 656 or STAT 668
- GCH/NURS 805 or STAT 662
- GCH 712

Certificate in Federal Statistics

This professional program is targeted at upgrading the skills of practitioners. The federal statistical system is a complex data collection and analysis system that requires a wide variety of multidisciplinary skills for its maintenance. The federal statistics certificate is intended to respond to the need for broad training in statistics; survey methods; data analysis, including graphics and data visualization; databases and data security; parallel computation and related technology; geographic information systems; and issues of statistics and public policy. The program is extremely flexible and can be tailored to the needs of students within the federal statistical sector. It is also intended to be responsive to the needs of those in state and local governments, and those in the private sector involved in the collection, interpretation, or statistical analysis of federal data.

Admission Requirements
Potential candidates should hold a bachelor’s degree and have taken at least two courses in calculus and one course in probability or statistics at the 300 level or higher. The recommended minimum preparation includes MATH 113–114 and STAT 344 or their equivalents. Candidates must also be computer literate. Applicants typically have degrees in such fields as sociology, economics, engineering, mathematics, statistics, and business. Candidates should inquire with the department’s graduate coordinator for details of program planning. Courses are offered in late afternoon and evening and are particularly suitable for part-time students.

Certificate Requirements
The certificate program consists of 15 credits (five courses), which are selected from certificate courses and electives. The certificate courses build the foundations of statistical analysis and survey methods. They consist of the following:

- STAT 535 Analysis of Experimental Data
- STAT 554 Applied Statistics
- STAT 574 Survey Sampling I
- STAT 634 Case Studies in Data Analysis
- STAT 663 Statistical Graphics and Data Exploration
- STAT 665 Categorical Data Analysis
- STAT 673 Statistical Methods for Longitudinal Data Analysis
- STAT 674 Survey Sampling II
- STAT 779 Topics in Survey Design and Analysis

All of these courses, except for STAT 535, may be used for credit toward the MS in statistical science. Credit is granted for only one of STAT 535 and 554.

For the certificate program, students must choose three of the certificate courses plus two electives chosen with the consent of the department’s graduate coordinator. The electives are intended to provide a broad background supportive of the multidisciplinary needs of complex statistical systems. They include courses from economics, operations research, public administration, sociology, and statistics. Only one course (3 credits) can be outside the Statistics Department program and must be approved in advance by the department’s graduate coordinator. Suggested electives include STAT 544, 655, 656, 657, 660, 662, 664, 668, 875; ECON 637; OR 541, 542; PUAD 741, 742; and SOCI 631. Some courses may have prerequisites for which students must qualify or seek a waiver from the appropriate instructor. A cumulative GPA of 3.00 is required, and no more than one course with a grade of C may be applied toward the certificate. Only one of STAT 501–503 can be applied toward the 15 credits required for the certificate.

Certificate in Signal Processing

The Department of Statistics, in conjunction with the Department of Electrical and Computer Engineering, offers the certificate in signal processing, which provides graduate students with a program of courses and laboratory experience. Course work for the graduate certificate can be used for credit toward the MS in statistical science as well as the MS in electrical engineering. The primary purpose is to provide a well-defined target for students who want to advance or update their knowledge in this fast-moving field. The certificate may be pursued concurrently with any of the graduate degree programs in the Volgenau School.

Admission Requirements
The program is open to all students who hold a bachelor’s degree in any scientific or engineering discipline from an accredited university.

Certificate Requirements
The certificate consists of five graduate courses (15 credits) in signal processing. A cumulative GPA of 3.00 is required, and no more than one course with a grade of C may be applied toward the certificate. The certificate courses consist of two required foundation courses and three elective courses. See the list of courses under the Certificate in Signal Processing in the Electrical and Computer Engineering section of this chapter.

Statistical Science, PhD

The terminal degree PhD in statistical science represents the highest academic attainment for a statistician and, as such, requires in-depth knowledge of modern statistical theory and
practice. Current research areas of key department faculty in the program include sampling, statistical signal processing, biometric identification, biostatistics, statistical genetics, statistical graphics, and data exploration.

Degree Requirements

Students are required to complete 72 credits. Typically, a student entering with a master’s degree in statistics, mathematics, or similar discipline is able to receive a reduction of up to 24 credits from approved course work. In particular, students entering with a master’s degree in statistics are expected to have completed course work equivalent to STAT 544, 554, 652, and 656 with a 3.50 GPA. The program also requires a course in advanced calculus (MATH 315 or equivalent) with a B or better. In exceptional circumstances, talented students with a mathematically intensive undergraduate degree may be admitted.

Written qualifying exams will be taken in the following areas:

Applied Probability
Applied Statistics and Data Analysis
Statistical Inference

Students are required to complete 24 credits of advanced emphasis course work, including three core courses:

STAT 876 Measure and Linear Spaces or STAT 971 Probability Theory
STAT 972 Mathematical Statistics I
STAT 973 Mathematical Statistics II

The remaining five courses are selected and approved by the doctoral supervisory committee and the Statistics Department chair and should be numbered 600 or above. For STAT courses, qualified electives must be numbered 655 or above. STAT 700–701 do not count as electives for the PhD program.

No later than the end of the second semester of study, students should select a dissertation director and a doctoral supervisory committee. The chair of the doctoral supervisory committee, if a tenured member of the Department of Statistics, will ordinarily be the doctoral dissertation supervisor. If not a tenured member of the department, the chair will be chosen from among tenured department faculty on the committee. The committee will consist of the dissertation advisor, at least two graduate faculty members from the Department of Statistics, and an external member. The doctoral supervisory committee must be approved by the department chair.

Admission to candidacy is acquired on completion of an oral comprehensive exam administered by the doctoral supervisory committee, covering the three core courses and five advanced emphasis courses, and a dissertation proposal. The student is evaluated as pass, conditional pass, and fail. A student who fails the comprehensive exam may take it a second time. If the student fails a second time, the student is terminated from the program.

The dissertation defense serves as the student’s final examination and is conducted by the doctoral supervisory committee. Both the comprehensive exam and final exam are scheduled on approval of a written request to the department chair.

For more information, e-mail specific questions to statistics@gmu.edu.

Systems Engineering and Operations Research

Phone: 703-993-1670
Web: seor.gmu.edu

Faculty

Professors: Adelman, Chang, Donohue, Hoffman, Nash, Polyak, Sage, Schum, Sofer (chair)
Associate professors: Brouse, Chen, Laskey, Loerch, Shortle, White
Assistant professors: Ganesan, Liu
Affiliated faculty members: Gulledge, Houck, VanTrees

Research and term professors: Gross, Sherry, Wagenhals, Wagner, Wolman

Adjunct professors: Alexander, Barry, Camp, Carley, Durbin, Fischer, Humphrey, Killam, Laveson, McDevitt, Nguyen, Patel, Rothwell, Wieland, Yost

The Systems Engineering and Operations Research (SEOR) Department offers a bachelor’s degree in systems engineering, a certificate for undergraduates (the equivalent of a minor) in operations research and engineering, and master’s degrees in systems engineering and operations research. In addition, the department offers five certificate programs at the master’s level: architecture-based systems engineering; command, control, communications, computing, and intelligence (C4I); military operations research; computational modeling; and systems engineering for computer, information, and software-intensive systems. Students interested in pursuing doctoral education in operations research or systems engineering are encouraged to read the sections on the interdisciplinary PhD in information technology and the PhD study in systems engineering and operations research.

Systems engineers determine the most effective ways for an organization to use all of a given system’s components: people, machines, materials, information, and energy. The engineers plan, design, implement, and manage integrated systems, working to ensure performance, safety, reliability, and maintainability. They also work to ensure that systems are delivered on time at a reasonable cost. Examples of systems are computer networks, automobiles, intelligent robots, stereos, the Metro, and Mason. Whereas other engineering disciplines concentrate on individual aspects of a system, such as electronics, ergonomics, or software, systems engineers focus on the system as a whole. Systems engineering, perhaps more than any other engineering discipline, is involved with the human and organizational aspects of developing the desired system. Systems engineering is the people-oriented engineering profession.

Operations research is the professional field that deals with using scientific methods in engineering and management decision making, often focusing on how best to allocate limited resources. Operations researchers do for organizations what physicists do for the physical world: they try to find order in apparent chaos by identifying the structure in complex situations and understanding how the components of organizations interact. The goal is to explain and predict the effects of actions taken on these systems. Much of this work is developing and manipulating mathematical and computer models of organizational systems composed of people, ma-
machines, information, and procedures. The overall purpose is to provide a rational basis for decision making.

Mason’s operations research faculty members are principally involved in the theoretical and empirical study of managerial and operational processes, and the use of mathematical and computer models to optimize these systems. Models are needed for a variety of decision-making purposes in business, industry, scientific research, and government to describe different environments and relate alternative plans of action. Thus, the courses in operations research focus on quantitative modeling and the analysis of complex systems. Courses stress the use of contemporary computer hardware and software in modeling and analysis. The Bureau of Labor Statistics predicts that the field of operations research will be one of the fastest-growing professions of the next decade. Obviously, there is much overlap between systems engineering and operations research. The department encourages students of either discipline to elect courses in the other. For more information, go to seor.gmu.edu.

Course Work
The department offers all courses designated SYST and OR in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAM
The mission of the undergraduate program is to equip students with the ability to participate productively in the many professional activities associated with engineering a trustworthy system that satisfies client needs. The term “system” is interpreted broadly to include information, telecommunication, defense, health delivery, transportation and manufacturing systems, and corporate processes.

Specifically, the objectives of the systems engineering program are that graduates of the program will be able to

- Apply fundamental concepts of mathematics, science, information technology, and engineering to contemporary and future systems.
- Contribute to the development of systems using systems engineering methods, processes, models, and tools.
- Work effectively as a member of multidisciplinary teams and behave in a professional, ethical, and responsible manner (including establishing a foundation for lifelong learning in systems engineering and related areas).
- Communicate effectively with team members and decision makers orally and in writing.

Systems Engineering, BS BS-SYST
The program leading to the BS in systems engineering prepares students for a professional career in systems engineering. The educational program reflects the systems engineer’s unique perspective, which considers all aspects of a system throughout its lifetime. Mason’s systems engineering program is interdisciplinary, drawing from engineering, computer science, operations research, psychology, and economics. The core systems engineering courses tie these diverse threads to provide a global understanding of how individual engineering disciplines fit into the development of complex, large-scale systems. Students gain depth in a technical area by selecting a sequence of technical electives that constitute an emphasis. Students construct their own emphasis with the help of their advisor. A yearlong senior design project provides hands-on experience in applying various systems engineering methods and tools.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, Maryland 21202-4012; 410-347-7700. The requirements for the degree may be satisfied on a part-time basis. Cooperative education provides students with the opportunity to integrate paid career-related work experience with classroom learning.

Degree Requirements
In addition to Mason’s general education requirements, students must meet specific requirements for this degree. In the first two years, students obtain a basic foundation in mathematics, the natural sciences, computing, writing, humanities, arts, and social sciences. The systems engineering program builds on this foundation, teaching theoretical knowledge, practical skills, and the ability to apply systems thinking to problems. Teamwork, collaborative learning, analytical skills, practical problem solving, and oral and written communication are strongly stressed.

Degree requirements for the systems engineering major include 120 credits. Students must complete the following:

- Mathematics and statistics: MATH 113, 114, 203, 213, 214; STAT 346, 354
- Natural sciences: PHYS 160, 161, 260, 261; CHEM 251 or 211
- Computer science: CS 112, 211
- Humanities and social sciences: COMM 100; ENGL 101, 302; ECON 103; approved courses in literature, Western civilization, global understanding, arts, and synthesis to satisfy the university’s general education requirement
- Engineering: ENGR 107
- Systems engineering: SYST 101, 210, 220, 221, 320, 330, 335, 371, 470, 473, 489, 490, 495; OR 441, 442; and three approved technical electives. Students must complete each of these courses with a grade of C or better

Writing-Intensive Requirement
Mason’s writing-intensive requirement for systems engineering majors is satisfied by successful completion of SYST 489.

Synthesis Requirement
Mason’s synthesis requirement for systems engineering majors is satisfied by successful completion of SYST 495.

General Education Electives
General education electives should be selected from the department’s list of approved courses.

Sample Schedule
The following sample schedule shows the required and elective courses in the program. Students are strongly encouraged to follow this sample schedule to ensure that prerequisites are satisfied. For students who do not place into MATH 113 by taking the math placement exam, an alternative schedule is available. The position of the technical elective courses within the schedule will vary depending on the specialization, and the position of some general education classes may vary.
as well. Please consult with your advisor to plan the correct sequence.

**First Semester**
- COMM 100 Oral Communication ................................................. 3
- ECON 103 Contemporary Microeconomic Principles ................. 3
- ENGL 101 Composition ............................................................. 3
- ENGR 107 Introduction to Engineering ...................................... 2
- MATH 113 Analytic Geometry and Calculus I .......................... 4
- Total .................................................................................. 15

**Second Semester**
- CS 112 Introduction to Computer Programming .........................4
- MATH 114 Analytic Geometry and Calculus II .......................... 4
- PHYS 160 University Physics I .................................................. 3
- PHYS 161 University Physics I Laboratory ................................ 1
- SYST 101 Understanding Systems Engineering ....................... 3
- Total .................................................................................. 15

**Third Semester**
- CS 211 Object-Oriented Programming ..................................... 3
- MATH 213 Analytic Geometry and Calculus III ......................... 3
- PHYS 260 University Physics II ............................................... 3
- PHYS 261 University Physics II Laboratory ................................ 1
- SYST 210 Systems Design ...................................................... 3
- Literature course .................................................................... 3
- Total .................................................................................. 16

**Fourth Semester**
- CHEM 251 General Chemistry or CHEM 211 General Chemistry.................................................. 4
- MATH 203 Matrix Algebra ....................................................... 4
- MATH 214 Elementary Differential Equations .......................... 3
- SYST 220 Dynamical Systems I .............................................. 3
- SYST 221 Systems Modeling Laboratory ................................ 1
- Total .................................................................................. 14

**Fifth Semester**
- ENGL 302 Advanced Composition (for natural sciences and technology) .................................................. 3
- OR 441 Deterministic Operations Research ............................. 3
- STAT 346 Probability for Engineers ......................................... 3
- SYST 320 Dynamical Systems II ............................................ 3
- Arts course ........................................................................... 3
- Total .................................................................................. 15

**Sixth Semester**
- STAT 354 Engineering Statistics ............................................. 3
- SYST 330 Systems Methods .................................................... 3
- SYST 335/OR 335 Discrete Systems Modeling and Simulation .................................................. 3
- SYST 371 Systems Engineering Management .......................... 3
- Technical elective .................................................................... 3
- Total .................................................................................. 15

**Seventh Semester**
- SYST 470 Human Factors Engineering ................................ 3
- SYST 489 Senior Seminar ..................................................... 3
- SYST 490 Senior Design Project I .......................................... 3
- SYST 473 Decision and Risk Analysis A ................................. 3
- Technical elective .................................................................... 3
- Total .................................................................................. 15

**Eighth Semester**
- OR 442 Stochastic Operations Research ................................ 3
- SYST 495 Senior Design Project II ....................................... 3
- Technical elective .................................................................... 3
- Global understanding course ............................................... 3
- Western civilization or world history course .......................... 3
- Total .................................................................................. 15

All systems engineering students are assigned a faculty advisor. With the advisor’s help and approval, each student is required to complete a plan of study. This plan of study, contained in the detailed pamphlet available from the SEOR office, constitutes a learning plan for the degree program. The advisor must approve changes to the plan of study. All students in systems engineering are required to see their advisor at least once each semester to plan for the next semester’s registration.

The systems engineering program requires 9 credits of technical electives. Students must select one of the following technical specializations, each containing three courses.

**Operations Research**
- OR 481 Numerical Methods
- SYST 420 Network Analysis
- SYST 465 Pricing in Optimization and Game Theory

**Aviation Systems**
- SYST 420 Network Systems
- SYST 460 Introduction to Air Traffic Control
- SYST 461 Air Transportation Systems Engineering

**Control Systems**
- ECE 201 Introduction to Signal Processing
- ECE 220 Signals and Systems I
- SYST 421 Classical Systems and Control Theory

**Computer Network Systems**
- SYST 420 Network Analysis
- ECE 465 Computer Networking Protocols
- TCOM 500 Modern Telecommunications

**Software-Intensive Systems**
- CS 310 Data Structures
- CS 332 Object-Oriented Software Design and Implementation
- CS 421 Software Requirements and Design Modeling

**Engineering Systems**
- CEIE 230 Hydraulics
- ENGR 210 Statics and Dynamics
- ENGR 310 Mechanics of Materials

In addition to receiving a BS degree, students may wish to select a sequence that contributes toward a minor program.

**Change of Major**

Students who want to change their major to systems engineering must have a GPA of at least 2.75 in all math, physics, engineering, and computer science courses taken to fulfill requirements for the systems engineering degree and should have completed MATH 114 with a grade of B or better.

### Certificate in Operations Research and Engineering

This certificate program is open to students enrolled in the computer science, decision sciences, and mathematics undergraduate degree programs. The certificate augments the standard curricula with material on the computational aspects of operations research. Because the demand for people trained in this area is great, this program expands the career options available to students.

**Required Courses**
- MATH 313 Introduction to Applied Mathematics
- OR 335 Discrete Systems Simulation Modeling
- OR 441 Deterministic Operations Research
OR 442 Stochastic Operations Research
STAT 344 Probability and Statistics for Engineers and Scientists or STAT 346 Probability for Engineers
STAT 362 Introduction to Computer Statistical Packages

Plus two of the following courses:
OR 481 Numerical Methods in Engineering
OR 498 Independent Study in Operations Research
OR 499 Special Topics in Operations Research
STAT 354 Statistical Methods for Engineers and Scientists
Any 400-level STAT class

Students seeking the certificate must apply to the SEOR Department.

Interdisciplinary Minor Programs
By taking appropriate sequences of technical electives and, in some cases, a few courses in addition to the 120 credits required for graduation, students in the systems engineering program can obtain a minor in an interdisciplinary program. Available minors include data analysis and computer science. Students should check with their advisor and the departments offering the minors for specific requirements.

BS/Accelerated MS Program in Systems Engineering
Qualified undergraduate students may apply for this five-year program, which leads to a BS in an engineering discipline and an MS in systems engineering. The program can be completed in 144 credits. Applicants must be Mason undergraduate students majoring in systems engineering, computer science, computer engineering, electrical engineering, or civil and infrastructure engineering. Students may apply after they have completed at least 90 credits applicable to the BS degree. Students must have an overall GPA of at least 3.30 on courses applicable to the BS degree and must have completed all MATH and PHYS requirements. The MS degree is granted on completion of remaining courses.

Up to two courses (6 credits) of master’s level courses taken as part of the undergraduate degree may be applied to the graduate degree. For BS candidates, these graduate courses replace the corresponding undergraduate courses. The undergraduate version of these courses may not be applied to the MS degree. Systems engineering majors in the accelerated program are required to take OR 541 and 542 in place of OR 441 and 442.

GRADUATE PROGRAMS

Operations Research, MS

This program prepares students for research and professional practice associated with the formulation and analysis of mathematical models for decision making and their computer implementation. Major components include optimization, queueing and network modeling, computer simulation and applied probability, and application of these components to realistic and relevant operational problems. Students are expected to become proficient in these areas, as well as in supporting areas of information technology necessary to implement operations research methods.

The program includes core and elective courses selected by the student with the aid of a faculty advisor. To obtain the MS degree, students complete an approved plan of study that contains a minimum of 30 graduate credits. Students may take courses through the Commonwealth Graduate Engineering Program. Appropriate courses may be transferred, with advisor approval, into this Mason degree program.

Admission Requirements
To be admitted to the program, students must hold a baccalaureate degree from an accredited institution in engineering, mathematics, computer science, physical sciences, economics, or a related field. They also must have completed courses in calculus (MATH 113, 114, and 213), matrix algebra (MATH 203), differential equations (MATH 214), applied probability and statistics (STAT 346), and a scientific programming language (CS 112). Other requirements are as follows:
- Provide evidence of satisfactory educational achievement in at least one of the following forms: a GPA of at least
3.00 as an undergraduate or an acceptable GPA in graduate courses. International students must also achieve satisfactory scores on the GRE. Nonnative English speakers must have a satisfactory score on the TOEFL.

• Provide three letters of recommendation submitted by former professors or supervisors.

The department offers SYST 500 as an intensive review of undergraduate engineering mathematics, including matrix algebra, transforms, differential equations, probability, and statistics. On acceptance, students will be required to take a foundation qualification test a week or two before school starts, unless waived by the department chair or graduate coordinator. Students who fail the test will be required to take SYST 500. A sample test is available from the department.

Students with minor deficiencies in preparation may be accepted conditionally pending removal of the deficiencies. Courses taken to remove admission deficiencies (including SYST 500) extend minimum requirements for the degree. Students whose undergraduate training was in the quantitative social sciences or quantitatively oriented business administration may be allowed to complete a portion of the mathematics prerequisite by taking SYST 500.

**Degree Requirements**

The program consists of 30 credits. Students must complete four core courses and the project (15 credits).

**Core Courses, Project**

- OR 541 Operations Research: Deterministic Models
- OR 542 Operations Research: Stochastic Models
- OR 635 Discrete Event Simulation
- OR 680 Project Course in Operations Research, Systems Engineering, and Computational Modeling
- STAT 544 Applied Probability*

* Students who have performed well in their undergraduate calculus-based probability class may take OR 645 Stochastic Processes instead.

In addition, at least three 600-level or higher OR courses must be taken. These include at least one deterministic methods and one stochastic methods course.

**Deterministic methods courses:**

- OR 640 Global Optimization and Computational Intelligence
- OR 641 Linear Programming
- OR 642 Integer Programming
- OR 643 Network Modeling
- OR 644 Nonlinear Programming

**Stochastic methods courses:**

- OR 645 Stochastic Processes
- OR 647 Queuing Theory
- OR 648 Production and Inventory Systems
- OR 675 Reliability Analysis
- OR 674 Dynamic Programming
- OR 677 Statistical Process Control

**Electives**

Up to two additional elective courses may be chosen with written concurrence of the advisor. These courses should be taken in an area appropriate to the student’s interests, such as operations research statistics, computer science, information systems, systems engineering, electrical and computer engineering, economics, and mathematics. At least one of these electives must be taken from SEOR’s course offerings.

With the advisor’s permission, a qualified student may elect to write a thesis in place of 3 credits of course work from the methodological or applications area.

Students may construct concentration areas by choosing electives from among special groupings. The four concentrations available are decision analysis, military operations research, optimization, and stochastic modeling.

▲ **Concentration in Decision Analysis (DA)**

Students concentrating in decision analysis must complete OR 671 and 681, and SYST/STAT 664. The remaining two electives are chosen with written concurrence of the student’s advisor and must include one deterministic methods course and one stochastic methods course.

▲ **Concentration in Military Operations Research (MOR)**

Students concentrating in military operations research must complete OR 651 and 652, and SYST 683. The remaining two courses are chosen with written concurrence of the student’s advisor and must include one deterministic methods course and one stochastic methods course.

Particularly important to students planning a PhD program are the core courses that satisfy the breadth requirement.

▲ **Concentration in Optimization (OPT)**

Students whose primary interest is in optimization may complete a concentration by choosing three courses from OR 640, 641, 642, 643, 644, 682, and 741. The remaining two courses are chosen with written concurrence of the advisor. They should be tailored to the student’s interest and must include at least one stochastic methods course. The other course may be chosen from the department’s offerings, appropriate offerings in other departments within the Volgenau School, and appropriate courses from other university departments. A sample of possible courses outside SEOR is available from the department office.

▲ **Concentration in Stochastic Modeling (STM)**

Students concentrating in stochastic modeling must complete one 600-level statistics course (numbered 634 or above) and two courses from OR 645, 647, 648, 674, and 677. The remaining two courses are chosen with written concurrence of the student’s advisor and must include at least one deterministic methods course.

**Systems Engineering, MS**

This program prepares students for a professional career in systems design, development, and management, associated with problem formulation, issue analysis, and evaluation of alternative courses of action. The program emphasizes both analytical and practical aspects of engineering complex systems. Students are expected to demonstrate proficiency in several quantitative modeling disciplines. Students are also expected to master issues relevant to practical aspects of systems design, engineering, and management. The program prepares students for careers in research and development, and pursuing advanced graduate study leading to the PhD in information technology.

Each student is assigned a faculty advisor with whom to work to complete an approved plan of study. This plan of study must include three core courses, two methods courses, three to four electives in an emphasis area, and a thesis or systems...
engineering project. The plan of study must include 30 graduate credits. Either a thesis (6 credits) or research project (3 credits) is required for the degree. Matriculation requirements for candidates needing additional work in mathematics or engineering also may be included in the plan of study.

Foundation and Admission Requirements

Applicants should have a baccalaureate degree from an accredited institution in engineering, mathematics, computer science, physical sciences, economics, or a related field. They also should have completed courses in calculus (MATH 113, 114, and 213), matrix algebra (MATH 203), differential equations (MATH 214), applied probability and statistics (STAT 346), and a scientific programming language (CS 112). Other requirements are as follows:

- Evidence of satisfactory educational achievement in at least one of the following forms: a GPA of at least 3.00 as an undergraduate or an acceptable GPA in graduate courses. International students must also achieve satisfactory scores on the GRE. Nonnative English speakers must have achieved a satisfactory score on the TOEFL exam.
- Three letters of recommendation submitted by former professors or supervisors
- Working background in engineering mathematics and computer systems. Students with minor deficiencies in preparation may apply for admission to the program, but they will be required to take one or more foundation courses. The department offers SYST 500 as an intensive review of undergraduate engineering mathematics, including matrix algebra, transforms, differential equations, probability, and statistics.

Students who have not completed a basic engineering undergraduate mathematics sequence will be required to complete courses in engineering calculus and matrix algebra prior to acceptance. On acceptance, students will be required to take a foundation qualification test a week or two before school starts, unless waived by the department chair or graduate coordinator. Students who fail the test will be required to take SYST 500 or other foundation courses. A sample test is available from the department.

Familiarity with analytical modeling software, such as spreadsheets or math packages, is also expected. Students should acquaint themselves with these software packages before beginning classes.

Project or Thesis

Each student must complete a project (3 credits) or thesis (6 credits). Under the project option, students complete 3 credits of SYST 798, in which students propose and conduct an approved team project. A project report is submitted at the end of the semester, and a final presentation is made to the Systems Engineering and Operations Research Department faculty. Under the thesis option, students complete 6 credits of SYST 799. The master’s thesis should reflect a significant independent research effort. The work is conducted under the guidance of a faculty thesis advisor from the Systems Engineering and Operations Research Department, and the final written thesis and oral defense are approved by a three-member faculty committee and submitted to the Volgenau School. The thesis work is expected to be completed while taking 6 credits of SYST 799. Although students may register for more than 6 credits, only 6 credits can be applied toward the degree.

Core Courses

Students must complete the following three core courses (9 credits):

- SYST 510 Systems Definition and Cost Modeling
- SYST 520 System Engineering Design
- SYST 530 System Management and Evaluation

Methods Courses

Students must complete two basic methods courses, including SYST 611 System Methodology and Modeling. The other basic methods course may depend on the emphasis chosen by the student and must be selected from the following list:

- ECE 528 Introduction to Random Processes in Electrical and Computer Engineering
- OR 541 Operations Research: Deterministic Models
- OR 542 Operations Research: Stochastic Models
- OR 635 Discrete System Simulation
- SYST 563 Research Methods in Systems Engineering and Information Technology
- SYST 573 Decision and Risk Analysis
- SYST 620 Discrete Event Systems
- SYST 664 Bayesian Inference and Decision Analysis

Emphasis Courses

Students must complete a set of elective courses that, together with the basic methods courses, constitute a clearly defined emphasis within systems engineering. Students pursuing the thesis option complete three electives in an emphasis; students pursuing the project option complete four electives in an emphasis.

Students may create their own emphasis with the approval of their advisor, or they may choose one of the following six emphases: systems engineering analysis, systems management, architecture-based systems integration, C4I, systems engineering of software-intensive systems, and advanced transportation systems. Approved basic methods courses and electives for the major emphases are as follows.

Systems Engineering Analysis Emphasis

Systems engineers must address a broad range of issues relevant to the design, implementation, analysis, and management of systems. This emphasis provides methodological tools that can be applied to the systems engineering process. Areas of focus include decision support systems, distributed intelligent systems, knowledge-based planning systems, network systems, probabilistic reasoning systems, sensor fusion systems, and optimization methods. The graduate program in systems engineering recognizes the importance of balancing an education in quantitative models and engineering tools with a proper understanding of the systems perspective.

Basic methods courses:

- SYST 611 System Methodology and Modeling

One additional course from the list of basic methods courses

Emphasis-specific courses:

Students must complete the following course:

- SYST 542 Decision Support Systems Engineering

The remaining courses are electives taken from the list below. The set of elective courses must constitute a well-defined focus and must be approved by the student’s advisor. Courses designated as basic methods courses may also be used as elective courses once the requirement of two basic methods courses has been met.
SYST 619 Introduction to Architecture-Based Systems Engineering
SYST 621 System Architecture Design
SYST 677/OR 677/STAT 677 Statistical Process Control

**Systems Management Emphasis**
The management aspect of systems engineering involves tracking and control of system development through the major phases of the system lifecycle, identifying and resolving problems to minimize their effect on cost, schedule, or performance, and iteratively improving product and process. This track emphasizes the theory and practice of systems management and prepares students for careers in managing the development of complex systems.

**Basic methods courses:**
SYST 611 System Methodology and Modeling

One additional course from the list of basic methods courses

**Emphasis-specific courses:**
*Students must complete the following courses:*
SYST 571 Systems Engineering Management
SYST 619 Introduction to Architecture-Based Systems Engineering

The remaining courses are electives taken from the list below. The set of elective courses must constitute a well-defined focus. Courses designated as basic methods courses may also be used as elective courses once the requirement of two basic methods courses has been met:

SYST 513 Total Systems Engineering, Re-engineering, and Enterprise Integration
SYST 540 Analysis for Systems Management
SYST 542 Decision Support Systems Engineering
SYST 621 Systems Architecture Design
SYST 622 System Integration and Architecture Evaluation
SYST 671/OR 671 Judgment and Choice Processing and Decision Making
SYST 677/OR 677/STAT 677 Statistical Process Control

**Architecture-Based Systems Integration Emphasis**
There is much interest today in the engineering of systems that comprise other component systems, where each of the component systems serves organizational and human purposes. These systems families are often categorized as systems of systems, federations of systems, or coalitions of systems. The design of architectures is a major ingredient in the design of systems families. Furthermore, it provides the conceptual basis for achieving system integration. This emphasis covers the formulation of the system integration problem, definition of architecture frameworks, use of structured analysis and object-oriented methodologies for the design of architectures, modeling and simulation for the evaluation of architectures, and approaches to integration. Both defense and industrial applications are considered.

**Basic methods courses:**
SYST 611 System Methodology and Modeling
SYST 620 Discrete Event Systems

**Emphasis-specific courses:**
*Students must complete the following courses:*
SYST 619 Introduction to Architecture-Based Systems Engineering
SYST 621 System Architecture Design
SYST 622 System Integration and Architecture Evaluation

The remaining course is an elective taken from the list below. Courses designated as basic methods courses may also be used as elective courses once the requirement of two basic methods courses has been met:

SYST 513 Total Systems Engineering, Re-engineering, and Enterprise Integration
SYST 542 Decision Support Systems Engineering
SYST 571 Systems Engineering Management
SYST 683 Modeling, Simulation, and Gaming

**Command, Control, Communications, Computing, and Intelligence Emphasis**
C4I systems are concerned with gathering, retrieving, analyzing, and disseminating time-sensitive information to achieve mission-critical objectives. These systems support military operations across the spectrum of conflict, intelligence operations, transportation monitoring, emergency response, drug interdiction, and law enforcement, among others. C4I systems include the equipment, people, and procedures necessary to accomplish the mission. The equipment may include a variety of sensors, communications systems, and information processing and decision-support systems.

The program focuses on the analysis, design, development, and management of C4I systems. Topics addressed include C4I architectures and software, communications, decision support, modeling and simulation, and sensor data fusion.

**Basic methods courses:**
OR 542 Operations Research: Stochastic Models or ECE 528 Introduction to Random Processes in Electrical and Computer Engineering
SYST 611 System Methodology and Modeling

**Emphasis-specific courses:**
*Students must complete the following courses:*
SYST 680/ECE 670/OR 683 Principles of C4I
SYST 683 Modeling, Simulation, and Gaming

The remaining courses are electives taken from the list below. The set of elective courses must constitute a well-defined focus. Courses designated as basic methods courses may also be used as electives once the requirement of two basic methods courses has been met:

SYST 671/OR 671 Judgment and Choice Processing and Decision Making
SYST 684 Sensor Data Fusion
SYST 685 Estimation and Tracking: Principles and Techniques
SYST 760 Special Topics in C4I Systems Engineering
OR 651 Military Operations Research I: Cost Analysis
OR 652 Military Operations Research Modeling II: Effectiveness Analysis
ECE 542 Computer Network Architectures and Protocols
ECE 630 Statistical Communication Theory
ECE 642 Design and Analysis of Computer Communication Networks

**Systems Engineering of Software-Intensive Systems Emphasis**
This emphasis addresses the software component of the systems engineering life cycle. It specifically covers the allocation of system requirements to software. Practitioners are concerned with the theoretical and practical aspects of tech-
Basic methods courses:
SYST 611 System Methodology and Modeling
One additional course from the list of basic methods courses

Students must complete one of the following:

Emphasis-specific courses:
Syudents must complete the following courses:
SYST 513 Total Systems Engineering, Re-engineering, and Enterprise Integration
SYST 619 Introduction to Architecture-Based Systems Engineering

The remaining courses are electives taken from the list below. The set of elective courses must constitute a well-defined focus. Courses designated as basic methods courses may also be used as elective courses once the requirement of two basic methods courses has been met:

- CS 571 Operating Systems
- CS 631 Object-Oriented Design Patterns
- INFS 622 Information Systems Analysis and Design
- SWE 619 Object-Oriented Software Specification and Construction
- SYST 540 Analysis for Systems Management
- SYST 542 Decision Support Systems Engineering
- SYST 571 Systems Engineering Management

At most, one of the following:
- CS 555 Computer Communications and Networking
- ECE 542 Computer Network Architectures and Protocols
- INFS 612 Principles and Practices of Communication Networks

Advanced Transportation Systems Emphasis

The air transportation system is one of the most complex networked systems. This specialization is designed to provide students with the skills to address the next generation of challenges of the air transportation system. Topics addressed include congestion and safety of the national air space, economic and human factors, impact of technology innovation, and public policy. The program emphasizes design, modeling, and analysis to support decision making for government and the aviation industry.

Basic methods courses:
SYST 611 System Methodology and Modeling
One additional course from the list of basic methods courses.

Emphasis-specific courses:
Students must complete the following courses:
SYST 560 Introduction to Air Traffic Control
SYST 660/OR 660 Air Transportation Systems Modeling

The remaining courses are electives taken from the list below. The set of electives must constitute a well-defined focus. Courses designated as basic methods courses may also be used as electives once the requirement of two basic methods courses has been met:

- SYST 571 Systems Engineering Management
- SYST 619 Introduction to Architecture-Based Systems Engineering
- SYST 671 Judgment and Choice Processing and Decision Making

This program allows students to earn an MS in operations research and an MS in statistical science by completing 48 credits of course work in both areas instead of the 60 that would be required if the degrees were sought independently.

Admission Requirements

Applicants must satisfy admission requirements for the MS in Operations Research Program and the MS in Statistical Science Program. A joint faculty committee from the Statistics Department and the Systems Engineering and Operations Research Department make final admission decisions into the dual-degree program.

Degree Requirements

The dual-degree program requires a total of 48 credits as specified below:

- OR 541, 542, 635, and 680
- STAT 544, 554, 652, and 656
- 12 elective credits in OR courses at the 600 level, including at least one deterministic methods course chosen from OR 641, 642, 643, 644, and at least one stochastic methods course chosen from OR 645, 647, 648, 675, 677
- 12 elective credits in STAT courses numbered 574 or higher, excluding STAT 700 and 701. Courses must be approved in advance by the student’s statistics academic advisor and the statistics graduate coordinator.

A maximum of 6 credits across the two disciplines may be in independent research (thesis). The requirements for independent research are the same as detailed for the associated MS program.

Students in either the BS/Accelerated MS in Operations Research Program or the BS/Accelerated MS Statistics Program cannot get a reduction of 6 credits toward this dual degree. Students who want to proceed to a PhD degree will only be able to waive the number of credits specified in the associated PhD degree requirements, even though they have 48 credits at the MS level.

If a student decides not to complete the required 48 credits, a single MS degree will not be granted unless the student fulfills the requirements for the MS in operations research or the MS in statistical science.

Certificate in Architecture-Based Systems Integration

This program is available to students who hold bachelor’s degrees in engineering and scientific disciplines or are in graduate status in such programs. Admission requirements are identical to those for the master’s degree in systems engineering. To be eligible for a certificate, students must complete SYST 520, SYST 611 or ECE 521; SYST 619, 620, 621, and 622 with an average grade of B or better. The following is a suggested program of study for obtaining the certificate while studying for the MS in systems engineering degree:
Certificate in Command, Control, Communications, Computing, and Intelligence

This certificate program is available to students who hold bachelor’s degrees in engineering and scientific disciplines or are in graduate status in such programs. Admission requirements are identical to those for the master’s degree in systems engineering. To be eligible for a certificate, students must complete with an average grade of B or better SYST 680; ECE 528 or OR 542; and three electives from SYST 664, 683, 684, 685, 760, OR 635, 651, 652, ECE 542, 630, 642. The following is a suggested program of study for obtaining the certificate while studying for the MS in systems engineering degree (certificate required courses indicated in italics):

**Core courses:**
SYST 510, 520, 530

**Methods courses:**
SYST 611
ECE 528 or OR 542

**Emphasis-specific courses:**
SYST 680, 683, and two C4I approved elective courses

**Project:**
SYST 798

* Required for certificate

Certificate in Discovery, Design, and Innovation

This program responds to the growing need for professional knowledge in innovation. It provides a balanced understanding of the entire process: discovery of knowledge, use in inventive problem solving, development of inventions, and familiarity with using various inventive design methods and tools. The program is available to students who hold master’s degrees in engineering and scientific disciplines or who are in such graduate programs. Students may pursue the certificate concurrently with any of the graduate programs in the Volgenau School; however, the certificate is not awarded until all requirements have been completed.

Certificate candidates must complete at least 15 credits with an average grade of B or better.

To obtain the certificate, students must take SYST 520 and IT 894 and 944, and two of the following: CEIE 601 or 670; SYST 573 (recommended if going on for MS in civil and infrastructure engineering); STAT 664/SYST 664; SYST 781/STAT 781; STAT 652, 700, and 701; OR 671/SYST 671; or IT 819.

Certificate in Military Operations Research

This program provides knowledge, tools, and techniques to those who work or plan to work in the field of military operations research. It is appropriate for students who cannot complete requirements for a master’s degree in operations research, but who want a concentrated study of military modeling. Admissions requirements are identical to those for the master’s degree in operations research.

Certificate candidates must complete six courses, with an average grade of B or better, for a total of 18 graduate credits.

To obtain the certificate, a student needs to complete the following: OR 541, 542, 635, 651, and 652, and SYST 683. Students who already have 3 credits of deterministic operations research can receive the certificate with 15 graduate credits. Those who already have taken a course equivalent to OR 542 should substitute OR 681.

Certificate in Systems Engineering of Software-Intensive Systems

This certificate is available to any student who holds a bachelor’s degree in an engineering or scientific discipline or has graduate status in such a program. Admission requirements are identical to those for the master’s degree in systems, except that the math requirements include only MATH 113, MATH 114, and a probability and statistics course. Note: Some certificate electives may require stronger math requirements.

To be eligible for a certificate, students must complete with an average grade of B or better SYST 510, 513, and 520, and two of these electives: SYST 542, 619, SWE 619, ECE 542; CS 555; INF 612; only one of CS 555, ECE 542 and INF 612 may be taken. The following is a suggested program of study for obtaining the certificate while studying for the MS in systems engineering:

**Core courses:**
SYST 510*, 520*, 530

**Methods courses:**
SYST 611 and one other method course
**Information Technology and Engineering**

**Project:**
SYST 798

*Required for certificate

### PhD Study in Systems Engineering and Operations Research

Doctoral studies in systems engineering and operations research may be pursued in two ways.

Doctoral study in both systems engineering and operations research is available through the PhD in Information Technology Program, which offers advanced courses in this discipline. The doctoral program allows students to take a broad range of courses and research options. Students may designate a concentration in systems engineering or operations research in their doctoral degree title. In that case, the degree conferred on a graduating student is a PhD in information technology with concentration in operations research or a PhD in information technology with concentration in systems engineering. Students may also pursue such doctoral studies without designating a concentration in their degree title.

Pending approval of the State Council of Higher Education for Virginia, the SEOR Department will offer a PhD in Systems Engineering and Operations Research (SEOR) Program, beginning spring 2009. The PhD in SEOR curriculum will offer a unique integration of systems engineering and operations research. This integration will give students a strong analytical and computational capability on the one hand and an overarching systems perspective that is well-grounded in application of the other. No other department in the nation offers a PhD degree program that covers systems engineering and operations research in this integrated manner. On approval of this degree program, students will have the opportunity to transfer into the new PhD in SEOR Program or complete the PhD in information technology with a concentration in systems engineering or operations research. When all students have graduated from the concentration (or have transferred into the PhD in SEOR), we will discontinue the concentration.

### Information Technology, PhD

#### Concentration in Systems Engineering (SYST)
#### Concentration in Operations Research (OPRS)

**Requirements**

Students seeking one of these concentrations must satisfy all requirements for the PhD in information technology. In addition, the following requirements must be met.

**Admissions**

Students are usually admitted with an MS degree in systems engineering, operations research, or some related engineering or information technology area. The admissions materials are similar to those of the PhD in information technology; however, submittal of GRE scores is mandatory.

### Plan of Study

All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with consent of the department’s doctoral coordinator.

### Doctoral Supervisory Committee

The committee chair should be selected from the list of approved chairs of SEOR, and the dissertation director must be a member of SEOR. The doctoral supervisory committee must include at least three members from SEOR. The composition of the doctoral supervisory committee is to be approved by the department’s doctoral coordinator. Permission for the comprehensive exam and dissertation defense are requested from the Volgenau School associate dean on the basis of a written request and plan that has been approved by the supervisory committee and the department’s doctoral coordinator.

### Qualifying Exams

Each student must take a set of four exams from three different degree programs from the following:

- OR 541 Deterministic Models in Operations Research
- OR 542 Stochastic Models in Operations Research
- STAT 544 Applied Probability
- STAT 554 Applied Statistics
- SYST 520 System Design and Integration
- SYST 573 Decision and Risk Analysis

### Advanced Emphasis Requirement

For students specializing in operations research, at least 18 of the 24 credits in the advanced emphasis requirement must be in OR courses numbered 600 or higher or in IT courses with an OR designation. For students specializing in systems engineering, at least 18 of the 24 credits must be in SYST courses numbered 600 or higher, or in IT courses with a SYST designation. All exceptions to this rule must be approved by the student’s doctoral supervisory committee and the department’s doctoral coordinator. The doctoral supervisory committee and the associate dean for graduate studies and research of the Volgenau School must approve the overall plan of study. A list of IT courses with an OR or SYST designation is available from the SEOR office.

### Systems Engineering and Operations Research, PhD

(筹备 SCHEV 批准)

**Requirements**

All general Mason and specific Volgenau School requirements apply. In addition, the following rules apply.

**Admissions**

Candidates for the PhD program must hold an MS degree from an accredited institution of higher education in systems engineering, operations research or related areas in engineering mathematics and computer science with a minimum graduate GPA of 3.50 and a minimum undergraduate GPA of 3.00. In addition, well-qualified candidates holding a BS degree in these areas may apply directly to the PhD program.

All applicants should have a strong background in engineering mathematics, which includes three semesters of calculus, differential equations, linear algebra, and probability. In addition, students entering the doctoral program must have a sound working knowledge in computing.
The admission process involves submitting the application for admission, undergraduate and graduate transcripts from previous colleges and universities attended, GRE test results, three letters of reference, a résumé and a statement of career goals and aspirations, and a self-assessment of past background. Translations of international credentials must be provided, if they are not in English; in some cases, applicants will be required to have documents evaluated by an external agency. A satisfactory score on the TOEFL examination is required for nonnative English speakers. All of an applicant’s background is examined before an admission decision is made.

Course Requirement
Students entering with a master’s degree in a related discipline will be required to complete 48 credits. In particular, students entering with a master’s degree are required to complete the following: at least 24 credits of advanced emphasis course work and at least 24 research credits from SEOR 998 Doctoral Dissertation Proposal and SEOR 999 Doctoral Dissertation, with at least 12 credits of SEOR 999.

The advanced course work includes the following:

- STAT 554 Applied Statistics (3 credits)
- SYST 763 Research Methods in Systems Engineering and IT (3 credits)
- 15 credits of 700-level SEOR approved courses, a list of approved courses is available from the department.
- 3 credits in a SYST or OR course numbered 600 or higher, excluding SYST 798 Project Course in Systems Engineering and OR 680 Project in Operations Research.

No more than 3 credits are allowed for a directed reading course. All courses must be approved by the student’s dissertation committee chair. Course substitutions must be approved by the dissertation committee chair and the SEOR Department chair. A GPA of 3.50 is required, and no grade of C is allowed in these 24 credits.

Students entering without a master’s degree are required to complete an additional 24 credits of master’s level courses. Consult the SEOR Department for further details.

Plan of Study
All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with consent of the department’s doctoral coordinator.

Qualifying Exam
Each student must take four exams within two years of enrolling in the program. The exam is primarily for testing the students’ familiarity with fundamental concepts.

- SYST 510 Systems Definition and Cost Modeling
- SYST 520 Systems Engineering Design
- OR 541 Operations Research: Deterministic Models
- OR 542 Operations Research: Stochastic Models

A student who passes three of the four exams in the first attempt must retake and pass the failed exam within one year. A student who passes fewer than three exams in the first attempt must retake and pass an entire set of four exams within one year. After two unsuccessful attempts, a student is dismissed from the PhD program.

Doctoral Supervisory Committee
The dissertation director must be a member of the SEOR graduate faculty or a member of the Mason graduate faculty with approval from the SEOR Department chair. The doctoral supervisory committee must include at least three members from the SEOR Department-approved graduate faculty, and at least one non-SEOR member from the Mason faculty. The composition of the doctoral supervisory committee is to be approved by the doctoral coordinator. At least three members of the committee must be members of the Mason graduate faculty.

Comprehensive Exam
The comprehensive exam is taken after the student has satisfactorily completed all the advanced emphasis course work requirements in the approved plan of study filed by the student. The examiners will include SEOR faculty and the supervisory committee plus any outside examiners considered appropriate; however, the supervisory committee determines whether the student passes or not. The comprehensive exam consists of an eight-hour written exam and an oral exam. The committee will determine whether the student has a mastery of the advanced emphasis course work. If a student fails the comprehensive exam, the student may request a re-examination within 60 days of receiving notice of the exam result. The request should be made in writing to the doctoral coordinator. If the student fails the re-examination or does not request a re-examination within 60 days, the student will be dismissed from the PhD program.

Dissertation Proposal
After passing the comprehensive exam, each doctoral student prepares a written dissertation proposal, which is presented to the doctoral supervisory committee. After successfully completing this requirement, the student is formally admitted as a candidate for the PhD degree.

Dissertation Defense
When the central portions of the research have been completed to the point where the student is able to describe the original contributions of the dissertation effort, a candidate submits the written dissertation to the supervisory committee and schedules an oral predefense with the committee. This predefense is attended by the supervisory committee. The supervisory committee must approve the work or the student must schedule a second predefense.

Once the committee believes the student is ready, a final public oral defense may be scheduled no sooner than one month after the conclusion of the predefense, to have an announcement posted for at least two weeks. Following a satisfactory evaluation of the oral defense of the dissertation by the supervisory committee, the student must prepare, with supervision from the dissertation director, a final publishable dissertation that represents a definitive contribution to knowledge in systems engineering and operations research. This document must meet format guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects. If the student fails to successfully defend the dissertation, the student may request a second defense, following the same procedures as for the initial defense. There is no time limit for this request, other than the general time limits for the doctoral degree. An additional predefense is not required, but
the student is strongly advised to consult with the committee before scheduling a second defense. If the student fails on the second attempt to defend the dissertation, the student will be dismissed from the PhD program.

**Virginia Commonwealth Graduate Engineering Program**

The Commonwealth Graduate Engineering Program (CGEP) is a cooperative program of Mason, the University of Virginia (UVA), Virginia Tech, Old Dominion University (ODU), and Virginia Commonwealth University (VCU) designed to make graduate engineering education available in locations throughout Virginia through distance learning. CGEP offers graduate degree programs in engineering and information technology. Instruction takes place through a mix of videoconferencing and web-based courses available at educational and corporate receive sites around the state.

Each degree program is taught by one of the five participating universities, and prospective students should apply directly to the university offering the degree of interest. Mason’s master of science in computer science degree is available through CGEP. Courses from the other institutions may be offered at Mason’s Fairfax or Prince William campuses. For more information, go to <ite.gmu.edu/graduates/commonwealth_graduate_engineering.php>.
The School of Management (SOM) provides the following academic offerings:

Undergraduate
- Accounting (ACCT)
- Finance (FNAN)
- Information Systems and Operations Management (ISOM)
- Management (MGMT)
- Marketing (MKTG)
- Business Minor (MSOM)
- Business Administration for RAK Campus (BUAD)

Graduate
- MBA (Master of Business Administration)
- Executive MBA
- MS in Accounting
- MS in Technology Management
- Postbaccalaureate Accounting Certificate

SOM has provided high-quality business education to the region since 1972. SOM’s 80 full-time and 80 adjunct faculty members bring both theoretical and applied expertise to the classroom.

SOM faculty members have research and teaching expertise on topics such as executive compensation, effect of insider trading on stock prices and e-commerce, and international work groups and teams. Faculty members have testified before nearly every federal agency and served as consultants to industry and organizations such as NASDAQ, the Federal Deposit Insurance Corporation, and the Department of Defense.

Today, more than 3,800 students are studying in five undergraduate majors, the business minor, and four graduate programs. SOM’s offerings provide a solid business core that emphasizes information technologies and communication, entrepreneurial thinking, and a global business strategy. We prepare students to lead with initiative, imagination, and innovation. The Mason MBA, Executive MBA, and MS in Technology Management are pioneers nationwide, being among the first graduate business programs to require a global residency program for all graduate business students.

Of more than 2,000 business programs in the nation, only one-quarter are fully accredited by the Association to Advance Collegiate Schools of Business (AACSB) International. SOM is one of only 167 business schools with both business and accounting accreditation by AACSB International.

A Mason business degree provides in-depth exposure in an area of specialization, as well as the skills required for success in a global business world. The school’s unique undergraduate key and capstone courses develop communication and analytical skills and provide students with opportunities to interact with regional business leaders.

More than 90 percent of the school’s graduate students study while employed, which gives them numerous opportunities to link classroom learning to real-world business challenges. Because our graduate programs emphasize learning in teams, each student has the opportunity to test classroom concepts against the best practices of some of the region’s premier organizations. SOM integrates teamwork, technology, and innovation into a state-of-the-art curriculum to prepare students for tomorrow’s business environment.

Administration
Richard J. Klimoski, Dean
David J. Harr, Senior Associate Dean
Alison S. O’Brien, Associate Dean, Undergraduate Programs
Angel J. Burgos, Director, MBA Program, MSA Program
Edward M. Lewis, Director, Technology Management Program
Roy W. Hinton, Associate Dean, Executive Programs, and Director, Executive MBA Program
Hilda M. Maness, Director, Development
Stacy M. Williams, Director, Marketing and Communications
Pamela A. Allen, Assistant Dean, Academic and Career Services
Neta A. Moye, Assistant Dean, Executive Education

Faculty
Accounting
Buchanan, Douthett, Hylton, Jones, Kitching, Krishnan, Magro, McMichael, Moraglio, Nutter, Pevzner, Sengupta, Shen, Visvanathan, Zadeh, Zhang

Finance
Canterbury, Christophe, Crockett, Ferri, Gao, Hallows, Haneck, Hsieh, Johnston, Nikolova, Philipov, Stahel, Wang, Xie, Zhdanov
Information Systems and Operations Management
Andromikov, Auffret, C. Chen, M. Chen, Das, Dutta, Gillyard, Hsu, Hughes, Hutchison, Kim, Mazumdar, Mehta, Naor, Singer

Management
Coffinberger, Cramton, Cronin, Demory, Joshi, Klomoski, Kravitz, Langfred, C. Lee, H. Lee, Lei, Ling, Marks, O’Brien, Parker, Rockmann, Samuels, Wolf, Wolfe, Yasai

Marketing
Entrikin, Harvey, Joiner, Jaju, Kulick, Li, Martin, McCrohan, Meamber, Mouri, Philpot, Saini, Schneider, Sussan

Course Work
SOM offers all course work designated ACCT, BULE, EMBA, FNAN, MBA, MGMT, MIS, MKTG, MSOM, OM, SOM, and TECM in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS
Because all organizations face constant change driven largely by information technology (IT), organizations and business models are continuously evolving. SOM faculty and students are intellectually curious about what IT, new business models, and paradigm shifts mean to present and future organizations.

Success in business requires a broad portfolio of skills, as well as a desire for lifelong learning. When studying business, focusing on just one discipline is not enough. Today’s workforce must be able to perform successfully in an environment of change and ambiguity. The SOM interdisciplinary curriculum prepares students to be successful in the fast-paced world of global business.

Bachelor of Science Degree
Associate Dean for Undergraduate Programs
Phone: 703-993-1880
Web: som.gmu.edu

The programs in management education culminate in a BS degree with a major from one of five areas: accounting, finance, information systems and operations management, management, or marketing. A minimum of 120 credits of course work is required, of which at least 45 credits must be at the 300 or 400 level.

Students should consult the Baccalaureate Degree Requirements section in the Academic Policies chapter in this catalog for information concerning literacy, general education, residence, and other academic requirements.

In addition, students should carefully examine prerequisites for SOM courses. Students may be removed from a course if they enroll without having fulfilled the prerequisites.

Writing-Intensive, Synthesis Requirements
Mason’s writing-intensive requirement for SOM majors is satisfied by successful completion of SOM 301. The synthesis requirement is satisfied by successful completion of SOM 498.

Degree Requirements
All degree applicants must complete a minimum of 30 credits of SOM core and major courses at Mason. They must include at least 9 credits required for the specific major and SOM 498. A grade of C or higher must be earned in SOM core and major requirements.

SOM students pursuing a BS degree must complete the university-wide general education program plus 1 additional credit of natural science. The natural science requirement must be fulfilled by completing two 4-credit laboratory sciences. All degree applicants must complete the following SOM degree requirements:

- ECON 103* .................................................. 3
- ECON 104* .................................................. 3
- ECON 300–400 ........................................... 3
- ANTH, PSYC, SOCI, or SOM 100 .................. 3
- MATH 108 or 113* (satisfies university requirement for quantitative reasoning) .................... 3

School of Management Core* .................................. 35
- ACCT 203 .................................................. 3
- ACCT 301 .................................................. 3
- BULE 302 .................................................. 3
- FNAN 301 .................................................. 3
- MGMT 301 .................................................. 3
- MIS 102 ..................................................... 1
- MIS 301 ..................................................... 3
- MKTG 301 .................................................. 3
- OM 210 ..................................................... 4
- OM 301 ..................................................... 3
- SOM 301 ..................................................... 3
- SOM 498 ..................................................... 3
- Major* ..................................................... 18

General Electives ..................................................... 20
These credits may not include pure activity courses, such as those listed under the catalog designations of individual sports, physical education, team sports, and recreational activities. Certain courses under the designation of dance, music, theater, and arts are also restricted. Consult the SOM web site for specific information.

Total Credits
University General Education and SOM .................. 120
*Completion with a grade of C or better is required for graduation.

Acceptance into SOM
A student interested in pursuing a major in accounting, finance, information systems and operations management, management, or marketing must apply for acceptance to SOM during the semester in which the student will complete acceptance requirements. A student who has not received acceptance will have a degree status classified as “BPRE,” until the application is approved.

Acceptance is selective, based on completion of the following:
- At least 48 credits, with a minimum of 9 credits at Mason
- A GPA of 2.50 or higher at the end of the semester of application for acceptance for all courses attempted and from all schools and universities attended
- Successful completion of the following courses with a grade of C or better: ACCT 203 (prerequisite: C or better in ECON 103); OM 210 (prerequisite: C or better in MATH 108); SOM 301 (prerequisite/corequisite: C or better in ACCT 203 and OM 210); MATH 108
• A minimum Mason cumulative and semester GPA of 2.00 at the end of the semester of application

**Note:** Students must meet the SOM acceptance requirements in effect at the time of application to the school.

Applications must be submitted by November 1 for the following spring semester; April 1 for the following summer term; and July 1 for the following fall semester. Students should file the application at the beginning of the semester in which they anticipate completing the requirements set forth above. For more information about the application process, contact the Office of Academic and Career Services, 703-993-1880, or visit som.gmu.edu.

**Academic Advising**

Academic planning for undergraduate students is available in the SOM Office of Academic and Career Services, Enterprise Hall, Room 008. Students are encouraged to consult with an advisor regularly. Any student who wishes to change to a major in SOM must consult a SOM academic advisor for degree requirements. For more information about making an appointment or walk-in advising hours, call 703-993-1880, or go to som.gmu.edu.

**Accounting, BS**

**Degree Requirements**

The BS in accounting (ACCT) prepares students for professional careers in the private and public sectors. Students learn how to evaluate fundamental value propositions for various types of organizations and transactions, and convert financial and economic information from these organizations and transactions into information that is useful for making decisions. Students also learn how to design and test information systems that provide reliable and relevant information for planning and control. Furthermore, students learn how to identify value-creating opportunities and choose from among competing operating, investing, financing, and disclosure alternatives to maximize firm or organizational value.

The program emphasizes, but is not limited to, the accounting profession and its role in business and government, including professional responsibilities and ethics. The program stresses conceptual understanding, technical competencies, analytic abilities, communication skills, and computer literacy. The accounting degree program is separately accredited by AACSB International.

In addition to general requirements for the BS degree, students must complete all required credits in upper-level accounting courses, with grades of C or better in each course. Students majoring in accounting must complete 18 credits composed of the following:

• ACCT 311 Managerial and Cost Accounting
• ACCT 331 Intermediate Financial Accounting I
• ACCT 332 Intermediate Financial Accounting II
• ACCT 351 Taxation and Managerial Decision Making
• ACCT 361 Accounting Information Systems
• ACCT 461 Assurance and Audit Services

The following elective courses are offered by the accounting area:

• ACCT 372 Business Analysis and Valuation
• ACCT 411 Advanced Managerial Accounting
• ACCT 433 Advanced Financial Accounting
• ACCT 451 Advanced Federal Taxation

• ACCT 462 Honors Seminar in Accounting
• ACCT 472 Government and Not-for-Profit Accounting
• ACCT 491 Seminar in Accounting
• ACCT 499 Independent Study

Materials are available in the Office of Academic and Career Services to provide guidance regarding recommended electives. Students who anticipate taking the CPA, CMA, CIA, or other professional exam should consult applicable regulations and meet with their advisor. State regulations regarding professional examinations may dictate course selections.

**Finance, BS**

**BS-FNAN Degree Requirements**

The BS in finance (FNAN) prepares students for professional careers by providing a solid foundation in the financial principles necessary to make operating decisions for an organization. In addition to general degree requirements for the major, students must complete 18 credits in upper-level finance courses with a grade of C or better in each course.

**Required courses (choose three)**

FNAN 302 Financial Analysis and Forecasting
FNAN 311 Principles of Investment
FNAN 321 Financial Institutions
FNAN 401 Advanced Financial Management

**Electives (choose three)**

FNAN 302, 311, 321, or 401, if not taken as a required course
FNAN 351, 411, 412, 421, 440, 451, 454, 462, or 491

**Information Systems and Operations Management, BS**

**BS-ISOM Degree Requirements**

The BS in information systems and operations management (ISOM) prepares students for a range of career options by instilling in them skills that add value to organizations. Graduates will apply their knowledge of technology and business functions to design and improve existing operational and core business processes. They will integrate different business functions into seamless IT-enabled processes and collaborate with business users in defining requirements, identifying new IT-driven business opportunities, building prototypes to validate operations, and managing complex technology projects. The content of the ISOM major is at the intersection of technology, process, and people.

In addition to general degree requirements for the major, students who major in ISOM must complete 18 credits of upper-level ISOM courses with a grade of C or better in each course. Of these, 9 credits in the required courses for the major are listed below. Students have considerable flexibility in their choice of electives and may choose from two tracks of study: one in management information systems, which prepares students for a career in the IT industry, and the other in management of business operations, which develops expertise in areas such as quality, project, and supply chain management and business process analysis. Students are strongly urged to discuss their choice of electives and programs of study with their academic advisor. It is also strongly recommended that students planning to major in ISOM take MIS 302 as part of their program.
Required courses
MIS 310 Introduction to Database Management Systems
MIS 330 Computer Systems Analysis and Design
OM 493 Management of Technology Projects

Electives (choose three)
OM 320, 352, 435, 452, 456, or 499
MIS 302, 320, 411, 412, 430, 435, 440, 450, 491, or 499

Management, BS

Degree Requirements
The BS in management prepares students to take leadership, management, and entrepreneurial roles in the public and private sectors. Students learn such skills as strategic thinking, motivating and managing nationally and internationally diverse workforces, building and leading team efforts, negotiating successfully, and instituting planned change in organizations. In addition to general degree requirements for the BS, students must complete 18 credits in upper-level management courses with a grade of C or better in each course.

Required courses
MGMT 312 Principles and Practices of Management
MGMT 321 Introduction to Human Resource Management
Electives (choose four):
MGMT 412, 413, 421, 431, 451, 461, 462, 463, 464, 471, 491; BULE 402

Management majors may focus their careers in several areas. In selecting four elective courses, students may want to consider a likely career path. Recommended courses for three possible careers are provided below.

- Human Resource Management
  MGMT 421, 431
  Two other courses from above list
- Front-Line Manager or Management Trainee
  MGMT 412, 463, 464
  One other course from above list
- Entrepreneur
  MGMT 451, 471; BULE 402
  One other course from above list

Students with a GPA of at least 3.00 are offered the opportunity to further distinguish their record by participating in MGMT 462 Management Honors Seminar, which addresses a key contemporary management issue in an intensive small group format.

Enrollment in MGMT 462 is by management faculty invitation. To be eligible for an invitation, students must be accepted into SOM with a management major, have a cumulative GPA of at least 3.00 with a minimum of 75 semester hours of course work, and have a minimum GPA of 3.00 in course work completed for the management major. The size of the Honors Seminar will be kept small. If the number of interested and qualified students exceeds the number of available spots, management area faculty will select the most qualified students to participate.

Marketing, BS

Degree Requirements
The BS in marketing prepares students for a broad range of global and domestic career options in market and consumer research, brand management, advertising, customer relationship management, new market and business development, and marketing strategy. Marketing opportunities are increasing in the new economy as firms, government agencies, and non-profit organizations adopt a market orientation.

A marketing major provides students with a solid background in marketing concepts and practices, with emphasis on market analysis and planning, research, and consumer behavior. Because marketing draws on a variety of disciplines for its foundation and is practiced globally, marketing majors are encouraged to take electives in related fields such as psychology, sociology, economics, public policy, international studies, computer science, and foreign languages. Students must complete 18 credits of upper-level marketing courses with a grade of C or better in each course.

Required Courses
MKTG 312 Consumer Behavior
MKTG 351 Marketing Research Techniques and Applications
MKTG 471 Marketing Management

Electives (choose three):
MKTG 311, 313, 315, 332, 333, 407, 451, 481, 491, 499

Concentration in Internet Marketing

Resiliency (IMR)
Marketing also offers a concentration in Internet marketing resiliency within the marketing major. This concentration prepares students to enhance and protect the electronic marketing efforts of their firms.

Required courses
Choose four from the following six courses:
MIS 320 Business Data Communications
MKTG 315 Internet Marketing
MKTG 351 Marketing Research Techniques and Applications
MKTG 451 Competitive Intelligence and Information Security
MKTG 471 Marketing Management
MKTG 491 Special Topics in Marketing

Marketing majors are advised to work closely with their academic advisor to ensure that electives taken in related fields provide the opportunity to gain proficiency in specific marketing-related areas.

Certificate Program in Accounting

CERB-ACCT
This program provides an opportunity for nondegree-seeking students to earn the academic credit necessary to sit for the Uniform CPA Examination in Virginia. The requirement for enrollment is a bachelor’s degree or higher from an accredited college or university.

Students are required to complete a minimum of 30 credits of accounting courses. Fifteen credits must be taken at Mason after acceptance to the certificate program. Successful completion of the certificate program requires a grade of C or better in accounting courses and a GPA of at least 2.00 in all courses. All students who want to sit for the Uniform CPA Examination in Virginia are required to have completed 150 college-level credits, including at least 30 credits of accounting courses in financial accounting, auditing, taxation,
and management accounting, and at least 24 credits of nonaccounting business courses. To receive the Mason accounting certificate, individuals must have completed the following required accounting courses or their equivalents:

**Required courses**

- ACCT 203 Survey of Accounting
- ACCT 301 Financial Accounting and Managerial Decision Making
- ACCT 311 Managerial and Cost Accounting
- ACCT 331 Intermediate Financial Accounting I
- ACCT 332 Intermediate Financial Accounting II (prerequisite FNAN 301)
- ACCT 351 Taxation and Managerial Decision Making
- ACCT 361 Accounting Information Systems
- ACCT 461 Assurance and Audit Services

**E electives (choose two):**

- ACCT 372 Business Analysis and Valuation
- ACCT 382 Financial Analysis and the Business Life Cycle
- ACCT 411 Advanced Managerial Accounting
- ACCT 433 Advanced Financial Accounting
- ACCT 451 Advanced Federal Taxation
- ACCT 462 Honors Seminar in Accounting
- ACCT 472 Government and Not-for-Profit Accounting
- ACCT 491 Seminar in Accounting
- ACCT 499 Independent Study in Accounting

If a student has not previously studied business, the following courses are recommended:

- BULE 302 Legal Environment of Business
- BULE 402 Commercial Law
- FNAN 301 Financial Management (Prerequisite for ACCT 332)
- FNAN 302 Financial Analysis and Forecasting
- MIS 301 Introduction to Business Information Systems
- OM 210 Statistical Analysis for Management

If a student has a previous degree in business or accounting, the faculty recommends that students take SOM courses above the 301 level to complete the 15 Mason credits needed after acceptance to the certificate program.

**Minor in Business**

The business minor provides an introduction to the skills needed for success in the rapidly changing and evolving world of business. Because it is designed for nonbusiness students who seek to learn business essentials to enhance their own area of expertise, the minor provides broad exposure to business concepts and theories. The minor also presents and integrates the major functional areas in business to solve management problems through the use of IT. Strong written and oral communication skills are expected. Prior to beginning the minor, students must have sophomore standing.

The minor consists of the following seven courses. Students must complete five of the seven courses for a total of 15 credits.* **Students must achieve a grade of C or better in each course that is applied toward the minor.**

**Required courses**

- MSOM 300 Managing Financial Resources
- MSOM 301 Managing People and Organizations
- MSOM 302 Managing Information in a Global Environment
- MSOM 303 Marketing in the Global Economy

**Electives (choose one of the following)**

- MSOM 304 Entrepreneurship: Starting and Managing a New Enterprise
- MSOM 305 Managing in a Global Economy
- MSOM 306 Managing Projects and Operations

These courses may not be taken for credit by SOM majors, except for MSOM 305, which may be used only to fulfill the university general education global understanding requirement.

General education students who have already taken and received credit for MGMT 301, MIS 301, MKTG 301, or OM 301 shall substitute courses as follows: MGMT 301 for MSOM 301, MIS 301 for MSOM 302, MKTG 301 for MSOM 303, and OM 301 for MSOM 306. Both courses cannot be taken for credit. Students who have taken and received credit for both ACCT 203 and FNAN 301 shall substitute the combination for MSOM 300. All three courses cannot be taken for credit. Transfer students may transfer a maximum of 6 credits toward the business minor.

### Business Administration, BS

**George Mason University at Ras Al Khaimah (RAK)**

The program in business administration offered by SOM at the Mason RAK Campus culminates in a BS degree. A minimum of 120 credits of course work is required, of which at least 45 credits must be at the 300 or 400 level.

Students should consult the Baccalaureate Degree Requirements section in the Academic Policies chapter of this catalog for information concerning the literacy requirement, English composition requirement, core requirements, catalog requirements, residence requirements, and academic requirements. All undergraduates seeking a baccalaureate degree from Mason must complete the university’s general education requirements. The requirements and the selection of courses that fulfill those requirements are listed earlier in this catalog. SOM degree requirements and acceptance to degree status must be completed as stated earlier in this section. Additional courses to satisfy the 18 credits of major courses will be in advanced accounting, finance, management, marketing, operations management, and management information systems, along with global business administration.

This program is available only on the Mason RAK Campus. More information may be found at the rak.gmu.edu.

### GRADUATE PROGRAMS

**Graduate Admissions**

4400 University Drive, MS 5A2
Fairfax, VA 22030
Phone: 703-993-2136
Fax: 703-993-1778
E-mail: somgrad@gmu.edu
Web: som.gmu.edu

SOM offers an MS in accounting, MBA, Executive MBA, and MS in technology management. Graduate programs are accredited by AACSB International.

### Accounting, MS

**MS-ACCT**

Phone: 703-993-2136
E-mail: somgrad@gmu.edu

The MS in accounting (MSA) is designed to meet the special needs of new professionals entering the accounting profession.
The programs allow students to earn a state-of-the-art graduate degree in accounting and thereby meet the 150-credit requirement to sit for the Uniform CPA Examination in Virginia and CPA exams in most other states. The program integrates fundamental business skills and specialized knowledge and skills required by the accounting profession.

Admission Requirements

All students registering for SOM graduate courses must have graduate standing. Nondegree student status is not available. Admission is highly competitive and available to qualified candidates holding a baccalaureate degree in accounting from an AACSB-accredited business school. Applicants are evaluated primarily on their undergraduate record and GMAT performance. For information on the GMAT, go to www.mba.com. Professional work experience is not required. Students begin the program in the fall or spring semester. The priority deadline for application is April 1 for the fall semester and November 1 for the spring semester.

Students can have part- or full-time status. Students completing the MS in accounting course work may elect to further develop their leadership potential by transferring to the MBA with a concentration in accounting. Please contact the department for details.

Required Courses

All MS in accounting students must complete the following 10 courses (3 credits each):

- ACCT 741 Information Technology Auditing
- ACCT 742 Corporate Governance and Ethics
- ACCT 743 Corporate Financial Reporting
- ACCT 744 Fraud Deterrence and Detection
- MBA 603 Managerial Economics and Decisions of the Firm
- MBA 633 Statistics for Business Decision Making
- MBA 638 Managing Operations and Technology for the Digital Enterprise
- MBA 643 Managerial Finance
- MBA 653 Organizational Behavior and Human Resource Management
- MBA 701 Business Analysis and Valuation

Students must either graduate with an MSA degree on completion of 30 credits or opt into the Mason MBA program.

Business Administration, MBA

Phone: 703-993-2136
E-mail: mba@gmu.edu

The Mason MBA Program provides a high-level professional education in business administration. It is offered in both part- and full-time formats. The curriculum integrates functional areas with an emphasis on group work, information technology, and the global business environment.

Admission Requirements

All students registering for SOM graduate courses must have graduate standing. Nondegree student status is not available. Admission is highly competitive and available to all qualified candidates without regard to prior academic major. No previous course work in business administration is required, but a four-year undergraduate degree and a college-level calculus course must be successfully completed before matriculation.

Admission is based on a combination of academic, professional, and leadership factors. No portion of the portfolio is considered more important than another; careful consideration is given to every part of the application packet to ensure that the Admission Committee has an accurate profile of a candidate’s professional and academic qualifications. For information on the GMAT, go to www.mba.com. A minimum of two years of professional work experience is required before entering the program.

The part-time MBA format commences twice a year: fall and spring semesters. Priority is given to applicants submitting their application by November 1 for the following spring semester and April 1 for the following fall semester. Applications for admission received after November 1 and April 1 will be considered on a space-available basis. The full-time MBA format begins only in the fall and has an application deadline of April 1. International students have an application deadline of February 1.

The MBA core curriculum effectively integrates functional areas with the use of IT, oral and written communication, and teamwork. The MBA program requires 48 credits: 30 credits of core courses and 18 credits of elective courses. Students complete the degree program in two or three years depending on the cohort selected. Because of the cohort structure, part-time students commit to attending classes a minimum of two times per week and full-time students attend classes in the late afternoon three or four days each week. Part-time students are required to enroll in classes during the summer session to complete their degrees on a timely basis.

Core Courses

Thirty credits of core courses are completed prior to enrollment in electives. Part-time students enroll in at least 6 credits per semester and at least 3 credits each summer. Full-time students enroll in 12 credits per semester, with no expectation for enrollment in the summer session. All MBA students complete the following core courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 603 Managerial Economics and Decisions of the Firm</td>
<td>3</td>
</tr>
<tr>
<td>MBA 612 Managing Costs and Evaluating Performance</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 613 Financial Reporting and Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 623 Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 633 Statistics for Business Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 638 Managing Operations and Technology for the Digital Enterprise</td>
<td>3</td>
</tr>
<tr>
<td>MBA 643 Managerial Finance</td>
<td>3</td>
</tr>
<tr>
<td>MBA 653 Organizational Behavior and Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 701 Business Analysis and Valuation</td>
<td>3</td>
</tr>
<tr>
<td>MBA 702 Business Strategy and Organizational Leadership</td>
<td>3</td>
</tr>
<tr>
<td>MBA 798 Global Business Perspectives*</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

*Travel outside the United States is required. Travel costs are included in the MBA program tuition and fees.

Elective Courses

After completing the core courses, students must complete a series of market-driven elective courses (18 credits). A limited number of courses from outside the MBA Program or through the Consortium of Universities of the Washington
Metropolitan Area may be taken as electives with the permission of the program director.

Concentrations
MBA students may use electives to complete courses leading to a concentration in accounting, financial management, entrepreneurship, market and business development, information systems management, or project management.

▲ Accounting (ACCT)
Required courses
MBA 741 Information Technology Auditing
MBA 742 Corporate Governance and Ethics
MBA 743 Corporate Financial Reporting
MBA 744 Fraud Deterrence and Detection
One course from the following:
MBA 701 Business Analysis and Valuation
MBA 702 Corporate Financial Policy
MBA 703 Financial Markets
MBA 706 Investment Analysis
MBA 708 Taxes and Business Strategy
MBA 717 International Finance
Note: One elective must be taken outside this concentration.

▲ Entrepreneurship (ENTR)
Required courses
MBA 705 Venture Capital and Private Finance
MBA 711 Entrepreneurship
MBA 714 Managing Growth of Small Businesses
Two courses from the following:
MBA 701 Business Analysis and Valuation
MBA 708 Taxes and Business Strategies
MBA 712 Project and Cost Management
MBA 713 Human Resource Management
MBA 719 Entrepreneurship Laboratory (1 credit, may be repeated 3 times)
MBA 721 Marketing Decision Systems
MBA 725 Leadership
Note: One elective must be taken outside this concentration.

▲ Financial Management (FM)
Required courses
MBA 701 Business Analysis and Valuation
MBA 702 Corporate Financial Policy
MBA 703 Financial Markets
Two courses from the following:
MBA 704 Risk Management and Financial Innovation
MBA 705 Venture Capital and Private Finance
MBA 706 Investment Analysis
MBA 708 Taxes and Business Strategies
MBA 717 International Finance
Note: One elective must be taken outside this concentration.

▲ Information Systems Management (ISM)
Required courses
MBA 731 Business Systems Analysis and Design
MBA 737 Information Technology Governance and Policy
MBA 738 Business Intelligence and Data Management
Two courses from the following:
MBA 711 Entrepreneurship
MBA 732 Knowledge Management
MBA 734 Electronic Commerce and E-Business
MBA 735 Systems Thinking and Business Simulation
MBA 741 Information Technology Auditing
Note: One elective must be taken outside this concentration.

▲ Market and Business Development (MBD)
Required courses
MBA 721 Marketing Decision Systems
MBA 722 Consumer Behavior
MBA 723 Supply Chain Management
Two courses from the following:
MBA 711 Entrepreneurship
MBA 724 Marketing Communications
MBA 725 Leadership
MBA 732 Knowledge Management
MBA 734 Electronic Commerce and E-Business
Note: One elective must be taken outside this concentration.

▲ Project Management (PMGT)
Required courses
MBA 712 Project Management
MBA 715 Advanced Project and Program Management
MBA 725 Leadership
Two electives from the following:
MBA 713 Human Resource Management
MBA 724 Marketing Communications
MBA 726 Negotiation
MBA 731 Business Systems Analysis and Design
MBA 732 Knowledge Management
MBA 737 Information Technology Governance and Policy
Note: One elective must be taken outside this concentration.

■ Executive MBA
MBA-BUEx
Phone: 703-993-4457
E-mail: emba@gmu.edu

The Executive MBA Program is completed in 21 months, including a summer break between the first and second year. Students attend classes one day per week, on alternating Fridays and Saturdays. The program’s focus is management decision making, strategic management of business resources, and leadership.

Dedicated faculty, an innovative and relevant curriculum, a student-centered program team, and great colleagues contribute to the learning experience of a lifetime.

Participants
The Executive MBA is designed for those with a minimum of 7 to 10 years of significant business and professional experience. Participants must have the support of their organizations to attend Friday classes and participate in global and domestic residencies.

Sponsoring organizations have included ATPCO, AMS, Apple Federal Credit Union, Blue Cross/Blue Shield, Booz Allen Hamilton, Case New Holland, the Center for Naval Analyses, Cisco, CSC, DISA, Department of Defense, Department of Homeland Security, EDS, Ernst & Young, Exxon-Mobil, Fannie Mae, Freddie Mac, GE Healthcare Financial Services, General Dynamics, HP, IBM, KPMG, Level (3) Communications, Lockheed Martin, ManTech International, Marriott, Nextel, Northrop Grumman, OPM, Orbital Sciences, PamAmSat, Pinkerton Computer Consultants, Raytheon, SAIC, SRA, Sunrise Senior Living, USA Today, the
Management

Program Schedule

Eight Modules

During each of our seven-week modules, students complete two to three courses in an applications-oriented sequence that takes them from developing core management skills through the understanding and application of the tools of business performance to the talents of leadership.

Module 1: The Economic and Analytical Foundations of Management

Module 2 and 3: Managing Resources for Performance

Module 4: The Global Perspective

Module 5 and 6: Sustainable Business Performance

Module 7 and 8: Leadership and Strategy

Academic Year I

EMBA 603 Managerial Economics

EMBA 613 Financial Reporting and Decision Making

EMBA 623 Marketing Management

EMBA 633 Statistics for Managers

EMBA 638 Strategies for Operations Management: Process and Supply Chain Leadership

EMBA 641 Building the High Performance Team

EMBA 643 Managerial Finance

EMBA 653 Organizational Behavior

EMBA 752 Strategic View of the Firm

EMBA 791 Business, Government, and Regulatory Interface

EMBA 798 International Business Environment

Academic Year II

EMBA 612 Managing Costs and Evaluating Performance

EMBA 660 Management of Information Technology

EMBA 673 Legal Environment for Managers

EMBA 678 Strategic Management

EMBA 703 Financial Markets

EMBA 713 Human Resource Management

EMBA 735 Systems Thinking for Business Performance

EMBA 750 Capstone Course

EMBA 791 Business, Government, and Regulatory Interface

And two electives*

EMBA 708 Taxation and Business Strategy

EMBA 715 Special Topics in Accounting

EMBA 716 Managing Change

EMBA 717 Corporate Governance

EMBA 724 Integrated Marketing Communication

EMBA 725 Leadership and the Role of the General Manager

EMBA 734 Electronic Commerce

EMBA 735 Special Topics in Decision Science

EMBA 745 Special Topics in Finance

EMBA 751 Corporate Strategy and Policy

EMBA 755 Special Topics in Management

EMBA 765 Special Topics in Management Information Systems

EMBA 775 Special Topics in Marketing

Technology Management, MS

Phone: 703-993-1792
E-mail: techman@gmu.edu

The MS in technology management is designed to provide students with a graduate management education that will help them further their leadership careers in technology and technology-oriented businesses and organizations. With technology innovation and commercialization occurring at an increasing pace and industries becoming more networked and global, business success depends on the successful management of technology. Companies are succeeding with rapid innovation, insightful technology integration, creation of focused technology organizations, and skillful management of complexity. The program addresses how to succeed in this marketplace and emphasizes leadership and management; special considerations of technology innovation, commercialization, introduction, and integration; and methods and approaches of systems thinking.
Students are from the major firms and organizations in the Washington, D.C., region. They average 14 years of work experience, and almost 30 percent of the students already have graduate degrees. Approximately two-thirds of the students work for the private sector, while the remainder work for federal government agencies or departments.

Program graduates receive chief information officer (CIO) certification, in partnership with the federal CIO Council, in addition to their MS degree. The program satisfies the requirements for federal government CIOs that were developed in response to the passage of the Information Technology Management Reform Act. Mason is one of only six institutions certified to offer this qualification and was one of the founding university partners with CIO University.

Admission Requirements
Students must have a bachelor’s degree from an accredited institution, three years of professional work experience, two professional references, and a GMAT score or other evidence that they can perform graduate-level work.

Program Schedule
The program, designed for working professionals, starts in January and lasts for 18 months. Classes are held on the Fairfax Campus on Saturdays from 8 a.m. to 5 p.m. The program is 36 credits and includes a capstone project and an international residency.

Spring Semester, First Year
- TECM 610 Communications and Leadership
- TECM 620 Economics of Technology Management
- TECM 635 Metrics and Statistics for Quality and Project Management
- TECM 702 Interpersonal Dynamics and Teamwork

Summer Session, First Year
- TECM 700 Business Engineering and Change Management
- TECM 740 Managing of the Client Relationships

Fall Semester, First Year
- TECM 615 Decision Making Using Accounting and Financial Information
- TECM 704 Planning and Control of Projects
- TECM 720 Analysis of IT Industries

Spring Semester, Second Year
- TECM 640 Management of Consulting and Technical Professionals
- TECM 703 Technology Assessment, Evaluation, and Investment
- TECM 745 Business Function and Operations: Client Industries

Summer Session, Second Year
- TECM 735 Technology Management Capstone Project
- TECM 750 Global IT Management International Residency
School of Public Policy

Rooted in the strong democratic government traditions of the commonwealth of Virginia, the School of Public Policy (SPP) is committed to transcending traditional conceptual boundaries of research and teaching by integrating real-world experience and problem solving into public policy education. The school’s programs focus on the interplay of culture, organizations, and technology to find alternative approaches to public policy decisions and policy making. Teaching and research are focused on six themes: governance and public management; international commerce and policy; organizational informatics and e-government; regional development and transportation policy; science and technology policy; and society, culture, and values in public policy.

SPP contributes to new and innovative concepts in policy formation while building on the fundamental, pluralistic, and democratic characteristics of policy making in the United States. SPP endorses creativity and responsibility in governance, public management, and the development of economic policy.

Graduate Degree Programs
Public Policy, PhD
Public Policy, MPP
International Commerce and Policy, MA
Transportation Policy, Operations, and Logistics, MA
New Professional Studies: Organization Development and Knowledge Management, MS
New Professional Studies: Peace Operations, MS
New Professional Studies: Knowledge Management, MA
Joint JD and MPP

Graduate Certificate Programs
Collaboration and Learning in Policy Organizations
Culture and Values in Social Policy
Global Medical Policy
Global Trade Management
Governance Systems and Policy Management
International Business Planning
International Governance and Institutions
International Market Analysis
Managing International Commerce
National Security and Public Policy
Regional Economic Development and Technology Policy
Regional Trade Policy and Planning
Science and Technology Policy
Science, Technology, and the Global Economy
Transportation and Logistics Policy

Administration
Kingsley E. Haynes, Dean
James H. Finkelstein, Vice Dean
Roger R. Stough, Associate Dean for Research, Development, and External Affairs
Keith B. Segerson, Assistant Dean for Research Administration and Outreach
Matthys van Schaik, Senior Assistant Dean for Graduate Professional Programs
Jill V. Emerson, Assistant Dean for Student Services
Leslie Metzger Levin, Assistant Dean for Graduate Admissions and Marketing
Elizabeth C. Eck, Acting Assistant Dean for Program Management
William H. Coester, Administrator

Faculty

Associate Faculty
Avruch, Bernold, Conlan, Donahue, Fearnssides, Flood, Frase, Friesz, Guagnano, Heclo, Hennessey, Mahler, Paden, Regan, Scimecca
Research and Term Faculty
Benson, Cook, Courtot, Davis, Ferrin, Fowler, Ha, Heineman-Pieper, Holleman, Jain, Johnson, Keenan, Kil, Kingston, Kulkarni, Leitch, Nicogossian, Paelinck, Regan, Riggle, Robb, Spalding, Wheeler

Adjunct Faculty
Bensimon, Burris, Curtis, Gaske, Gianturco, Gordon, Kewley, Muhlhausen, Ravera, Robinson, Rogowsky, Spear, Stabile, Sullivan, Thompson, Varkonyi, Watkins

Faculty Emeritus
Kash, Warfield

Course Work
SPP offers courses designated PUBP, ITRN, MNPS, LRNG, and TELE in the Course Descriptions chapter of this catalog. Other academic courses are offered in conjunction with the research activities of the Mason Enterprise Center.

GRADUATE PROGRAMS

■ Public Policy, PhD  PHD-PUBP

Phone: 703-993-2280
This program is distinctive in its heavy emphasis on the combined influence of technology, culture, and institutions on public policy. Students investigate the increasing tensions created by technologically driven organizational change.

To investigate the policy issues associated with substantive policy areas, students develop in-depth understanding of American institutions, values, and culture; competence in research methods and advanced analytical methodologies; and a comparative, international perspective. At the time of admission, each student is assigned a faculty advisor who assists in the design and development of the student’s program.

Admission Requirements
The program seeks students with exceptional potential for accumulating, sorting, analyzing, and communicating information and findings effectively. Public policy is inherently complex and value laden. In the end, high-quality policy analysis requires thoughtful and judicious management of complex and incommensurate information, both quantitative and qualitative. Potential students must be able to manage and integrate both kinds of information and produce persuasive, well-organized, written syntheses and analytical insight.

The ideal applicant has demonstrated capabilities in research and writing, basic mathematical skills roughly equal to the first semester of calculus, competence in statistics, some background in economics, and a theoretical and working knowledge of public policy processes. Applicants with strong records who are lacking in one or more of these areas may be admitted to the program and will receive assistance in making up deficiencies.

Applicants must hold a master’s degree from an accredited institution and have a GPA of 3.00 or higher. Prospective students are encouraged to attend an information session.

Please see the Graduate Admissions Policies section in this catalog and online at http://admissions.gmu.edu/grad/ for general information on graduate admission to George Mason University.

The following items should be included when applying:
• Graduate application with fee (no fee waivers)
• Two- to three-page written statement of goals and interest in advanced study in public policy
• Current résumé or vita
• Two official transcripts of all university work. International students must also submit a translation of all international transcripts into English, if applicable.
• GRE or GMAT results; scores should not be older than five years.
• Two letters of recommendation, with at least one from an individual qualified to attest to the candidate’s academic potential
• A writing sample approximately 10 to 20 pages in length, such as a technical report, professional publication, or term or seminar paper
• For international applicants, TOEFL results with a minimum score of 600 on the paper-based exam; 250 on the computer-based exam; or 100 with a minimum of 23 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
• International Graduate Student Form (for students requesting an F-1 or J-1 visa)

Deadlines
The application deadline is February 1 for international students and March 1 for domestic students.

Degree Requirements
Students are required to complete a minimum of 82 credits of course work, of which no more than 12 may be dissertation credits. Up to 30 credits from a prior master’s degree may be applied toward the doctoral requirements at the program director’s discretion. Credit is not given for comprehensive exams passed at other universities.

Specific course work requirements include four foundational core courses, one semester of participation in the research colloquium, two courses in an area of program specialization, and four advanced courses tailored to the student’s research needs and interests. Courses are determined in collaboration with the student’s advisor and are drawn widely not only from SPP, but also from other programs at Mason.

At the completion of the first academic year of full-time study, students must pass a qualifying exam that evaluates mastery of the first year’s material, as well as the ability to integrate that material when addressing important and complex public policy problems and issues. The program also requires that students pass a field exam structured around their specific field of proposed doctoral research. Other requirements include the successful preparation and defense of a doctoral research proposal and the ensuing dissertation.

A complete description of the program policies, procedures, and requirements is in the SPP student and faculty handbook, which is published annually.

■ Public Policy, MPP  MPP-PUBP

Phone: 703-993-8200
The master’s program in public policy leads to a degree for aspiring or experienced professionals who seek career advance-
ment through cutting-edge education and training in policy analysis and development in increasingly technical and global environments. The program prepares students to be reflective practitioners who develop, implement, manage, analyze, evaluate, and effect innovative change in the public and private sectors through a course of study that emphasizes the fundamentals of policy development; the role of technology, analytic assessment, and modeling for policy evaluation; and the implications of international and global perspectives on policy formation. Courses are offered primarily in late afternoon and evening to fit the schedules of busy professionals.

Admission Requirements

Completed applications for fall and spring semesters are reviewed on a rolling basis, with late applications considered on a space-available basis. Applicants must hold a bachelor’s degree from an accredited institution, with a preferred GPA of 3.00 or higher on a 4.00 scale.

The following items must be included when applying:

• Graduate application with fee (no fee waivers)
• Two- to three-page written statement of student’s goals and interest in the program
• Current résumé
• Two official transcripts of all university work completed. International students must also submit a translation of all international transcripts into English, if applicable.
• For international applicants, TOEFL scores with a minimum score of 575 on the paper-based exam; 230 on the computer-based exam; or 88 with a minimum of 20 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
• Two letters of recommendation, with at least one from an individual who is qualified to attest to the candidate’s academic potential.

Submission of GRE or GMAT scores is required only for students requesting merit-based funding consideration.

Students may be admitted for nondegree study and apply a limited number of credits toward the master’s degree should they choose to apply to the degree program later, in accordance with university policy.

Degree Requirements

Students must complete 39 to 42 credits of course work through a combination of core courses, a sequence of courses in their area of emphasis, and a professional experience requirement. Appropriate professional experience can be demonstrated through previous employment, a supervised internship, or an approved policy project activity. Students will also be exposed to the global nature of public policy activity through the core requirement of international comparative policy assessment.

One of the courses in the emphasis sequence will also have an international focus. The plan of study includes the following:

PUBP 741 Financial Policy Processes and Procedures .......... 3
ITRN 503 Investment and Macroeconomics .................. 4
And one of the following:
PUBP 705 Advanced Statistical Methods for Policy Research ................................................................. 3
PUBP 711 Rational Choice and Uncertainty: Systems Dynamics Policy Making ........................................... 3
PUBP 712 Policy Analysis and Management Science ........ 3
PUBP 713 Policy and Program Evaluation ........................ 3

Substantive Policy Emphases ........................................ 12
Electives are chosen from one of the following policy emphases:

• Transportation Policy, Operations, and Logistics
• Regional Economic Development and Technology Policy
• Governance Systems and Policy Management
• International Governance and Institutions
• Collaboration and Learning in Policy Organizations
• Science and Technology Policy
• Culture, Values, and Social Policy
• National Security
• Global Medical and Health Policy

Professional Experience Requirement .......................... 0–3
Certification that the student has experience in the public policy process outside the classroom and is ready to take leadership responsibilities must be exhibited by one of two ways: previous professional experience, approved by the program director, or an approved internship.

Total Credits ................................................................ 39–42

Certificate Programs

SPP offers nine certificate programs in conjunction with the Master of Public Policy Program. All certificates require the completion of at least 15 credits (five courses) of work, including a required core course and electives approved in consultation with an MPP faculty advisor. Students already pursuing a master’s degree in the School of Public Policy may, after admission to a certificate program, earn an additional 9 credits (three courses) in SPP to receive a certificate in addition to the master’s degree.

Participants have to be admitted to a certificate program. Admission requirements are the same as those for the master’s program above, including possession of a bachelor’s degree.

■ Certificate in CERG-CLPO
Collaboration and Learning in Policy Organizations

Required Core Course
PUBP 700 Theory and Practice in Public Policy ............... 3
Electives........................................................................ 12
Total Credits .................................................................. 15

■ Certificate in Culture CERG-CVSP
and Values in Social Policy

Required Core Course
PUBP 700 Theory and Practice in Public Policy ............... 3
Electives........................................................................ 12
Total Credits .................................................................. 15

■ Certificate in Governance CERG-GSPM
Systems and Policy Management

Required Core Course
PUBP 700 Theory and Practice in Public Policy ............... 3
The International Commerce and Policy (ICP) Program is an interdisciplinary course of study to help students from around the world prepare for jobs in the new economy. Unlike traditional international affairs programs, the degree is focused on such international economic issues as global trade and investment. The MA in international commerce and policy differs from an MBA program by providing training in the political, social, and technological aspects of the global economy. In today’s world, it is critical for all participants in global markets to understand the multifaceted environment in which they work.

The core faculty is augmented by adjunct faculty members who bring a wealth of practical knowledge and experience, as well as strong academic qualifications to the program. Adjuncts are drawn from the U.S. Commerce and State Departments, the Office of the U.S. Trade Representative, and the International Trade Commission, among other government agencies, as well as from the private sector, the think tank community, and trade associations.

Courses are offered primarily in the late afternoon and evening to fit the schedules of busy professionals. In addition to classroom study, the program emphasizes experiential learning by supporting student internships, cooperative education, and research activities with private- and public-sector employers, and sponsoring a variety of study-abroad experiences.

Admission Requirements

Students from all academic backgrounds are welcome to apply; however, some knowledge of economics, preferably through at least two undergraduate economics courses, is encouraged. While many students may have prior educational and work-related training in business and economics, others see the ICP Program as a bridge from government, education, and other nonbusiness occupations to careers in the global economy.

Complete applications for fall and spring semesters are reviewed on a rolling basis, with late applications considered on a space-available basis. Applicants must hold a bachelor’s degree from an accredited institution, with a preferred GPA of 3.00 or higher on a 4.00 scale.

Please see the Graduate Admissions Policies section in this catalog and online at http://admissions.gmu.edu/grad/ for general information on graduate admission to George Mason University.

The following items must be included when applying:

- Graduate application with fee (no fee waivers)
- Two- to three-page written statement of student’s goals and interest in the program
- Current résumé
- Two official transcripts of all university work completed. International students must also submit a translation of all international transcripts into English, if applicable.
- For international applicants, TOEFL scores with a minimum score of 575 on the paper-based exam; 230 on the computer-based exam; or 88 with a minimum of 20 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
- Two letters of recommendation, with at least one from an individual who is qualified to attest to the candidate’s academic potential.

Submission of GRE or GMAT scores is required only for students requesting merit-based funding consideration.

Students may be admitted for nondegree study and apply a limited number of credits toward the master’s degree should they choose to apply to the degree program later, in accordance with university policy.
Degree Requirements

The ICP Program requires 42 credits of course work. All degree candidates must take 30 credits of work in the required courses, as described below. The remaining 12 credits, which must be chosen in consultation with an ICP faculty advisor, consist of electives that include internships, independent studies, and study abroad. Most electives are grouped into thematic areas, such as international trade and finance, international marketing, international trade relations, and technology and international commerce. Many students focus their studies on a particular region of the world, a policy issue, or a business sector.

Students entering the program first complete core courses to prepare for higher-level course work.

**SPP Common Core** ......................................................... 8
SPPB 502 Governance and Policy Processes .................. 4
SPPB 503 Culture, Organization, and Technology ........ 4
ICP Core Courses ......................................................... 22
ITRN 500 Approaches to International Commerce and Policy .................................................. 4
ITRN 501 Research and Analysis Methods for International Commerce .................................. 4
ITRN 502 Investment and Macroeconomics for International Commerce .................................. 4
ITRN 504 Trade and Microeconomics for International Commerce .................................. 4
ITRN 603 International Trade Relations ....................... 3
ITRN 602 International Financial Institutions and Globalization ............................................ 3
Electives ........................................................................ 12
Total Credits ................................................................. 42

**Certificate Programs**

SPP offers seven certificate programs in conjunction with the International Commerce and Policy Program. All certificates require the completion of at least 15 credits (five courses) of work, including a required core course and electives approved in consultation with an ICP faculty advisor. Students already pursuing a master’s degree in the School of Public Policy may, after admission to a certificate program, earn an additional 9 credits (three courses) in SPP to receive a certificate in addition to the master’s degree.

Participants have to be admitted to a certificate program. Admissions requirements are the same as those for the master’s program above, including possession of a bachelor’s degree.

- **Certificate in Global Trade** CERG-GTM Management
  
  **Required Core Course**
  ITRN 500 Approaches to International Commerce and Policy .................................................. 4
  Electives ........................................................................ 12
  Total Credits ................................................................. 16

- **Certificate in International Business Planning**
  
  **Required Core Course**
  ITRN 500 Approaches to International Commerce and Policy .................................................. 4
  Electives ........................................................................ 12
  Total Credits ................................................................. 16

- **Certificate in International Market Analysis** CERG-IMA
  
  **Required Core Course**
  ITRN 500 Approaches to International Commerce and Policy .................................................. 4
  Electives ........................................................................ 12
  Total Credits ................................................................. 16

- **Certificate in Managing International Commerce** CERG-MIC
  
  **Required Core Course**
  ITRN 500 Approaches to International Commerce and Policy .................................................. 4
  Electives ........................................................................ 12
  Total Credits ................................................................. 16

- **Certificate in Regional Trade Policy and Planning** CERG-RTP
  
  **Required Core Course**
  ITRN 500 Approaches to International Commerce and Policy .................................................. 4
  Electives ........................................................................ 12
  Total Credits ................................................................. 16

- **Certificate in Science, Technology, and the Global Economy** CERG-STGE
  
  **Required Core Course**
  ITRN 500 Approaches to International Commerce and Policy .................................................. 4
  Electives ........................................................................ 12
  Total Credits ................................................................. 16

- **Transportation Policy, Operations, and Logistics, MA**
  
  **Phone:** 703-993-8200
  
  The MA in Transportation Policy, Operations, and Logistics (TPOL) Program is designed for students and practicing professionals engaged in planning, regulating, managing, and operating transportation facilities and services. Students obtain a working knowledge of the theory, policy, law, research, and practices required to effectively and efficiently supply and operate transportation facilities and services. They also learn to think critically and analytically about the problems and challenges in this field and communicate their analyses clearly and effectively through written and oral presentations.

**Admission Requirements**

Students are admitted for fall and spring semesters. Complete applications are reviewed on a rolling basis, with late applications considered on a space-available basis. Applicants must hold a bachelor’s degree from an accredited institution, with a preferred GPA of 3.00 or better on a 4.00 scale.

Please see the Graduate Admissions Policies section in this catalog and online at http://admissions.gmu.edu/grad/ for general information on graduate admission to George Mason University.

To apply, applicants must submit the following:

- Graduate application with fee (no fee waivers)
- Two- to three-page written statement of goals and interest in the program
• Current résumé
• Two official transcripts of all university work completed. International students must also submit a translation of all international transcripts into English, if applicable.
• For international applicants, TOEFL scores, with a minimum score of 575 on the paper-based exam; 230 on the computer-based exam; or 88 with a minimum of 20 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
• Two letters of recommendation, with at least one from an individual who is qualified to attest to the candidate’s academic potential.

Submission of GRE or GMAT scores is required only for students requesting merit-based funding consideration.

Degree Requirements
The degree requires completion of 36 credits; time required to complete the degree varies. Part-time enrollees may take up to six years. Other students enroll in cohorts that complete courses at a pace equivalent to five courses per year; these students complete the degree in two years. Accelerated programs for cohort groups from the same employer are actively promoted, allowing completion in a shorter time.

Credits

SPP Common Core .............................................................. 12
PUBP 501 Policy and Organizational Analysis .................. 4
PUBP 502 Governance and Policy Processes .................. 4
PUBP 503 Culture, Organization, and Technology ........... 4

TPOL Core Courses ........................................................... 15
PUBP 715 Transportation Systems .................................... 3
PUBP 716 Transportation Operations and Logistics ........... 3
PUBP 718 Transportation Planning and Policy .................. 3
PUBP 721 Transportation Economics ............................... 3
PUBP 722 Practicum in Transportation Policy, Operations, and Logistics .................................................. 3

Electives ........................................................................... 9

Students may choose the remaining three electives. All eligible electives will be circulated via e-mail each semester by the program director. Students may take courses not listed but only with the program director’s approval.

Total Credits ...................................................................... 36

■ New Professional MA-NPST Studies, MA

▲ Knowledge Management (PSKM)
Phone: 703-993-8200
This 36-credit program is offered jointly with the National Defense University (NDU) Information Resources Management College (IRMC). Master’s degree applicants must have completed the Chief Information Officer Program or the Advanced Management Program offered by the NDU IRMC or its equivalent. These applicants will generally be eligible to transfer in 15 graduate credits toward the master’s degree.

Courses offered by Mason comprise the additional 21 credits required for the master’s degree. These consist of 12 credits of required courses, 6 credits of electives, and an experiential component of 3 credits. The courses focus on the social-organizational aspects of knowledge management. Students undertake a series of projects in their organizations; learning is supported by the use of collaborative technology.

Admission Requirements
To be eligible, applicants must have completed an approved NDU program. In addition, they must hold a bachelor’s degree from an accredited institution with a preferred GPA of 3.00 or better on a 4.00 scale.

Please see the Graduate Admissions Policies section in this catalog and online at http://admissions.gmu.edu/grad/ for general information on graduate admission to George Mason University.

To apply, applicants must submit the following:
• Graduate application with fee (no fee waivers)
• Two- to three-page written statement of goals and interest in the program
• Current résumé
• Two official transcripts of all university work completed. International students must also submit a translation of all international transcripts into English, if applicable.
• For international students, TOEFL scores, with a minimum score of 575 on the paper-based exam; 230 on the computer-based exam; or 88 with a minimum of 20 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
• Two letters of recommendation, with at least one from an individual who is qualified to attest to the candidate’s academic potential

Submission of GRE or GMAT scores is required only for those requesting merit-based funding consideration.

Degree Requirements
The 21 credits offered by Mason are as follows:

Credits

Core Courses ......................................................................... 12
MNPS 700 The New Professionalism: Theory and Practice* ............................................ 3
MNPS 702 The New Professional as Reflective Practitioner* .............................................. 3
MNPS 703 Technology and Learning in the New Professions* ............................................ 3
LRNG 762 Strategic Knowledge Management ................................................................ 3

Electives ............................................................................. 6

Experiential Component ......................................................... 0–3

In the absence of approved relevant professional experience, a 3-credit internship is required.

Total .................................................................................. 18–21

*Only those sections of MNPS 700, 702, and 703 that are designated for the ODKM Program will satisfy degree requirements.

■ New Professional MS-NPST Studies, MS

▲ Organization Development and Knowledge Management (ODKM)
Phone: 703-993-8200
The MS in Organization Development and Knowledge Management (ODKM) Program is an integrated, 18-month program taught in executive format and designed for professionals who have several years of work experience. Providing conceptual tools and practical guidance to foster
organizational change, the program focuses on three related areas: creating and leveraging knowledge through networks of people who communicate and collaborate; understanding and managing change by integrating the diverse roles of people, processes, and technology; and enhancing and facilitating collaboration by building effective relationships in technology-rich environments. A feature of this program is the group-oriented approach to learning supported by the use of web-based collaborative computer technologies. Students develop the competencies to apply these technologies to make organizations more effective.

Admission Requirements
Students are considered for admission for the fall term only. Complete applications are reviewed on a rolling basis, with late applications considered on a space-available basis. Applicants must hold a bachelor’s degree from an accredited institution, with a preferred GPA of 3.00 or higher on a 4.00 scale.

Please see the Graduate Admissions Policies section in this catalog and online at http://admissions.gmu.edu/grad/ for general information on graduate admission to George Mason University.

The following items must be included when applying:
• Graduate application with fee (no fee waivers)
• Two- to three-page written statement of goals and interest in the program
• Current résumé
• Two official transcripts of all university work completed. International students must also submit a translation of all international transcripts into English, if applicable.
• For international applicants, TOEFL scores, with a minimum score of 575 on the paper-based exam; 230 on the computer-based exam; or 88 with a minimum of 20 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
• Two letters of recommendation, with at least one from an individual who is qualified to attest to the candidate’s academic potential.

Submission of GRE or GMAT scores is required only for students requesting merit-based funding consideration.

Degree Requirements
ODKM is a 36- to 39-credit executive format program. Students work in teams and complete most of the courses in sequence. The second academic year includes an action-learning component, in which participants undertake projects in organizations and apply research methods. Overall, the process and methods of evaluation stress the cumulative development of competencies and the capacity to apply the insights gained. Students are expected to have easy access to a computer and the Internet. Minimum computer specifications can be obtained from the program office. Successful completion of the following courses is necessary to fulfill the course requirements of the program.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 501</td>
<td>Policy and Organizational Analysis</td>
<td>12</td>
</tr>
<tr>
<td>PUBP 502</td>
<td>Governance and Policy Processes</td>
<td>4</td>
</tr>
<tr>
<td>PUBP 503</td>
<td>Culture, Organization, and Technology</td>
<td>4</td>
</tr>
</tbody>
</table>

Core Courses .......................................................... 9

MNPS 700 The New Professionalism: Theory and Practice* ........................................... 3
MNPS 702 The New Professional as Reflective Practitioner* ........................................ 3
MNPS 703 Technology and Learning in the New Professions* ......................................... 3

Additional Requirements ............................................. 12
LRNG 602 Group Dynamics and Team Learning ......................................................... 3
LRNG 672 Organizations Learning Laboratory ..................................................... 3
LRNG 762 Strategic Knowledge Management ...................................................... 3
MNPS 720 Learning Community ................................. 3

Electives (minimum of one course) .......... 3

Experiential Component ........................................... 0–3

In the absence of an approved relevant professional experience, a 3-credit internship is required. This requirement can be waived, with the approval of the program director or dean, for students with appropriate work experience.

Total Credits .......................................................... 36–39

*Certain sections of MNPS 700, 702, and 703 are designated for the ODKM Program, and only those will satisfy the degree requirements.

■ New Professional Studies, MS

▲ Peace Operations (PSPO)

Phone: 703-993-8200

This program is designed for students and practicing professionals engaged in the planning, regulation, management, and conduct of peace operations. Students obtain a working knowledge of the theory, policy, law, research, and practices required to effectively and efficiently participate in or conduct a peace operation. Students also learn to think critically and analytically about the problems and challenges in this field and communicate their analyses clearly and effectively through written and oral presentations.

Admission Requirements

Complete applications for fall and spring semesters are reviewed on a rolling basis, with late applications considered on a space-available basis. Applicants must hold a bachelor’s degree from an accredited institution, with a preferred GPA of 3.00 or better on a 4.00 scale.

To apply, applicants must submit the following:
• Graduate application with fee (no fee waivers)
• Two- to three-page written statement of goals and interest in the program
• Current résumé
• Two official transcripts of all university work completed. International students must also submit a translation of all international transcripts into English, if applicable.
• For international applicants, TOEFL scores, with a minimum score of 575 on the paper-based exam; 230 on the computer-based exam; or 88 with a minimum of 20 on each of the subsections on the Internet-based exam. Students may also be required to be tested by the English Language Institute.
• Two letters of recommendation, with at least one from an individual who is qualified to attest to the candidate’s academic potential.

Submission of GRE or GMAT scores is required only for students requesting funding consideration.

Degree Requirements

Students must complete 39 credits. Part-time enrollees may take up to a maximum of six years to complete the degree requirements. All students are required to take the three common courses and four core courses listed below (24 credits), as well as five electives (15 credits).

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>SPP Common Core</td>
<td>12</td>
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<td>4</td>
</tr>
<tr>
<td>PUBP 503 Culture, Organization, and Technology</td>
<td>4</td>
</tr>
<tr>
<td>Peace Operations Core Courses</td>
<td>12</td>
</tr>
<tr>
<td>CONF 501 Introduction to Conflict Analysis and Resolution (or equivalent)</td>
<td>3</td>
</tr>
<tr>
<td>MNPS 700 The New Professionalism: Theory of Peace Operations*</td>
<td>3</td>
</tr>
<tr>
<td>MNPS 702 The New Professional as Reflective Practitioner: Practice of Peace Operations*</td>
<td>3</td>
</tr>
<tr>
<td>MNPS 703 Technology and Learning in the New Professions: Experiential Applications in Conflict and Postconflict Environments*</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

*Only those sections of MNPS 700, 702, and 703 designated for the Peace Operations Program will satisfy degree requirements.

Total Credits: 39

Research Centers

Center for Regional Analysis
Director: Steve Fuller, PhD

Focusing on economic development in technologically intensive regions, the Center for Regional Analysis (CRA) maintains a corporate technology database for the national capital region. The CRA provides economic forecasting services to government agencies at all levels around the world.

Policy Analysis Center
Director: Thomas Gulledge, PhD

The Policy Analysis Center (PAC) is a clearinghouse for research on such topics as peacekeeping policy, enterprise integration, and information technology. Areas of focus include business-to-business electronic commerce, implementation planning for standard software solutions, and enterprise integration.

Center for Transport Policy and Logistics
Director: Kenneth J. Button, PhD

This center works with federal and state authorities to find better ways to manage existing transport networks from surface to air to space. The center is extremely active in the areas of intelligent transportation systems and aviation policy.

International Center for Applied Studies in Information Technology
Director: Stephen Ruth, PhD

The International Center for Applied Studies in Information Technology (ICASIT) is a consulting group dedicated to delivering the power of the Internet to businesses, underserved markets, and developing countries. ICASIT has contracts in more than 20 countries.

Mason Enterprise Center
Director: Roger Stough, PhD

Dedicated to creating and developing businesses in the Washington, D.C., area, the Mason Enterprise Center (MEC) is the synthesis of seven programs designed to meet the needs of growing businesses. The center focuses the energy, skills, and intellectual capital of the university on enterprise creation, expansion, and restructuring. MEC is highly geared on providing its clients with services that add value to their organizations. The center specializes in business development, entrepreneurship, government contracting, international business, technology ventures, and telework, making it a business-development center unlike any other. In addition, MEC conducts seminars and conferences related to its areas of expertise.

Center for Global Policy
Director: Jack Goldstone, PhD

This center conducts research on a wide range of global policy issues, including foreign trade, democratization and state-building, and transnational networks. It also analyzes specific policy issues for a variety of government agencies, and develops and serves as the home to several major cross-national databases for global policy.

Center for Science and Technology Policy
Director: Philip Auerswald, PhD

This center helps facilitate the exchange of information and ideas among the worldwide science, foreign affairs, trade, and technology communities. Areas of emphasis include international trade and science and technology.

Office of International Medical Policy
Director: Arnauld Nicogossian, MD

The Office of International Medical Policy provides leadership and focus on global medical and public health policies and processes, working collaboratively with health, science, and medical organizations in the public and private sectors and academic organizations to address pressing global policy concerns.

Center for Executive Education and Leadership in Public Policy
Director: A. Lee Fritschler, PhD

This center helps executives better understand, develop, and implement public policy, positive leadership roles, public and private sector cooperation, and programming. Programs focus on what business needs to know about government and public policy processes and what government and public policy makers should know about business and private sector management.
State Economic Development Center  
**Director:** Roger Stough, PhD

This center’s focus is on providing education, training, and research support for state-level economic development policy and programs. While the primary goal is to provide assistance to agencies and organizations in Virginia, the center also works with other government organizations in the United States as well as abroad. Methods employed by the center include roundtable discussions, formal focus groups, survey research, statistical analysis, and mathematical models.

Center for Entrepreneurship and Public Policy  
**Director:** Roger Stough, PhD

Economic development policy has shifted dramatically from a business and industry attraction strategy to a more entrepreneurship approach. The Center for Entrepreneurship and Public Policy focuses on entrepreneurship policy research and program delivery, offering programs in research, collaboration, and analysis.

Center for Aerospace Policy  
**Director:** Kenneth J. Button, PhD

The mission of the Center for Aerospace Policy is to develop the U.S. aerospace sector by providing educational and research resources. The center helps national agencies, such as NASA, enhance their internal efficiency and smooth the interface between U.S. agencies and other government agencies, the private sector, and foreign counterparts.
The College of Science (COS) serves as the nexus for research and education in the natural, mathematical, and computational sciences at Mason. The central mission of COS is to create and disseminate scientific knowledge, provide outstanding scholarship in concert with excellent teaching, and develop the human and technical resources required to address the current and future needs of society. Through its innovative and multifaceted educational and research mission, COS offers exciting opportunities to undergraduate and graduate students, scientists, educators, and other professionals in Northern Virginia and the national capital region.
In addition to the wide variety of undergraduate degree programs offered by its 10 departments, COS also offers many innovative graduate degrees and interdisciplinary minors. The research strength of COS provides an essential resource to graduate students and to undergraduates whose involvement in research is strongly encouraged. Many undergraduates go on to graduate school and to pursue careers in public service, nonprofit organizations, and the private sector. Graduate students engage in more specialized study at the master’s and doctoral levels, preparing them for first or second careers or job advancement and providing personal enrichment.

Faculty members are committed to teaching grounded in scholarship and research. They strive to make students rigorous thinkers and clear communicators while encouraging experimentation with new approaches and ideas. Students are thus prepared for their role as informed citizens in a complex, global society and able to adapt to an ever-changing world.

Administration

Vikas Chandhoke, dean
Evans J. Mandes, senior associate dean for budget and personnel
Maria Dworzecka, senior associate dean for academic planning and facilities
Peter A. Becker, associate dean for graduate programs
Richard J. Diecchio, associate dean for undergraduate programs
Paul S. Schopf, associate dean for research and computing

Graduate Degree Programs

COS offers 11 master’s degrees and 11 doctoral degrees. The requirements for each degree are described in the departmental and degree sections that follow.

Graduate Certificate in Forensics

This collegewide interdisciplinary graduate certificate program is designed for students seeking training in forensic science, as well as for current professionals employed by the federal government, local law enforcement, and private security corporations. Forensics refers to the application of scientific methodologies to the analysis of crime scenes, the collection of evidence, and the laboratory analysis of that evidence in support of criminal investigations. Related legal aspects are also considered as part of a comprehensive approach to forensics. Students enrolled in the forensic science concentration obtain the specific scientific skills necessary for laboratory employment in the field. Students enrolled in the general forensics concentration obtain a more general background in the field with a focus on criminal law and anthropology. At the time of completion, depending on the concentration, students will be able to

- Understand the basic principles of forensics.
- Perform a general crime scene analysis.
- Develop DNA profiles and interpret results of toxicological studies.
- Apply fundamental legal and anthropological concepts.
- Work collaboratively in interdisciplinary groups.

Admission Requirements

Applicants to the forensic science concentration should hold a BA or BS degree in biology or chemistry from an accredited university with a minimum GPA of 3.00. Applicants to the general forensics concentration should hold a BA or BS degree from an accredited university with a minimum GPA of 3.00. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé to the COS Fairfax Campus Graduate Admissions Processing Center. TOEFL scores are required of all international applicants. Students may not pursue this certificate concurrently with any other graduate degree program or certificate program offered by COS because this certificate program will charge students at a differential (premium) tuition rate. However, students enrolled in academic programs outside COS may enroll in this certificate program concurrently.

Program Requirements

The certificate in forensics requires a total of 18 credits, comprising six 3-credit courses. A unique element of the program is the Forensics Capstone Course, which is shared by the two concentrations. In this class, students from the two concentrations will combine their skills as members of interdisciplinary investigation teams as they analyze a real-world crime scene. This unique course will demonstrate in practice how students with skills in the scientific/quantitative analysis or legal/anthropological areas can combine forces to understand and interpret the nuances of the evidence presented at an actual crime scene. The curriculum requirements for each concentration are listed below:

Required Core Courses:

- FRN 500 – Introduction to Forensic Science (3)
- FRN 510 – Crime Scene Analysis (3)

▲ Forensic Science Concentration (FRSC) Required Courses:

- FRN 520 – Toxicology (3)
- FRN 540 – Chemical Analysis (3)
- FRN 560/BINF 637 – Forensic DNA Sciences (3)
- FRN 590 – Forensics Capstone Course (3)

▲ General Forensics Concentration (FRSG) Required Courses:

- FRN 530 – Criminal Law (3)
- FRN 550 – Issues in Forensic Anthropology (3)
- FRN 570 – Introduction to Biochemical Forensics (3)
- FRN 590 – Forensics Capstone Course (3)

Undergraduate Degree Programs

The undergraduate degree consists of course work in university-wide general education, a major area of study, and electives. COS offers six bachelor of arts degrees and seven bachelor of science degrees. To earn a bachelor’s degree, students must complete 120 credits, of which at least 45 must be in upper-level courses (numbered 300 and above). At least one course at the 300 or 400 level must be designated “writing intensive.” All entering students who have not yet satisfied the university-wide general education requirement in quantitative reasoning are required to take the math placement test prior to enrollment.

Students should consult the University General Education chapter for information concerning university-wide general education requirements for undergraduate degrees.
College-Level Requirements

The baccalaureate degree is designed to provide a broad knowledge of the world, develop in students the ability to think conceptually and critically, acquaint them with many different methods of inquiry, and provide skills to continue intellectual growth throughout life. Because these goals can be achieved in many ways, students may select from a range of courses for completing them. But education involves more than fulfilling requirements. The selection of courses should not only deepen knowledge in areas of interest, but also expand the range of those interests. The courses enable students to link the present to the past, their culture to other cultures, and what is to what could be. Learning to make these connections increases the ability to understand and enjoy the world in ways not yet imagined.

Bachelor of Arts

The BA degree provides students with a breadth of knowledge, as well as the necessary skills to make in-depth study of a major truly meaningful. In addition to the university-wide general education program, students pursuing a BA degree must complete the course work below, and the courses listed in the departmental sections that follow. Except where expressly prohibited, a course used to fulfill a college-level requirement may also be used simultaneously to satisfy other requirements, such as university-wide general education requirements, college-level requirements, or requirements for the major.

- Philosophy or religious studies: 3 credits, fulfilled by any course in philosophy or religious studies (PHIL, RELI)
- Social science: 3 credits, fulfilled by any course in ADJ, ANTH, ECON, GEOG (except GEOG 102 or 309), GOVT, PSYC, or SOCI
- Foreign language: intermediate-level proficiency in one foreign language. This requirement may be fulfilled by completing a course in a foreign language numbered 202, 209, or 210 or higher, or by achieving a satisfactory score on an approved proficiency test. International students should consult the COS Undergraduate Academic Affairs Office about a possible waiver of this requirement.
- Science sequence requirement: 1 additional credit that may be fulfilled only by an approved two-semester sequence in a single science
- Non-Western culture: 3 credits that may be fulfilled by any of the following courses: ANTH 114, 300, 301, 302, 304, 305, 306, 311, 313, 330, 332, 396; ARTH 203, 319, 320, 380, 381, 382, 383, 384, 385, 482; CHIN 318, 320, 325; DANC 118; ECON 361, 362; FREN 451; GEOG 101, 316, 325, 330, 399; GOVT 328, 332, 333, 432; HIST 125, 130, 251, 252, 261, 262, 271, 281, 282, 328, 329, 353, 354, 355, 356, 365, 366, 387, 426, 459, 460, 461, 465, 466; MUSI 103; RELI 211, 212, 313, 314, 315, 337, 374, 490; or RUSS 353, 354

Students who can document attendance at a native school in a non-Western country for at least four years may request a waiver from this requirement through the COS Undergraduate Academic Affairs Office. In addition to the university-wide general education requirements, BS majors are required to take the courses listed in the departmental sections that follow.

Bachelor of Science

The BS degree provides students with a more intensive approach to the core technical concepts in their major field of study. Therefore, this curriculum has a reduced number of courses in humanities and social sciences in comparison with the BA degree to allow students to achieve greater depth in their majors. Requirements for each BS major are listed in the departmental sections that follow.

Physical Education Courses

Activity courses offered by the Health, Fitness, and Recreation Resources Department cannot be counted toward the credits required for a degree in COS. Students may take nonactivity PHED courses for the elective credit for COS degrees.

Teacher Licensure

Students who wish to become teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Minors

Students may elect to take a minor in addition to their major field of study. For policies governing all minors, see the Academic Policies chapter of this catalog. Students interested in earning a minor should complete the appropriate section of the Change/Declaration of Academic Program form.

Bioinformatics and Computational Biology

Phone: 703-993-8400
Web: bioinformatics.gmu.edu

Faculty

Professors: Grefenstette, Jafri (chair), Willett
Associate professors: Kinser, Seto, Vaisman
Assistant professor: Klimov
Contract assistant professor: Solka
Affiliate faculty: Ascoli, Blackwell, Carr, Gillevet, Jamison, Olds, Weller

Course Work

The department offers all course work designated BINF in the Course Descriptions chapter of this catalog.

Minor in Bioinformatics

The bioinformatics minor is an interdisciplinary program consisting of required courses in biology, programming, statistics, and bioinformatics. Eight credits of course work must be unique to the minor.

Students must complete the following courses with a minimum GPA of 2.00, distributed as follows:

BINF 401 Bioinformatics and Computational Biology I
BINF 402 Bioinformatics and Computational Biology II
BINF 403 Bioinformatics and Computational Biology Lab I
BINF 404 Bioinformatics and Computational Biology Lab II
BIOL 213 Cell Structure and Function
BIOL 482 Introduction to Molecular Genetics
IT 108 Programming Fundamentals
IT 208 Program Design and Data Structures
or CS 112 Computer Science I (instead of IT 108 and IT 208)
STAT 344 Probability and Statistics for Engineers and Scientists I
or STAT 250 Introductory Statistics I

GRADUATE PROGRAMS

Bioinformatics Management, MS

This degree addresses the regional and national need for technically trained managers who will be able to lead teams of bioinformaticians in both the public and private sectors. The degree combines a solid foundation in bioinformatics research, tools, and techniques, with the management skills needed to address the associated legal, ethical, managerial, and business issues. The MS in bioinformatics management is intended for:

- Students seeking advancement in their current bioinformatics careers that requires an advanced degree in bioinformatics combined with management expertise.
- Students with a general background in biological science or computational methods who are planning to enter the field of bioinformatics as managers and would like to strengthen their bioinformatics and managerial expertise.

Admission Requirements

Applicants should have a bachelor’s degree in biology, computer science, or a related field, with a GPA of at least 3.00 in their last 60 credits of study. Applicants should have taken courses in molecular biology, computer science, calculus, physical chemistry, and statistics. Students with deficiencies in one or more of these areas may be required to take additional courses from the undergraduate curriculum. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Graduate Admissions Processing Center. Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE-GEN exam. The GRE requirement will be waived if the student holds a master’s degree from a U.S. institution. TOEFL scores are required of all international applicants.

Degree Requirements

Candidates must successfully complete 30 credits as follows:

Bioinformatics Core Courses (15 credits)—foundation courses in modern biotechnology, tools and methods for bioinformatics analysis, and methods for creating customized bioinformatics tools.

- BINF 630 Bioinformatics Methods
- BINF 631 Molecular Cell Biology for Bioinformatics
- BINF 634 Bioinformatics Programming
- One of the following: BINF 633 Molecular Biotechnology, BINF 636 Microarray Methodology and Analysis, or BINF 650 Data Modeling for Bioinformatics
- BINF 730 Biological Sequence Analysis or above

Management Core Courses (12 credits)—foundation courses in management theory related directly to the management of scientific programs and personnel.

- MBA 638 Managing Operations
- MBA 712 Project Management
- TECM 615 Decision Making Using Accounting and Financial Information
- TECM 640 Management of Consulting and Technical Professionals

Capstone research project (3 credits)—focusing on bioinformatics management issues and techniques
- BINF 798 Research Project

Bioinformatics and Computational Biology, MS

This degree addresses the growing national and regional demand for trained computational biologists. It combines a solid foundation in biotechnology with the computational skills required for bioinformatics. The flexibility of the degree structure permits students to custom design their curriculum under an advisor’s guidance, making the MS in bioinformatics especially relevant for students employed in today’s diverse biotechnology workplace. Students completing the program are qualified to pursue careers that require knowledge of current bioinformatics methods and the ability to develop new bioinformatics software.

Courses are generally offered in the late afternoon or early evening to accommodate students with full-time employment outside the university. Students employed at area biotechnology organizations may take up to 6 credits (out of 31) for bioinformatics work done on the job, under the guidance of a faculty member. This work-related project may be applied as either a 3-credit research project or a 6-credit master’s thesis.

Admission Requirements

Applicants should have a bachelor’s degree in biology, computer science, or a related field, with a GPA of at least 3.00 in their last 60 credits of study. Applicants should have taken courses in molecular biology, computer science, calculus, physical chemistry, and statistics. Students with deficiencies in one or more of these areas may be required to take additional courses from the undergraduate curriculum. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Graduate Admissions Processing Center. Applicants should also include three letters of recommendation, and an official report of scores obtained on the GRE-GEN exam. The GRE requirement will be waived if the student holds a master’s degree from a U.S. institution. TOEFL scores are required of all international applicants.

Degree Requirements

Candidates must successfully complete 31 credits as follows:

- 12 credits of bioinformatics core courses: BINF 630, 631, 634, and 734
- 3 credits of advanced bioinformatics courses numbered BINF 730 and above
- 12 credits of electives in bioinformatics and computational biology, biology and biotechnology, or computational sciences, as approved by the advisor
- 1 credit of bioinformatics seminar BINF 704
- Research component: 3 credits of BINF 798 Research Project or 6 credits of BINF 799 Master’s Thesis; exercise
of the thesis option results in a corresponding reduction in the electives requirement from 12 credits to 9 credits

■ Certificate in Bioinformatics  CERG-BCB and Computational Biology

This graduate certificate program addresses the growing national and regional demand for trained computational biologists by combining a solid foundation in biotechnology with computational skills relevant to bioinformatics. The flexibility of the certificate structure permits students to custom design their curriculum under an advisor’s guidance, making the certificate in bioinformatics especially relevant for students employed in today’s diverse Northern Virginia high-technology workplace. Ideal candidates for this certificate are those who have a background in biological and computer sciences, and are currently working in or planning to enter the fields of biotechnology or bioinformatics. The certificate is also highly relevant for students who are interested in advancing their career goals but may not have adequate time available to undertake a graduate degree program.

Admission Requirements

Applicants should hold a BA or BS degree in a discipline related to biological or computer science from an accredited university, with a minimum GPA of 3.00. Applicants should have taken courses in molecular biology, computer science, calculus, physical chemistry, or statistics, and should also possess working knowledge of a computer programming language. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé to the COS Graduate Admissions Processing Center. TOEFL scores are required of all international applicants.

The certificate program is a professional certification program that charges students at a differential (premium) tuition rate, with an additional $100 per credit added to the standard Mason graduate tuition rate for students who enroll in this certificate program, regardless of in-state or out-of-state status. The differential tuition is used to fund continuing improvements in the COS educational facilities used to support the certificate program. Students may not pursue this certificate concurrently with any other graduate degree program or certificate program offered by COS. In addition, students may not apply previous credit hours to the certificate program from another certificate, degree, or nondegree program because of the differential (premium) tuition rate.

Program Requirements

The certificate in bioinformatics and computational biology requires a total of 15 credits, based on the set of core courses supporting the MS and PhD degree programs in bioinformatics and computational biology, along with a set of elective courses. Students are required to take three core courses, plus two courses selected from the list of electives indicated below.

Required Core Courses: (all are required)

- BINF 630 - Bioinformatics Methods
- BINF 631 - Molecular Cell Biology for Bioinformatics
- BINF 634 - Bioinformatics Programming

Elective Courses: (choose two of the following or other courses approved by the coordinator)

- BINF 633 - Molecular Biotechnology
- BINF 636 - Microarray Methodology and Analysis
- BINF 639 - Biometrics
- BINF 730 - Biological Sequence Analysis
- BINF 731 - Protein Structure Analysis
- BINF 732 - Genomics
- BINF 733 - Gene Expression Analysis
- BINF 734 - Advanced Bioinformatics Programming
- BINF 739 - Topics in Bioinformatics

■ Bioinformatics and Computational Biology, PhD

Recent advances in molecular biology have produced an avalanche of data, including DNA sequences and genetic maps that cover thousands of genes whose functions are poorly understood or completely unknown. These advances are having a profound effect on the biological sciences and have resulted in the development of the new discipline of bioinformatics. Bioinformatics uses computational approaches to analyze patterns in biological data and create complex models of biological activity, including attempts to elucidate the functions of genes and their interactions in genetic pathways. Widespread social benefits are expected from the exploitation of the wealth of new knowledge concerning the genetic mechanisms of life and related processes. The coming years will see major developments in functional genomics, and environmental sciences, as well as profound advances in understanding the fundamental processes of biology. These benefits are increasingly dependent on the application of advanced information technology to the analysis of biological information.

The program’s main objective is to train the next generation of computational biologists for careers in academia, industry, and government. The program provides students with an interdisciplinary academic environment, including fundamental biosciences courses and core and advanced courses in bioinformatics. In general, course requirements may be completed within the first two years. The program is structured to be accessible for full- and part-time students.

Admission Requirements

Applicants should have a bachelor’s degree in biology, computer science, or a related field, with a minimum GPA of 3.25. Admission also requires minimum GRE scores of 1,100 (verbal plus quantitative) and 4.00 (analytical writing). Applicants should have taken courses in molecular biology, cell biology, biochemistry, genetics, calculus, physical chemistry, computer programming and data structures, and probability and statistics. Students with deficiencies in one or more of these areas may be admitted provisionally and required to take additional courses from the undergraduate curriculum. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Graduate Admissions Processing Center. Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE-GEN. The GRE-SUB is recommended if it is given in the student’s undergraduate major. The GRE requirement for admission to the doctoral programs will be waived if the student holds a master’s degree.
from a U.S. institution. TOEFL scores are required of all international applicants.

Degree Requirements
The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work and 24 credits of dissertation research. For those holding master’s degrees, the 72 required credits may be reduced by up to 30 credits, depending on graduate courses completed. The curriculum is divided into four areas: 12 credits of fundamental biosciences courses; 13 credits of core bioinformatics courses; 23 credits of electives or independent research; and 24 credits of dissertation research. The course work is organized as follows:

• Fundamental bioscience courses: BINF 701 and 702, plus 3 credits each of BINF 703 and 704
• Core bioinformatics courses: BINF 690, 705, 730, 731, and either 732 or 740
• General electives

Students whose undergraduate record does not include basic biochemistry will be required to take a basic course prior to BINF 701 Biochemical Systematics (Biochemistry). If the undergraduate record is otherwise insufficient, students may be required to take prerequisite courses, some of which may not be applicable to the 48-credit course total for the bioinformatics PhD. By the end of the semester when course work is completed, the student must form a doctoral committee, which will supervise the candidacy exam. The exam includes written and oral components. On passing the candidacy exam and submitting an acceptable dissertation proposal, the student is advanced to doctoral candidacy.

Chemistry and Biochemistry

Phone: 703-993-1070
Web: chemistry.gmu.edu

Faculty
Professors: Blaisten-Barojas, Cozzens, Davies, Foster (chair), Mose, Mushrush
Associate professors: Born, Davis (associate chair), Honeychuck, Hussam, Schreifels, Slayden, Weatherspoon
Term associate professor: Hatton
Assistant professors: Bishop, Cooper, Couch
Term assistant professors: Kort, Pettigrew

Course Work
This department offers all course work designated CHEM in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

■ Chemistry, BA  

BA-CHEM

This program, when coordinated with the necessary courses in education, meets requirements for teacher licensure (see below). It also meets requirements for entrance to medical and other professional schools.

In addition to satisfying the university-wide general education requirements and requirements for the BA degree in COS, students majoring in chemistry must complete the following.

(Through the course work below, chemistry majors satisfy the university-wide general education requirements in natural science and quantitative reasoning.)

• 37 credits of chemistry: CHEM 211, 212, 313, 314, 315, 318, 321, 331, 332, 336, and 337; and 5 credits of electives in chemistry
• 11 credits of math: MATH 113, 114, and 213
• 8–12 credits of physics: PHYS 243–246 (8 credits), or PHYS 160–161, 260–263 (12 credits)

▲ Concentration in Biochemistry (BC)

This program is for students interested in studying chemistry at its interface with the biological sciences. Those interested in health science careers can obtain an excellent science background through this concentration.

In addition to satisfying the university-wide general education requirements and requirements for the BA degree in COS, students majoring in chemistry with a concentration in biochemistry must complete the following. (Through the course work below, majors satisfy the university-wide general education requirements in natural science and quantitative reasoning.)

• 37 credits of chemistry: CHEM 211, 212, 313, 314, 315, 318, 321, 331, 446, 463, 465
• 11 credits of math and statistics: MATH 113, 114; STAT 250
• 8 credits of physics: PHYS 243–246
• 4 credits of biology BIOL 213

■ Chemistry, BS  

BS-CHEM

This program is approved by the American Chemical Society; on completion, students are certified to the society. Students planning professional careers in chemistry should choose this degree.

In addition to satisfying university-wide general education requirements for the BS degree, students majoring in chemistry must complete the following with a minimum GPA of 2.00. No more than two courses with a grade of D (1.00) may be applied to the major. (Through the course work below, chemistry majors satisfy the university-wide requirements in natural science, information technology, and quantitative reasoning.)

• 52 credits of chemistry: CHEM 211, 212, 313, 314, 315, 318, 321, 331, 332, 336, 337, 350, 422, 423, 441, 445, and 463; and 3 credits of electives in chemistry
• 14 credits of math: MATH 113, 114, 213, 214
• 8–12 credits of physics: PHYS 243–246 (8 credits), or PHYS 160–161, 260–263 (12 credits)

▲ Concentration in Biochemistry (BC)

Students planning professional careers in biochemistry, the pharmaceutical industry, medicine, biotechnology, or related fields with a chemistry emphasis should choose this program instead of the traditional BS in chemistry. This concentration provides students with a focus on biochemistry while retaining a strong chemistry foundation. Students are allowed to tailor the concentration to their interests with 9 credits of electives.

In addition to satisfying university-wide general education requirements for the BS degree, students majoring in chemistry with a concentration in biochemistry must complete the following with a minimum GPA of 2.00. No more than two courses with a grade of D (1.00) may be applied to the major. (Through the course work below, they satisfy the
The department offers a minor in chemistry. The program requires 16 credits of chemistry at the 300 level or above with a minimum GPA of 2.00. Eight credits of course work must be unique to the minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Certificate in Environmental Chemistry

The department offers an undergraduate certificate program in environmental chemistry. The program consists of 35 credits of course work dealing directly with environmental studies. To receive the certificate, students must hold a baccalaureate degree in any major or be earning one from Mason at the time they receive the certificate. Substitutions from the following list of required courses are allowed but require permission from the environmental chemistry certificate director: BIOL 377; CHEM 313, 314, 315, 318, 321, 331 or 333, 505, 554; EVPP 301, 454; STAT 344. To optimize employment and graduate school opportunities, students are encouraged to take additional courses in natural science, computer science, and environmental law.

Premedical, Predental, Prepharmacy, and Preveterinary Students

Web: prehealth.gmu.edu

Many students planning medical, dental, pharmacy, veterinary, optometry, or other health professional careers choose to pursue a major in chemistry. These students should consult the health professions advising web site on required course work and overall preparation.

Prepharmacy Society

Mason students who are interested in pursuing careers in pharmacy are encouraged to participate in the Prepharmacy Society. This student organization organizes supplemental programming focused toward pharmacy as a career.

Chemistry Club

The Chemistry Club provides a social and informational network for students. It serves the Department of Chemistry and Biochemistry by sponsoring informational programs and allowing students to work at university events.

Teacher Licensure

Students who wish to become teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Chemistry, Bachelor's/Accelerated Master’s Degree

A five-year bachelor’s/accelerated master’s degree program leads to a research-based MS degree following satisfactory completion of 144 credits. It allows academically strong undergraduates with a commitment to research to obtain BS and MS degrees within five academic years plus the summer of the last year. On completion of this program, students will be exceptionally well prepared for entry into a professional school or a PhD program in chemistry or a related discipline. Students can enter this program after completing 90 credits and enroll in graduate courses when they have successfully completed prerequisites. This flexibility makes it possible for students to complete some of their graduate classes during their junior and senior years. Consult the department for details on the program.

Admitted students are able to use up to 6 graduate credits in partial satisfaction of the requirements for the undergraduate
degree. On completion of that degree and with satisfactory performance (3.00) in the graduate courses, students are given advanced standing in the master’s program and can complete an additional 24 credits to receive the master’s degree. All other master’s degree requirements must be met.

GRADUATE PROGRAMS

The department offers an MS in chemistry with a research project (thesis option) or an all-course-work program (non-thesis option). Within the MS, students may pursue a concentration in biochemistry. The PhD in all branches of chemistry is available through the degrees in environmental science and policy, bioscience, and physical sciences. An area of emphasis in computational chemistry is available through the PhD in computational sciences and informatics program offered in conjunction with the Department of Computational and Data Sciences.

Chemistry, MS

The MS in chemistry provides advanced training for recent college graduates, professionals in teaching, and technical workers in research organizations who have an interest in chemistry or biochemistry.

Admission Requirements

To be considered for admission to degree status, students must have a bachelor’s degree in chemistry, biochemistry, or a related field from an accredited institution and must meet general admission requirements for graduate study. Admission is based on a departmental evaluation of the applicant’s background as evidenced by transcripts and letters of recommendation. Applicants who received a bachelor’s degree more than five years before the application date must submit a résumé.

Degree Requirements

To receive an MS in chemistry, students must complete 30 credits of graduate work. The thesis option is for students planning to pursue a doctoral degree or a career in the chemical, biochemical, or pharmaceutical industry. The thesis is based on research that must be approved by the thesis or advisory committee, which is appointed during the first semester of registration in CHEM 799. Students who select the thesis option complete 6 credits of 799 and present a seminar followed by an oral defense. Students in this option are expected to choose a laboratory advisor during their first semester in the program and begin working on their thesis project no later than the second semester.

The nonthesis option is for those seeking to go on to professional school, teach chemistry in secondary schools, or pursue other careers in which advanced work in chemistry is necessary or advantageous. Students must complete the following requirements:

- CHEM 633
- 9 credits from the different core areas of chemistry (analytical, biochemical, environmental, inorganic, and organic) (Classes that fulfill this requirement are specifically designated in the catalog as core classes.)
- 6 credits of electives within chemistry (Eligible classes must have a CHEM designation.)
- 6 credits of electives within chemistry or related fields (Classes used to fulfill this requirement need to be approved by the Graduate Committee prior to registration.)
- 3 credits of CHEM 690, graduate seminar
- 6 credits of CHEM 799, thesis research

Nonthesis Option, Chemistry

This program is specifically designed for students seeking to go on to professional school, teach chemistry in secondary schools, or pursue other careers in which advanced work in chemistry is necessary or advantageous. Students must complete the following requirements:

- CHEM 633
- 9 credits from the different core areas of chemistry (analytical, biochemical, environmental, inorganic, and organic) (Classes that fulfill this requirement are specifically designated in the catalog as core classes.)
- 6 credits of electives within chemistry (Eligible classes must have a CHEM designation.)
- 6 credits of electives within chemistry or related fields (Classes used to fulfill this requirement need to be approved by the Graduate Committee prior to registration.)
- 3 credits of CHEM 690, graduate seminar
- 3 credits of CHEM 670/Chem 579 (see below)

Any combination of CHEM 670 and CHEM 579 may be used to fulfill the 3-credit requirement listed above. CHEM 579 may be used to fulfill these requirements only with prior written approval of the department and must be used to complete a laboratory- or library-based research project or enhance the student’s teaching skills.

Concentration in Biochemistry (BC)

Thesis Option

This program is specifically designed for students who wish to pursue a doctoral degree or a career in the biochemical or pharmaceutical industry. Students must complete the following requirements:

- 9 credits from the different core areas of chemistry (analytical, biochemical, environmental, inorganic, and organic) (Classes that fulfill this requirement are specifically designated in the catalog as core classes.)
- 6 credits of electives in biochemistry (A list of approved biochemistry electives may be obtained from the department.)
- 3 credits of electives within chemistry (Eligible classes must have a CHEM designation.)
- CHEM 531 or 633 (The specific requirement for each student will be made by the departmental graduate admissions committee at the time of acceptance into the program.)
• 3 credits of CHEM 690, graduate seminar
• 6 credits of CHEM 799, thesis research

Nonthesis Option
This program is specifically designed for students seeking to go on to professional school, teach biochemistry in secondary schools, or pursue other careers in which advanced work in biochemistry is necessary or advantageous. Students must complete the following requirements:
• 9 credits from the different core areas of chemistry (analytical, biochemical, environmental, inorganic, and organic) (Classes that fulfill this requirement are specifically designated in the catalog as core classes.)
• 9 credits of electives in biochemistry (A list of approved biochemistry electives may be obtained from the department.)
• 3 credits of electives within chemistry (Eligible classes must have a CHEM designation.)
• CHEM 531 or 633 (The specific requirement for each student will be made by the departmental graduate admissions committee at the time of acceptance into the program.)
• 3 credits of CHEM 690, graduate seminar
• 3 credits of CHEM 670/CHEM 579 (see below)

Any combination of CHEM 670 and 579 may be used to fulfill the 3-credit requirement listed above. CHEM 579 may be used to fulfill these requirements only with prior written approval of the department and must be used to complete a laboratory- or library-based research project or enhance the student’s teaching skills.

■ Physical Sciences, PhD PHD-PSCI
This interdisciplinary doctoral program is offered by the Department of Physics and Astronomy and the Department of Chemistry and Biochemistry. The degree focuses on preparing scientists in the separate disciplines listed above or as members of interdisciplinary science teams, primarily involving astronomy, biochemistry and biophysics, chemistry, and physics. The main emphasis is on theoretical, experimental, or laboratory research. The program is not intended to produce graduates who are scientific generalists; however, the areas of specialization are cut across traditional disciplines, as in the research fields mentioned above.

The degree is built on a foundation of several interdisciplinary courses that expose students to fundamental research problems in modern science and provide them with an introduction to each of the general areas that compose the degree (physics, chemistry, biochemistry and biophysics, and astronomy). The program curriculum, however, has been designed to provide enough flexibility to accommodate students seeking a fully interdisciplinary program, as well as those with interests more closely aligned with one of the traditional physical science disciplines. Students who seek a program with a heavy emphasis on computational methods may alternatively consider the doctoral program in computational sciences. This program includes concentrations in computational physics and space sciences and computational astrophysics. See the Department of Computational and Data Sciences section for degree and admission requirements.

Admission Requirements
The physical sciences PhD program is intended for students who (1) have completed an undergraduate program of study in one of the physical sciences, (2) have taken math to the level of differential equations, and (3) are computer literate.

Applicants are expected to have a BS degree with minimum GPA of 3.00 and acceptable GRE and TOEFL scores. The undergraduate degree should be in a scientific field, such as physics, chemistry, astronomy, mathematics, or engineering. Applicants with insufficient undergraduate records may be accepted provisionally and required to successfully complete selected remedial courses, some of which may not be applicable to the 48-credit total for the PhD course work requirement.

Interested students should submit a completed Mason graduate application, three letters of recommendation, official reports of GRE and TOEFL scores, and a goals statement reflecting their general research interests and career plans. Mason’s Educational Testing Service code is 5827.

Degree Requirements
The program requires 72 credits beyond the baccalaureate degree. All students in the physical sciences PhD program are required to take 48 credits of course work and 24 credits of dissertation research. For students entering the doctoral program with previous graduate work, the 48 credits of course work may be reduced by a maximum of 30 credits. Of the 48 credits of course work, 9 credits will consist of core courses to be taken by all students in the program, and at least 15 hours will be selected as part of a student’s contract with a three-member faculty committee (explained below). At least five of the contract core courses will be selected from the list presented below. Thus, the program consists of
• 3 credits of PSCI 703 (a 1-credit course that must be repeated three times)
• a minimum of 15 credits of course work chosen as part of a contract
• up to 24 credits of electives (approved by committee)
• 24 credits of dissertation research

A three-member predoctoral faculty committee will be formed by the student as soon as possible after admission but not later than after completion of the 9-credit core. The composition of the student’s committee must be approved by the program director. At this point, the student is expected to have selected a rather broad area of future research interest; typically, the area may not yet be specific enough to define an actual dissertation project.

Because students entering the program will have diverse backgrounds and goals and the program is explicitly designed to accommodate students preparing for a range of fields of research, it is not possible to have a completely standardized set of degree requirements. Instead, the student and his or her committee will decide on a set of at least five courses (15 credits) that will best meet the student’s goals and future research direction. This portion of the program will be set up in the form of a contract between the student and the committee. The contract will include courses that the student should take and books and articles that should be read. Fifteen of the contract credits must be chosen from the following list; however, no more than three classes can be taken in any one area, unless the student obtains special permission from the program director. Furthermore, no more than two classes at the 500 level can be selected.
• Astronomy courses: ASTR 530, 701, 766, 767
• Biochemistry and biophysics courses: CHEM 646, 660, 661, 662, 665
Students can choose their elective classes more widely, but these courses need to be approved by the faculty committee in order to be applied toward satisfaction of the degree requirements. As an example, a student planning to pursue interdisciplinary research in the general area of bioinorganic chemistry would form a committee headed by a bioinorganic scientist and would have a contract that probably required taking at least these five courses:

• CHEM 646 Bioinorganic Chemistry
• CHEM 660 Protein Biochemistry
• CHEM 662 Drug Design
• CHEM 633 Chemical Thermodynamic and Kinetics
• CHEM 617 Organic Structural Spectroscopy

The contract is an interactive document agreed to between the student and the committee. It can be revised, but any revisions must be approved by the program director. For purposes of the written preliminary exam, the scope of the contract will be narrowed to cover particular courses, books, and such as the committee sees fit. The final contract must be signed by the student and by all committee members.

Climate Dynamics

Phone: 301-595-7000
Web: climate.gmu.edu

Faculty

Professors: Schneider, Schopf, Shukla (chair), Strauss
Associate professors: DelSole, Houser, Huang, Kinter, Klinger
Contract professor: Krishnamurthy
Research assistant professor: Jin
Guest lecturers: Dirmeyer, Koster, Sud

Course Work

The department offers all course work designated CLIM in the Course Descriptions chapter of this catalog.

GRADUATE PROGRAMS

Climate Dynamics, PhD

The mission of this program is to train the next generation of world leaders in the science of climate dynamics. While there is no unambiguous definition of “climate,” climate dynamics is generally considered to encompass processes that determine the behavior of the atmosphere, land, and oceans averaged over time scales of weeks to centuries and millennia. Understanding climate variability and predictability poses difficult mathematical, computational, and observational questions that have generated increasing intellectual excitement in recent years.

Climate variability has important ramifications for society, from planning for next year’s electrical demand and forecasting agricultural production to answering complex questions involving long-term global change. While it is thought to be theoretically impossible to predict day-to-day weather more than a few weeks in advance, recent progress in predicting El Niño supports the idea that seasonal averages of temperature, rainfall, and other factors may be at least partly predictable months or even years in advance.

Climate dynamics faculty members are varied and have a blend of expertise in dynamics, statistics, and computational methods. Yet, they cover the traditional areas of atmospheric dynamics, physical and dynamical oceanography, land surface physics, and hydrology. The faculty and students involved in the program work closely with scientists at the Center for Ocean-Land-Atmosphere Studies (COLA) and the Center for Research on Environment and Water (CREW).

Faculty research focuses on the areas of climate prediction and predictability, climate variability, coupled ocean-atmosphere-land dynamics, and dynamical systems and retrospective analysis. Recent research topics include predictability of weather and climate; modeling of the complex climate system; El Niño dynamics; deforestation, desertification, and monsoons; atmosphere-ocean interaction; land-climate interaction; decadal climate variability; ocean circulation theory; abrupt climate change; and water and energy cycle dynamics.

External research collaborations exist with federal agencies, private corporations, and other universities, exemplifying COS’ and the university’s commitment to the development of effective regional and national collaborations. The faculty is heavily involved with national and international climate science efforts, providing students with the opportunity for participation in research.

Admission Requirements

Applicants should have demonstrated high aptitude for quantitative reasoning, applied mathematics, and physical science. Applicants should have an undergraduate degree from an accredited institution, with a GPA of at least 3.00 in undergraduate work and a combined GRE score of 1,100 (verbal plus quantitative). To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Fairfax Campus Graduate Admissions Processing Center. Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE-GEN. The GRE-SUB is recommended if it is given in the student’s undergraduate major. The GRE requirement for admission to the doctoral programs will be waived if the student holds a master’s degree from a U.S. institution. TOEFL scores are required of all international applicants.

Degree Requirements

The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work, and 24 credits of dissertation research. For those holding master’s degrees, the required 48 credits may be reduced by up to 30 credits, depending on graduate courses completed. The degree will be awarded on completion of the required course work and approval of a PhD thesis that makes an original and significant contribution to the field.

The 48-credit curriculum requirement is divided into four areas: 12 credits of fundamental climate science courses, 9 credits of core computational methods, 3 credits of seminar, and a minimum of 24 credits of electives. The course work is organized as follows:
• Fundamental climate science courses: CLIM 710, 711, 712, 714
• Core computational courses: CSI 700 and 701, and CLIM 715
• Climate seminar: 3 credits of CLIM 991
• 24 credits of electives, including up to 5 credits of independent research

After completing the fundamental climate science courses, students take a two-part qualifying exam that includes core and specialty components. The core component is administered by an examination committee. After successfully completing the core component, students take the specialty component, which is administered by the dissertation committee that students typically form by the spring semester of their second year. Following successful completion of both parts of the qualifying exam, students present a written dissertation proposal to the committee. Students may enroll in CLIM 998 Doctoral Dissertation Proposal to complete this effort. After approval of the dissertation proposal, students are formally advanced to doctoral candidacy and produce the dissertation while taking CLIM 999. The degree will be awarded on completion of the required course work and approval of a PhD thesis that makes an original and significant contribution to the field.

Computational and Data Sciences
Phone: 703-993-3807
Web: cds.gmu.edu

Faculty
Associate professors: Axtell*, Borne, Cebral, Wallin, C. Yang, R. Yang*, S. Yang*, Zoltek
Assistant professors: Camelli, Griva, Klimov*, Opher*, Sheng, Tollaksen, Weigel, Zhang
Research professors: Dere, Gomez, Poland, Titarchuk
Senior contract professor: Beall
Adjuncts: Guharay, Lanzagorta, Veytsman
*Faculty holding primary appointments in other departments.

Course Work
The department offers all course work designated CDS, CSI, CSS, and NANO in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Computational and Data Sciences, BS

The BS degree in computational and data sciences represents a new direction for integrated science at Mason based on the combination of applied mathematics, real-world computer science skills, data acquisition and analysis, and scientific modeling. Graduates of the BS program in computational and data sciences will possess the mathematical, scientific, and computational skills necessary to participate effectively as members of the interdisciplinary scientific simulation and analysis groups that are becoming more and more common in the public and the private sectors, particularly in Northern Virginia. Graduates will also be qualified to pursue graduate education in the sciences. Any student who meets the university’s general eligibility requirements may apply to the BS degree in Computational and Data Sciences Program.

In addition to satisfying the university-wide general education requirements for the BS degree, students must complete a total of 18 credits in computational and data sciences core courses, 15 credits in computer science, 23 credits in mathematics, 6 credits in statistics, 21 to 25 credits in a science concentration, and 3 to 9 credits in computational and data sciences electives with a minimum GPA of 2.00. (Through the course work below, computational and data sciences majors satisfy the university-wide requirements in natural science and quantitative reasoning.)

- Six required core computational and data sciences courses (18 credits): CDS 101, 301, 302, 401, 410, and 411
- Six required computer science courses (15 credits): CS 105, 112, 211, 261, 367, and 483
- Seven required mathematics courses (23 credits): MATH 113, 114, 125, 203, 213, 214, and 446
- Two required statistics courses (6 credits): STAT 344 and 354
- Science concentration (21–25 credits)
- Computational and data sciences electives (3–9 credits)

In meeting the above requirements, students choose a concentration in physics, chemistry, or biology. The courses required for each concentration are listed below. Students should plan a program of study in consultation with their advisor as appropriate for their selected concentration.

Concentration in Biology (BIOL)
This concentration is appropriate for students who wish to pursue a career or graduate education that applies computational techniques to the simulation of biological processes and systems. To complete this emphasis, students should take the following courses: CHEM 211, 212, 313, 315, and BIOL 213, 305, 306, and 311.

Concentration in Chemistry (CHEM)
This concentration is designed for students who wish to pursue a career or graduate education that applies computers to the simulation of chemical processes and systems. To complete this concentration, students should take the following courses: PHYS 243, 244, 245, 246, and CHEM 211, 212 plus either CHEM 313/315 or CHEM 331/336.

Concentration in Physics (PHYS)
This concentration is designed for students who wish to pursue a career or graduate education that applies computational techniques to the simulation of physical problems. To complete this concentration, students should take the following courses: PHYS 160, 161, 260, 261, 262, 263, and three of PHYS 303, 305, 306, 307, 308, 328.

Minor in Computational and Data Sciences
The minor in computational and data sciences (CDS) provides an attractive option for students majoring in mathematics, science, or engineering who wish to augment their major degree program with additional courses in scientific computing. The combination of computer science, numerical methods, science, and synthesis courses in computational and data sciences will significantly enhance the practical knowledge...
and computational skills of the students when compared with the major field alone. By absorbing the material in this cur-riculum, students will acquire the knowledge, skills, and techniques commonly used across scientific disciplines, which will allow them to apply their Mason education in a practical way in industrial, government, and academic settings.

At least 8 credits must be applied only to this minor and may not be used to fulfill requirements of the student’s major, concentration, or another minor or undergraduate certificate. Students must complete at least 6 credits in their minor at Mason and achieve a minimum 2.00 GPA in courses applied to the minor. Students interested in a minor should consult the appropriate chapters in this catalog.

The minor in computational and data sciences consists of 18 credits of course work as follows:

3 credits—CS 211 Object-Oriented Programming
3 credits—Math 446 Numerical Methods
9 credits—from any CDS or CSI courses
3 credits—from classes in physics, chemistry, biology, bioinformatics, environmental science and policy, geography, geology, astronomy, or statistics at the 300 level or above. Other discipline-based courses may be permitted with permission of the undergraduate program director.

Many of the courses listed above have additional prerequisites. Nonetheless, the CDS minor is within efficient reach of most students majoring in science, mathematics, engineering, or computer science, since these students will generally have the prerequisites for the classes listed above.

GRADUATE PROGRAMS

Computational Science, MS  MS-COMP

The interdisciplinary master’s program in computational science addresses the growing national and regional demand for trained computational scientists. It combines a solid foundation in information technology skills with computational courses in a variety of scientific areas. All courses are offered in the late afternoon or early evening to accommodate students with full-time employment outside the university.

The degree is centered on a strong computational component, which comprises 22 credits of course work. The remaining 9 credits represent the scientific component, which centers on specific areas such as mathematics, physics, chemistry, biology, and statistics. This provides students with a flexible set of options that can be used to create their own customized curriculum under the guidance of a faculty advisor. Students are encouraged to undertake an optional master’s thesis or research project that allows them to gain useful experience in the development of simulations and other aspects of computational science.

Admission Requirements

Applicants should have academic backgrounds in physical or biological sciences, engineering, mathematics, or computer science. They should have an undergraduate degree from an accredited institution, with a GPA of at least 3.00 in their last 60 credits of study. In addition, applicants should have taken at least one course in differential equations and have facility in using a high-level computer programming language. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Fairfax Campus Graduate Admissions Processing Center. Applicants should also include three letters of recommendation and an official report of scores on the GRE-GEN. The GRE-SUB is recommended if it is given in the student’s undergraduate major. The GRE requirement will be waived if the student holds a master’s degree from a U.S. institution. TOEFL scores are required of all international applicants.

Degree Requirements

Candidates must successfully complete 31 credits as follows:

• 9 credits of computational core courses: CSI 700, plus two of CSI 701, 702, 703, 710
• 12 credits of computational techniques courses from the CSI PhD emphasis courses
• 9 credits of computational science electives as approved by advisor
• 1 credit of seminar or colloquium

Optional research component: 3 credits of CSI 798 or 6 credits of CSI 799; exercising the research option results in a corresponding reduction in the computational science electives requirement.

Computational Sciences and Informatics, PhD

The Computational Sciences and Informatics (CSI) doctoral program addresses the role of computation in science, mathematics, and engineering, and is designed around a core of advanced computer technology courses. Computational sciences is defined as the systematic development and application of computing systems and computational solution techniques to models of scientific and engineering phenomena. Informatics is defined as the systematic development and application of computing systems and computational solution techniques for analyzing data obtained through experiments, modeling, database searches, and instrumentation. Computing is now part of a triad, along with theory and experimentation, which provides a new integrated means of investigation. The resulting interdisciplinary approach often leads to understanding that, in many cases, traditional theory or experimentation alone cannot provide. The close relationship of the CSI doctoral program to the research and development activities in federal laboratories, scientific institutions, and high-technology firms affords students opportunities for continuing or new employment. Scheduled courses and sequences accommodate part-time students, with most courses meeting once a week in the late afternoon or early evening.

Overview of the CSI Program

Founded in 1992, the innovative Computational Sciences and Informatics (CSI) doctoral program at George Mason University addresses the role of computation in science, mathematics, and engineering. Computational sciences is defined as the development and application of computational methodologies and techniques to the modeling, simulation, and understanding of phenomena in the natural sciences and engineering. Informatics is defined as the design and implementation of complex software systems for the extraction of knowledge from large databases. The research and teaching activities associated with the CSI program reflect the recognized role of computation as part of a triad with theory and experimentation, leading to a better understanding of nature.
Areas of Emphasis within the PhD Program
Research opportunities leading to the doctoral degree are available in each of the following areas of emphasis:
- Computational Fluid Dynamics
- Computational Learning
- Computational Materials and Chemical Sciences
- Computational Mathematics
- Computational Physics
- Computational Statistics
- Quantum Information Science

Space Sciences and Computational Astrophysics
Students may also pursue interdisciplinary research that combines the areas of emphasis listed above with each other and also with computational neuroscience, climate dynamics, bioinformatics, and remote sensing, which are now separate PhD programs.

The department’s research activities reflect the recognized role of computation as part of a triad with theory and experiment to generate new knowledge and a better understanding of nature. CDS maintains several weekly colloquia and seminar series to ensure that students are exposed to the latest developments at area research institutions. Doctoral students are encouraged to participate in national and international meetings where they can present their latest findings.

Program of Study
The list of research areas tells only part of the story because the greatest strength of the CSI doctoral program lies in its ability to foster and promote truly interdisciplinary research that crosses traditional domain boundaries. In the CSI doctoral program, each student is presented with an exciting opportunity to create a new area of interdisciplinary inquiry that would not fit into a traditional PhD program. Students in the CSI doctoral program use computationally intensive methods to solve current problems in these scientific areas.

The 72-credit doctoral program combines three intellectual elements:
- Core computational science topics
- Computational intensive courses in specific scientific areas
- Research leading to the dissertation

The doctoral program, designed to be completed in 4 to 5 years, includes:
- 12 credits of core computational courses (scientific computing, databases, visualization)
- 15 credits from courses in one of the science areas
- 18 credits in electives from science courses, with at least 9 credits of CSI courses
- 3 credits in colloquium/seminar
- 24 credits in dissertation research

PhD Admission Requirements
Students interested in applying for admission into the CSI PhD program should have a bachelor’s degree in any natural science, mathematics, engineering, or computer science with a minimum GPA of 3.00 in their last 60 credits of study. All applicants to the PhD program should have a mathematics background up to and including differential equations. All applicants to the PhD program should also have knowledge of a computer programming language such as C, C++, FORTRAN, etc.

The GRE is required, unless the applicant holds a master’s degree from a school in the United States. A TOEFL score of 575 (paper-based exam) or 230 (computer-based exam) is required for international students. The ETS code for GMU is 5827.

Students should submit a completed graduate application along with three letters of recommendation, an expanded goals statement, and a $50 check to cover the application fee (payable to George Mason University) in addition to the items listed above.

Applications should be received by March 1 for fall semester and November 1 for spring semester. Applications requesting financial support must be received by February 1 for the fall semester. Please note that applications from local applicants may be accepted after these general deadlines.

Please send completed applications to the address below:
COS Graduate Applications Processing Center
George Mason University
4400 University Drive, MS 6A3
Fairfax, VA 22030

For additional information, phone 703-993-1988; fax 703-993-9300, or e-mail: blasten@gmu.edu.

Degree Requirements
General core course requirements—12 credits from the following:
- CSI 700 Numerical Methods
- CSI 701 Foundations of Computational Science
- CSI 702 High Performance Computing
- CSI 703 Scientific and Statistical Visualization
- CSI 710 Scientific Databases

Emphasis core requirements—15 credits in one of the following areas:
- Computational Fluid Dynamics
- CSI 720 Fluid Dynamics
- CSI 721 Computational Fluid Dynamics I
- CSI 722 Computational Fluid Dynamics II
- CSI 742 The Mathematics of the Finite Elements Method


Computational Learning
- CSI 771 Computational Statistics
- CSI 772 Statistical Learning
- CSI 773 Statistical Graphics and Data Exploration
- CSI 777 Principles of Knowledge Mining
- CSI 873 Computational Learning and Discovery

Computational Materials and Chemical Sciences
- CSI 685 Fundamental of Materials Science or CSI 687 Solid State Physics and Applications
- CSI 780 Computational Physics and Applications
- CSI 783 Computational Quantum Mechanics
- CSI 787 Computational Materials Science

One from CSI 786 Molecular Dynamics Modeling, CSI 789 Mechanics of Solids, CSI 885 Atomistic Modeling of Materials

Computational Mathematics
- CSI 742 The Mathematics of the Finite Elements Method
- CSI 747 Nonlinear Optimization and Applications
Computational Social Science, PhD

The core objective of the computational social science (CSS) PhD program is to train graduate students to be professional computational social scientists in academia, government, or business. The program offers a unique and innovative interdisciplinary academic environment for systematically exploring, discovering, and developing skills to successfully follow careers in one of the areas of computational social science.

Admission Requirements

Applicants should have as background a bachelor’s degree in one of the social sciences; computer science, engineering, or a relevant discipline; and undergraduate courses in these and related areas. Bachelor’s degrees in the physical or biological sciences are also eligible, but applicants may be advised to take additional courses in social science or computer science as prerequisites to admission. Minimal requirements also include one undergraduate course in calculus and knowledge of a computer programming language, preferably object-based. Applicants should have an undergraduate degree from an accredited institution, with a GPA of at least 3.25. To apply, prospective students should send to the COS Fairfax Campus Graduate Admissions Processing Center a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, an expanded goals statement not to exceed 2,000 words, and the names of two Mason faculty members who may be suitable advisors. Applicants should also include three letters of recommendation from faculty members or individuals with direct knowledge of the student’s academic or professional capabilities. The letters must arrive directly from the senders. Applicants should also submit an official report of scores obtained on the GRE-GEN. TOEFL scores are required for all international applicants.

Degree Requirements

The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work, and 24 credits of dissertation research. For those holding a master’s degree, the 72 required credits may be reduced by up to 30 credits, depending on graduate courses. A minimum of 24 credits of prior graduate course work may be transferred, provided such credits have not been used for another degree. The 48 credits of courses have the functional distribution and learning objectives indicated below.

- 12 credits of required core CSS courses:
  - CSS 600 Introduction to Computational Social Science
  - CSS 605 Object-Oriented Modeling for Social Science
  - CSS 610 Computational Analysis of Social Complexity
  - CSS 620 Origins of Social Complexity
- 6 credits of extended core CSS courses taken from the following:
  - CSS 625 Complexity Theory in the Social Sciences
  - CSS 645 Spatial Agent-Based Models
  - CSS 692 Social Network Analysis
- 15 credits of discipline-based social science courses in a specific area such as anthropology, economics, geography, history, linguistics, political science, or sociology, as approved by the student’s advisor, to provide domain-specific knowledge
- 15 credits of elective courses or independent research, as approved by the student’s advisor, to provide further
substantive or methodological specialization as needed (Students with a strong background in computing, for example, a prior MS in computer science, but weaker social science training will be required to use all or most of these electives in a substantive social science. Conversely, students with a strong background in social science, for example, a BS in economics, will be required to use most or all of these electives in computing courses.)

- 24 credits of dissertation research to demonstrate doctoral-level originality and research excellence

Areas for dissertation research include, but are not limited to, the following:

- Agent-based computational economics: trade, finance, decision making under risk
- Computational political economy: voting, institutions, norms, inequality
- Computational linguistics: generative grammars, parsing, classifiers, inference
- Social network analysis: connectivity, structure, evolution of the Internet, cyberwarfare
- Computational anthropology: emergence of hierarchy, settlement patterns
- Computational political science: systems of government, conflict and war, cooperation
- Computational sociology: segregation, collective action, leadership, trust
- Complexity theory: power laws, potential theory, criticality, bifurcation
- Computational methodology: multiagent systems, evolutionary computation

During the first year, each student will form a graduate studies committee, called the first-year committee, consisting of the student’s advisor plus two or three appropriately qualified individuals. The committee assists the student in designing a specific plan of study and evaluating the student’s progress by the end of the first year. During the second year, the student forms a doctoral committee, with membership approved by the CSS Program director. The committee will advise the student on preparing for the doctoral candidacy exams and preparing, developing, and defending the doctoral dissertation.

The candidacy exam is taken after students have completed all core requirements and a majority of additional course work (18 plus 15 credits), which typically corresponds to the fifth semester in the program. The purpose of the candidacy exam is to assess the student’s substantive and methodological knowledge in CSS as a whole and in the chosen focus area; the ability to integrate materials from different courses; and the potential for a successful dissertation.

The exam will consist of written and oral parts. Upon passing the candidacy exam and submitting an acceptable dissertation proposal, students are advanced to doctoral candidacy. The degree is awarded on the successful defense of a PhD dissertation that represents a detailed written report of an original and significant research contribution to the CSS field.

Physical Sciences, PhD

The department participates in the PhD in physical sciences administered by the Department of Chemistry and Biochemistry, and the Department of Physics and Astronomy. Please see those departmental listings for program requirements.

Graduate Certificate in Computational Social Science

This 15-credit program is designed for students who seek training in computer simulation and related computational methods for analyzing social systems and processes. The program is open to all students with graduate standing at Mason and all students who hold a bachelor’s degree from an accredited university. The CSS certificate allows students with social science or computational backgrounds to acquire new knowledge and modeling skills to improve their qualifications and attractiveness to employers in government, academia, or industry. The core courses provide a common foundation; additional elective courses allow for a variety of student interests across diverse social domains.

Admission Requirements

Applicants should have an undergraduate degree from an accredited institution, with a GPA of at least 3.00. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé to the COS Fairfax Campus Graduate Admissions Processing Center. TOEFL scores are required of all international applicants.

Program Requirements

Students in the CSS certificate program must take both CSS 600 Introduction to Computational Social Science and CSS 610 Computational Analysis of Social Complexity. Students are also required to take a minimum of 9 credits in elective courses (for example, CSS 605, 620, 692). Students may include a maximum of 3 credits of programming courses to meet requirements. Programming courses such as procedural, object-oriented languages, or other approved programming approaches, such as CSI 603 or 604 Introduction to Scientific Programming I and II, may be used with the director’s approval. Some courses on computational techniques, modeling, statistics, visualization, graphics, and database packages (such as CSI 606 and 607) may also be used to meet the requirements with prior approval of the director. Students intending to obtain the certificate in CSS must contact the director no later than two semesters prior to completing the required credits.

Graduate Certificate in Computational Techniques and Applications

This certificate program focuses on mastering a variety of basic computational skills. The certificate is independent of the doctoral and master’s programs and is designed primarily for professionals in technical fields who seek to upgrade their computer expertise. This program is also available as an option for prospective or currently enrolled doctoral or master’s degree students.

Admission Requirements

Applicants should have an academic background in physical or biological sciences, engineering, mathematics, or computer science. They should have an undergraduate degree from an accredited institution, with a GPA of at least 3.00 in their last 60 credits of study. In addition, applicants should have taken at least one course in differential equations and have facility in using a high-level computer programming...
language. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé to the COS Fairfax Campus Graduate Admissions Processing Center. TOEFL scores are required of all international applicants.

Program Requirements
The program comprises 15 credits of course work designed to provide an accelerated introduction to concepts in modern computation. Topics include operating systems, environments, languages, graphics, databases, and applications. The required courses may be selected as follows: 6 credits from CSI 601–607, 6 credits from CSI 600, 610, 700, and one CSI elective. Special course schedules may be designed depending upon the background and qualifications of the student. Waived credits are to be replaced with applications courses approved by the director of the certificate program.

■ Graduate Certificate in CERG-NANO Nanotechnology and Nanoscience

This graduate certificate program focuses on mastering a variety of technical skills in the rapidly developing area of nanotechnology. The field highlights the effect of size on the physical and engineering properties of materials and the design of various devices and systems. The certificate enables students to acquire knowledge covering a broad range of instrumentation, modeling, analysis, and production methods that facilitate the solution of practical nanotechnology-related problems in the workplace.

Admission Requirements
Applicants should hold a BS degree in any branch of engineering, physics, chemistry, or materials science, with a minimum GPA of 3.00. Exceptions are reviewed on an individual basis. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé to the COS Fairfax Campus Graduate Admissions Processing Center. TOEFL scores are required for all international applicants.

Program Requirements
The certificate program comprises 15 credits of course work designed to provide an accelerated introduction to concepts in nanotechnology and nanoscience. Topics include nanomaterials, nanocharacterization, nanostructures, nanofabrication, nanoelectronics, and modeling for nanoscience. The prefix of the associated courses is NANO. Requirements are 9 credits of core courses (NANO 500, 510, 520) and 6 credits of electives (NANO 530, 610, 620).

The certificate program is a professional certification program that charges students at a differential (premium) tuition rate, with an additional $100 per credit added to the standard Mason graduate tuition rate for students who enroll in this certificate program, regardless of in-state or out-of-state status. The differential tuition is used to fund continuing improvements in the COS educational facilities used to support the certificate program.

Environmental Science and Policy
Phone: 703-993-1043
Web: esp.gmu.edu

Faculty
Professors: Diecchio, Hazen (Robinson Professor), Jones (chair), Lawrey
Term professor: Talbot
Associate professors: Birchard, Gillevet, Harlan, Jonas, Macfarlane, McBride, Rockwood, Torzilli
Assistant professors: Ahn, Balint, Crate, Darnall, Edwards, Forkner, Kraus, Krekeler, Kysar-Mattietti, Manca, Weeks
Term associate professors: Cressey, Parsons, Verardo
Term assistant professors: Cooper, Largen
Research associate professor: Litchfield
Emeritus professors: Bradley, Ernst, Kelso, Shaffer, Skog

Other Environmental Faculty
Professors: Black, Chandhoke, Conlan, Foster, Gifford, Haack, Houck, Mosc, Mushrush, Nadeau, Regan, Rowan, Sage, Schum, Wan, Willett, Wong
Associate professors: Beach, Christensen, Conant, deMonsabert, Fryxell, Guagnano, Honeychuck, Kozlowski, Mahler, Meyer, Paden, Palkovich, Rodgers, Royt, Seto, Stough, Wood
Assistant professor: Parker
Affiliate faculty: Bailey, Bartoldus, Baxter, Boggs, Bonnelly, Briggs, Buchino, Cooper, Fox, Hamdan, Hazen, Jordan, Kriechevsky, Leathery, Lebovitz, Leimgruber, Maladono, Marra, Maurakis, Magonigal, Mineau, Nead, Noe, Oren, Peters, Ragen, Rybicki, Seidensticker, Sillet, Sladen, Smith, Sonsasen, Strong, Wang, Wilder

Course Work
This department offers all course work designated EVPP and GEOL, and certain BIOL courses, listed in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

■ Biology, BS BA-BIOL

The undergraduate program in biology is offered by the Department of Environmental Science and Policy (ESP) and the Department of Molecular and Microbiology (MMB). The concentration in environmental and conservation biology is sponsored by ESP.

▲ Concentration in Environmental and Conservation Biology (ESCB)

This concentration is offered to students seeking a biology degree that focuses on ecology and organismal biology and prepares them for graduate work or employment in environmental and conservation fields, such as natural resources management, fisheries, forestry, water quality management, aquatic and wetland ecology, and conservation biology. The concentration is staffed and supported by the ESP Department.

In addition to satisfying university-wide general education requirements for the BS degree, students must complete the
following with a minimum GPA of 2.50. (Through the course work below, they satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- 24 credits in biology, including BIOL 213, 303, 304, 305, 306, 307, 311
- 20 credits in environmental and conservation biology, including BIOL/EVPP 377, 471; EVPP 318; a field course (either EVPP 350 or BIOL 345); and other courses chosen from the following: BIOL 309, 326, 331, 332, 333, 342, 344, 345*, 440, 472, 449; EVPP 350*, 415, 451; NCLC 401

* If not used for field course requirement.

- 13 credits of chemistry, including CHEM 211, 212, 313, 315
- One of the following options: CHEM 314 and 318 (5 credits)
  One chemistry course at the 300 or 400 level (3 credits)
  GEO 101 and 102 (8 credits)
- 8 credits of physics: PHYS 243, 244, 245, 246
- At least 6 credits from the following: MATH 110, 111, 113, 114, STAT 250
- 3 credits of computer skills: IT 103

Geology, BA

In addition to the university-wide general education requirements and requirements for a BA degree in COS, candidates for a degree in geology must complete the following with a minimum GPA of 2.50. (Through the course work below, geology majors satisfy the university-wide requirements in natural science and quantitative reasoning.)

- 38 credits in geology, including GEO 101,102, 302, 304*, 308*, 312, 317, 401, and 404**
- MATH 110, 111, or 113
- CHEM 211, 212
- GEO 316 or a computer science course (CS 112 or IT 103), which may fulfill the university information technology requirement
- 9 credits of degree-related course work in a coherent program designed in coordination with advisor and approved by department chair
- Students must achieve a grade of 2.00 or better in GEO 302 before taking GEO 304 or 308.

** No longer offered regularly; 6-credit geology field camp is required as substitute (see your advisor for details).

Teacher Licensure

Students who wish to become teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Global and Environmental Change, BS

This interdisciplinary undergraduate program, one of the first of its kind in the nation, distinguishes itself from other degrees in the natural sciences in that it examines from local, regional, and global scales the dynamics of Earth’s systems and their interactions: the geosphere, the atmosphere, the ecosphere, and the sociosphere. In addition, it emphasizes the dynamic and changing Earth systems and the use of Earth observing and remote sensing and related geoinformation technologies in detecting changes. It is jointly offered with the Department of Earth Systems and Geoinformation Sciences (esgs.gmu.edu).

Through the course work listed below, global and environmental change majors satisfy university-wide general education requirements in natural science, quantitative reasoning, information technology, global understanding, social science, and synthesis:

Six required core courses in global and environmental change (22 credits): EOS 121-122 or EVPP 110-111; plus EOS 353; EOS 305 or GEOL 305; GEOG 300 or BIOL 312; and EOS 304

Four required courses in geosphere and atmosphere (13 credits): GEOL 101(4) or PHYS 243-244(4); plus 3 courses from EOS 310, 312, 320; GEOG 309, 399; GEOL 317, 306, 309, 303; EVPP 490

Four required courses in ecosphere and sociosphere (12 credits): GLOA 101 or GEOG 101 or CEIE 100; and GEOG 103 or ANTH 135; and BIOL 371 or EVPP 377; and 1 from BIOL 318, BIOL 345, EOS 322, EOS 306, EVPP 336, EVPP 337, EVPP 350, EVPP 449 or GEOG 303

Two required courses in applications and techniques of detecting global change (6 credits): choose two from EOS 303, 354, 410, 455, 495, GEOG 412, 416, 463, GEOL 303

Two required supporting sciences sequence courses beyond general education requirements (8 credits): CHEM 211, 212 (8); or PHYS 243-244 (3–1), 245–246 (3–1); or ASTR 111–112 (4), 112–114 (4); or GEOL 101–102 (8); or BIOL 103–104 (8)

Four required supporting mathematics and IT courses (14 credits): MATH 113 and 114 (8), STAT 250/IT 250 (3), IT 103 (3)

General electives (27–31 credits)

In meeting the above requirements, students may choose a focus in environmental or global change.

Earth Science, BS

This degree is intended for students interested in studying the earth and its environment. Recognizing that these are integrated disciplines, students receive a broad background in Earth and environmental sciences and select a specialty concentration.

In addition to university-wide general education requirements, students must complete the following course work with a minimum GPA of 2.00. Through the course work below, earth science majors satisfy the university and college requirements in natural science and quantitative reasoning.

- 40 credits in core science and mathematics, including: CHEM 211, 212 GEOG 309 GEOL 101, 309 (BIOL 309), 406 or 420 MATH 113, 114 PHYS 160, 260, 261 or 243, 244, 245, 246 STAT 250
• 34–35 credits in one of the following concentrations:

▲ Earth Surface Processes (EP)
GEOL 102 or EVPP 110; GEOL 302, 303, 306, 316 or CS 112**, GEOL 317; and four of the following: GEOL 304*, 305, 313, 315, 363, 403, 417; GEOG 311, 412, 416

▲ Environmental Science (EVSC)
BIOL 307; EVPP 110, 111, 336, 377; GEOL 303, 305, 306; and two of the following: BIOL 345, 349, EVPP 350, 363

▲ Geology (GEOL)
GEOL 102, 302, 304*, 308*, 312, 317, 401, 404***

Earth science education (ESE): ASTR 111 or 112; EDCI 573; EDUC 522; GEOL 102, 302, 303, 408, 409; and three of the following: EVPP 110; GEOL 304, 308, 312, 317, 363, 401. Optional teacher licensure component: EDCI 673, 790; EDUC 672; EDRD 619

* Requires C or better in GEOL 302
** Satisfies general education information technology requirement
*** No longer offered regularly; 6-credit geology field camp is required as substitute (see advisor for details).

Writing-Intensive Requirement
Mason requires all students to complete at least one course designated as "writing intensive" in their majors at the 300 level or above. Students majoring in geology or earth science fulfill this requirement by successfully completing GEOL 317. Students in the environmental science concentration satisfy this requirement by taking BIOL 307.

Honors Program for Earth Science and Geology
Earth science and geology majors who have completed 16 credits of math and science, including GEOL 302 or BIOL 307, with a GPA of 3.00 or higher are eligible to enter the departmental honors program. Transfer students who have an incoming GPA of 3.10 or higher in math and science and a B or better in GEOL 302 or BIOL 307 are also eligible. To graduate with honors in Earth science or geology, students are required to maintain a minimum GPA of 3.00 in math and science and complete the following courses with an average GPA of 3.50 or better: GEOL 406, 410, and 411.

Minor in Conservation Biology
This minor is intended for nonbiology majors* with an interest in wildlife and habitat conservation issues. The minor may particularly suit global environmental change and Earth science majors, as well as New Century College students wishing to increase their understanding and qualifications in the field of conservation biology. The minor may also be of interest to nonscience majors, for example, students taking leisure studies classes with an interest in ecotourism.

Requirements
Candidates for the minor in conservation biology must complete at least 21 credits with a minimum GPA of 2.00, including

Core Biology Courses (15 credits)
BIOL 303 Animal Biology (4 credits)**
BIOL 304 Plant Biology (4 credits)**
EVPP 307/BIOL 307 Ecology (4 credits)

EVPP 318/BIOL 318 Conservation Biology (3 credits) or NCLC 401 Conservation Biology (3 credits only) and at least 6 credits of electives from the following courses:

Electives
EVPP 336 Human Dimensions of the Environment (3)
EVPP 361 Introduction to Environmental Policy (3)
EVPP 377 Applied Ecology (3)
EVPP 419 Marine Mammal Biology and Conservation (3)
EVPP 421 Marine Conservation (3) (requires BIOL 309/GEOL 309 Oceanography as a prerequisite)
EVPP 490 Conserving Endangered Species Topic (4)
NCLC 319 An Endangered Earth (3)
NCLC 520 Conservation Education (3)
NCLC 522 Developing an Institutional In Situ Conservation Strategy (3)
TOUR 312 Ecotourism (3)

Other conservation-oriented classes may also be applicable as an elective for this minor if agreed on with the faculty coordinator for the minor. Eight credits of courses must be unique to the minor and not count toward the student’s major.

*This minor cannot be taken by biology majors.
**These courses may have prerequisites that need to be met. See advisor for details.

Minor in Earth Science
To receive this minor, students must successfully complete 18 credits with a minimum GPA of 2.00 to include GEOL 101 and 309, GEOG 309, and 8 credits of geology electives. Eight credits of course work must be unique to the minor. Students may not receive both the minor in geology and the minor in earth science. For policies governing all minors, see the Academic Policies chapter of this catalog.

Minor in Environmental Policy
To receive this minor, students must successfully complete 21 credits with a minimum 2.00 GPA, including the following core courses (12 credits):

EVPP 336 (3) Human Dimensions of the Environment
EVPP 361 (3) Introduction to Environmental Policy
EVPP/BIOL 377 (3) Applied Ecology
PHIL 343 (3) Introduction to Environmental Ethics

Plus 9 credits from the following list (or other appropriate courses approved by the coordinator of the minor):

ANTH 370 (3) Ecology and Culture
ANTH 399 (3) Global Perspectives on Culture and Consumption
BIOL/EVPP 318 (4) Conservation Biology
BIOL 543 (4) Tropical Ecosystems
CEIE 456 (3) Environmental Law
EOS 306 (3) Sustainable Development
EOS 322 (3) Regional and Global Issues in the Earth and Environmental Sciences
EOS 355 (3) Environmental Impact Assessment
EVPP 337 (3) Environmental Policy Making in Developing Countries
EVPP 490 (3) Any policy-related course (for example, Conserving Endangered Species, Energy and the Environment, Ecological Economics, Environmental Sci-
ence of Puerto Rico, Marine Conservation, Marine Mammal Biology and Conservation) EVPP 505 (3) Any policy-related course GEOG 303 (3) Conservation of the Environment GEOG 399 (3) Special Topics: Climate Change and Global Warming GEOL 420 (3) Earth Science and Policy PRLS 300 (3) People with Nature PRLS 402 (3) Human Behavior in Natural Environments PRLS 526 (3) Environmental Education and Resource Interpretation SOCI 320 (3) Human Dimensions of Global Change SOCI 322 (3) Sociology of Urban Communities TOUR 312 (3) Ecotourism TOUR 340 (3) Sustainable Tourism TOUR 362 (3) Cultural and Environmental Interpretation TOUR 540 (3) Sustainable Tourism Management At least 8 credits of courses taken for the minor must be exclusive to the minor and not count toward the student’s major.

**Minor in Geology**
To receive the minor, students must successfully complete 20 credits with a minimum GPA of 2.00 to include GEOL 101, 102, and 302, and two of the following courses: GEOL 304*, 308*, 312, 317, or 401. Eight credits of course work must be unique to the minor.

*Students must achieve a grade of 2.00 or better in GEOL 302 before taking GEOL 304 or 308.

**Minor in Ocean and Estuarine Science**
To receive the minor, students must successfully complete 20 to 21 credits with a minimum GPA of 2.00 to include GEOL 101, BIOL 103 or BIOL 213 or EVPP 110, and BIOL/GEOL 309; plus GEOL/EVPP 363 or BIOL 449, and 6 credits from the following electives: GEOL/EVPP 363*, BIOL 449*, EVPP 350, 419, 421, NCLC 395 (Biological of the Chesapeake Bay or Exploring Underwater Archaeology topics), NCLC 495/BIO 440 (Coral Reef Ecology), BIOL/EVPP 546, and BIOL/EVPP 537. PHED 225 is strongly recommended but not required. Eight credits of course work must be unique to the minor.

*If not previously counted

**Certificate in Environmental Management**
This undergraduate certificate in environmental management is for students interested in environmental issues. The program consists of a minimum of 27 credits, most of which, with appropriate planning, may be counted toward fulfilling BS or BA requirements in biology, geography, Earth science, urban systems engineering, and other natural and social sciences. The curriculum provides a substantive appreciation of the biological, physical, and social aspects of environmental problems and methods for their analysis and resolution. The program should particularly interest students wishing to pursue graduate work or seeking employment in the environmental field. Inquiries should be made to the director of the environmental management certificate program.

Students receiving the certificate must hold a baccalaureate degree or be earning a baccalaureate degree from Mason at the time they receive the certificate. As an entry-level require-

- **Environmental certificate core (four courses):** EVPP/BIOL 377; GEOG 303 or 503; ECON 103, EVPP 351, EVPP 336, GOVT 351 or 357; a course in statistics
- **Physical perspective (one or two courses):** Options include BIOL/GEOL 309; BIOL 535; EVPP 550; EVPP/BIO 577; GEOG 102, 309; GEOG 305, 306, 363, 313, 317, 403, 405, 563; USE 440
- **Biological perspective (one or two courses):** Options include BIOL 307, 309, 344, 345, 371, 375, 440, 446, 449, 471, 532, 535, 536, 537, 543, 547; EVPP 315, 515, 550, 538; EVPP/BIO 318, 339, 350, 546, 577; HEAL 450
- **Social perspective (one course):** Options include ANTH 305, 365, 370, 440; CONF 501; ECON 350, 360; EVPP 336, 337, 361; GEOG 301, 304, 305, 306, 316, 325, 406; GOVT 318, 357, 364, 366; MGM 312; NURS 543; PHIL 555; PRLS 300, 402, 526; PUAD 502
- **Environmental methods (one course):** Options include BIOL 312; DESC 301, 352; EVPP 503, 555; GEOG 310, 311, 411, 412, 416, 463, 550, 553, 579, 580, 585

* Biology majors are required to complete two courses in physical or social perspective; geology or earth science majors are required to complete two courses in biological or social perspective. Social science majors are required to complete two courses in physical or biological perspective.

**GRADUATE PROGRAMS**

- **Environmental Science and Policy, MS**
The MS in environmental science and policy meets the increasing need for trained environmental professionals who can address the problems of land and water management, land use and urbanization, wetland loss, microbial ecology, bioremediation, conservation biology, and ecosystem preservation. These professionals will also contribute to the analysis and resolution of global problems, such as deforestation, insufficient world food supplies, acid deposition, population growth and public health, global warming, and depletion of the ozone layer. Areas of specific departmental focus include ecosystems, conservation; environmental biocomplexity; and sustainability science, policy, and management.

Environmental problems are defined in the real world and do not necessarily conform to traditional academic disciplines. As such, solutions require creative combinations of diverse interests and subjects. Effective training requires rigorous, problem-focused interdisciplinary action in a setting in which research is an essential element supporting instruction.

Four concentrations are available in the master’s program: environmental science and policy, environmental biocomplexity, Earth surface processes and environmental geochemistry, and environmental management. The first three concentrations, designed for students who wish to obtain a research-oriented master’s degree, serve as a training ground for
students wishing to further their education by pursuing the PhD in environmental science and public policy at Mason or doctoral programs at other universities. The environmental science and policy concentration is the largest and serves as a home for a broad array of research foci. The environmental biocomplexity concentration is designed for students who wish to obtain a research-oriented master’s degree in population genetics, microbial ecology, and molecular systematics. The concentration in Earth surface processes and environmental geochemistry provides a specific research focus in the earth science area.

The environmental management concentration serves as a terminal professional master’s degree for individuals working in or aspiring to work as managers in the environmental field in government or private industry. It combines the managerial and administrative skills developed in a traditional master of public administration degree program with the scientific knowledge and understanding normally found in a master of science degree.

**Admission Requirements**

Applicants must complete a standard Mason graduate application form, available from the Graduate Admissions Office or online at admissions.gmu.edu. Applicants should hold a bachelor’s degree with a GPA of 3.00 in natural or Earth sciences, engineering, resource planning, environmental studies, or a related field from an accredited institution. Applicants should have taken at least two semesters of chemistry and three semesters of biology, including a course in ecology. Applicants should submit a statement of interest, including at least one from a former professor or, if not available, from someone with a PhD. The aptitude portion of the GRE is required, and successful applicants usually have achieved a minimum score of 1,100 for verbal and quantitative combined. Applicants must also submit a statement of intent to the program, which should include the concentration to which they are applying, potential areas of emphasis, research option preferred, a statement of interactions with potential faculty advisors, and an explanation of career goals. Prospective students must contact potential faculty advisors appropriate to their interests during the application process. The availability of an advisor in the student’s area of interest is a prerequisite for admission. Students will choose their research skills option at the time of application but may change this option later with their advisor’s permission.

**Degree Requirements**

▲ Earth Surface Processes and Environmental Geochemistry Concentration (ESEG)

This concentration is for students desiring an MS degree with an earth science geology theme. Students must form a supervisory committee and submit a program of study to the graduate coordinator for approval within the first 9 credits of course work or by the end of the second semester, whichever comes first. The supervisory committee consists of the advisor and at least two other members, chosen in consultation with the advisor and conforming to Mason’s policy on master’s thesis committees. Requirements may be fulfilled by completing courses from a variety of academic units at Mason. The program requires a minimum of 33 graduate credits distributed in five categories to provide a breadth of knowledge appropriate for addressing current environmental and earth science issues. Course selection should support the research component of the student’s degree program.

• **Natural sciences:** At least 6 credits are required in courses that cover ecology, biogeochemistry, biochemistry, population genetics, molecular biology, molecular systematics, molecular evolution, microbial ecology, microbial diversity, quantitative genetics, and population biology.

• **Public policy:** At least 6 credits are required in environmental law, human ecology, environmental ethics, patent law, and legal and ethical issues in science.

• **Methods and statistics:** At least 9 credits are required in statistics, bioinformatics, information systems, instrumental analysis, microbiological techniques, molecular methods, phylogenetic methods, and bioinformatics.

• **Seminar:** At least 1 credit of EVPP 692 Master’s Seminar in Environmental Science and Public Policy on an appropriate topic is required.

• **Research:** This requirement may be satisfied in one of two ways: EVPP 798 Research Project (1–3 credits) or EVPP 799 Thesis; a thesis is required for this concentration.

Students present their results in a public seminar and defend their thesis before their committee. Students will be graded pass/no credit on the research component.

▲ Environmental Biocomplexity Concentration (EVBC)

This concentration is for students desiring an MS degree with an environmental biocomplexity theme. Students must form a supervisory committee and submit a program of study to the graduate coordinator for approval within the first 9 credits of course work or by the end of the second semester, whichever comes first. The supervisory committee consists of the advisor and at least two other members, chosen in consultation with the advisor and conforming to Mason’s policy on master’s thesis committees.

Course requirements may be fulfilled by completing courses from a variety of academic units at the university. The program requires a minimum of 33 graduate credits distributed in five categories to provide a breadth of knowledge appropriate for addressing current environmental issues. Course selection should support the research component of the student’s degree program.

Students are encouraged to complete at least 1 credit of directed studies (EVPP 693) as a lab rotation to broaden the scope of their experience in the concentration.

• **Natural sciences:** At least 6 credits are required in courses that cover ecology, biogeochemistry, biochemistry, population genetics, molecular biology, molecular systematics, molecular evolution, microbial ecology, microbial diversity, quantitative genetics, and population biology.

• **Public policy:** At least 6 credits are required in environmental law, human ecology, environmental ethics, patent law, and legal and ethical issues in science.

• **Methods and statistics:** At least 9 credits are required in statistics, bioinformatics, information systems, instrumental analysis, microbiological techniques, molecular methods, phylogenetic methods, and bioinformatics.

• **Seminar:** At least 1 credit of EVPP 692 Master’s Seminar in Environmental Science and Public Policy on an appropriate topic is required.

• **Research:** This requirement may be satisfied in one of two ways: EVPP 798 Research Project (1–3 credits) or EVPP 799 Thesis; a thesis is required for this concentration.
799 Thesis (3–6 credits) as described above for the environmental sciences and policy concentration.

▲ Environmental Management
Concentration (EVMG)
Students must complete 37 credits for the environmental management concentration. Students will be assigned an advisor on admission. Full-time students can complete this degree in three semesters; part-time students take six semesters. Course work must include the following:

- **Administration and policy:** At least 12 credits are required, including the following:
  - EVPP 670 Environmental Law or PRLS 501 Introduction to Natural Resources Law
  - PUAD 502 Administration in Public and Nonprofit Organizations or UAD 620 Organization Theory and Management Behavior
  - PUAD 640 Public Policy Process (with sections tailored to environmental science and policy)
  - EVPP 642 Environmental Policy

- **Environmental science:** At least 12 credits are required, including the following:
  - EVPP 546 Estuarine and Coastal Ecology or EVPP 550 Waterscape Ecology and Management or EVPP 644 Wetland Ecology and Management
  - EVPP 607 Fundamentals of Ecology (if student has not already taken a course in general ecology)
  - EVPP 641 Environmental Science and Public Policy
  - EVPP 677 Applied Ecology and Ecosystem Management

- **Methods and statistics:** At least 6 credits are required, including the following:
  - PUAD 611 Problem Solving and Data Analysis I (research design)
  - PUAD 612 Problem Solving and Data Analysis II (statistics)

- **Research/seminar:** Fulfilled with EVPP 741 Advanced Topics in Environmental Law and Public Policy: Problems in Environmental Management (4 credits)

- **Electives:** Students may choose 3 credits (or more to complete 37) from the following list of approved electives. Other courses may be used subject to approval of the program committee.
  - EVPP 524 Introduction to Environmental and Resource Economics
  - EVPP 525 Economics of Human/Environment Interactions
  - EVPP 546 Estuarine and Coastal Ecology (if not already taken)
  - EVPP 550 Waterscape Ecology and Management (if not already taken)
  - EVPP 620 Development of U.S. Environmental Policies
  - EVPP 621 Overview of Biodiversity Conservation
  - EVPP 622 Management of Wild Living Resources
  - EVPP 626 Environment and Development in South and East Asia
  - EVPP 627 Environmental Policy in Latin America
  - EVPP 628 Environment and Development in Africa
  - EVPP 630 Methods and Logic of Social Inquiry
  - EVPP 635 Environment and Society
  - EVPP 638 Corporate Environmental Policy
  - EVPP 644 Wetland Ecology and Management (if not already taken)
  - EVPP 650 Ecosystem Analysis and Modeling
  - EVPP 675 Environmental Planning and Administration
  - GEOG 550 Introduction to Geographic Information Science
  - PUAD 509 Justice Organizations and Processes
  - PUAD 615 Administrative Law
  - PUAD 622 Program Planning and Implementation
  - PUAD 657 Association Management
  - PUAD 729 Issues in Public Management: Lobbying and Advocacy
  - PUAD 741 Policy Analysis
  - PUAD 742 Program Evaluation
  - MBA 623 Marketing Management
  - MBA 712 Project and Cost Management
  - MBA 724 Marketing Communications
  - MBA 725 Leadership

▲ Environmental Science and Policy Concentration (EVSP)
This concentration encourages an independent and creative approach to the development of curricula that reside in the general field of environmental science and policy. Students must form a supervisory committee and submit a program of study to the graduate coordinator for approval within the first 9 credits of course work or by the end of second semester, whichever comes first. The supervisory committee consists of the advisor and at least two other members, chosen in consultation with the advisor and conforming to Mason policy on master’s thesis committees.

Course requirements may be fulfilled by completing courses from a variety of academic units at Mason. The program requires a minimum of 33 graduate credits distributed in four categories to provide a breadth of knowledge appropriate for addressing current environmental issues. Course selection should reflect a coherent individual program focus, which is stated and briefly described in the program of study, and support the research component of the student’s degree program.

- **Natural sciences:** At least 6 credits are required in biology, geology, geography, chemistry, or environmental engineering. For those students without previous course work in ecology, EVPP 607 is required in addition to the 6 credits.

- **Public policy:** At least 6 credits are required in environmental law, human ecology, environmental ethics, planning, or public affairs.

- **Methods and statistics:** At least 9 credits are required in statistics, remote sensing, information systems, instrumen-
tal analysis, or modeling. A course in statistics is highly recommended.

- **Seminar:** A minimum of 1 credit of EVPP 692 Master’s Seminar in Environmental Science and Public Policy on an appropriate topic is required.
- **Research:** This requirement may be satisfied in one of two ways: EVPP 798 Research Project (1–3 credits) or EVPP 799 Thesis (3–6 credits).

Students may conduct a project (EVPP 798) or produce a formal thesis (EVPP 799). The depth and sophistication of the research differs between the two options. The thesis normally involves original research with independent acquisition and interpretation of data, with the goal of peer-reviewed publication. Projects are generally less extensive and can include a broader range of activities.

Students fulfilling the research requirement with EVPP 798 are required to take a comprehensive exam administered by their committee. Students choosing to do a thesis and completing EVPP 799 will present their results in a public seminar and defend their thesis before their committee. Students will be graded pass/no credit on the research skills component.

### Earth Systems Science, MS

The department participates in the MS in Earth systems science administered by the Department of Geographical and Geospatial Sciences. Please see the departmental listing for program requirements.

### Graduate Certificate in Environmental Management

The graduate certificate allows students to expand their knowledge of the environment and environmental management beyond their undergraduate training. It offers a professional credential to students who might not have the time or background to enroll in a graduate degree program requiring a thesis or dissertation. Students who later obtain admission to the graduate degree programs in environmental science and policy may be able to use credits earned during the certificate toward their graduate degree program.

The curriculum provides a substantive exposure to the biological, physical, and social aspects of environmental problems, and methods for their analysis and resolution.

### Admission

Admission requirements are identical to those for admission to the graduate programs in environmental science and policy. Prospective students must have the following minimum requirements:

- Undergraduate (baccalaureate) degree, preferably in biology, chemistry, geology, geography, earth systems science, or some other environmentally related discipline
- Two semesters of general chemistry with a laboratory
- Two semesters of general biology with a laboratory
- Undergraduate course in general ecology; students who do not meet this requirement must take EVPP 607 Fundamentals of Ecology as their natural science elective.
- Three letters of reference and a statement of interest in the program

### Program Requirements

The certificate is awarded after satisfactory completion of six graduate courses (a minimum of 18 semester credits) as specified below:

- Environmental certificate core (three courses):
  - EVPP 677 Applied Ecology and Ecosystem Management
  - GEOG 503 Conservation and Natural Resources
  - One of the following:
    - EVPP 641 Environmental Science and Public Policy
    - EVPP 675 Environmental Planning and Administration
    - SOCI 635 Environment and Society
- Three electives (one from each of the following areas):
  - Natural sciences:
    - BIOL/EVPP 546 Estuarine and Coastal Ecology
    - BIOL/EVPP 577 Biogeochemistry: A Global Perspective
    - BIOL/EVPP 643 Microbial Ecology
    - BIOL/EVPP 745 Environmental Toxicology
    - EVPP 550 Waterscape Ecology and Management
    - EVPP 607 Fundamentals of Ecology
    - EVPP 644 Wetland Ecology and Management
    - EVPP 645 Freshwater Ecology
    - GEOG 570 Environmental Hydrology
  - Social sciences:
    - CONF 501 Introduction to Conflict Analysis and Resolution
    - EVPP 635 Environment and Society
    - EVPP 638 Corporate Environmental Policy
    - EVPP 641 Environmental Science and Public Policy
    - EVPP 642 Environmental Policy
    - EVPP 670 Environmental Law
    - or PRLS 501 Introduction to Natural Resources Law
    - EVPP 675 Environmental Planning and Administration
    - PHIL 555 Environmental Ethics
    - PRLS 526 Environmental Education and Resource Interpretation
    - PUAD 502 Administration in Public and Nonprofit Organizations
  - Environmental methods:
    - EVPP 650 Ecosystem Analysis and Modeling
    - GEOG 550 Introduction to Geographic Information Science
    - GEOG 553 Advanced Geographic Information Science
    - GEOG 579 Remote Sensing
    - GEOG 580 Digital Remote Sensing
    - GEOG 585 Quantitative Methods
    - SOCI 531 Statistical Reasoning

### Environmental Science and Public Policy, PhD

This interdisciplinary program draws on faculty and expertise from the environmental science and policy core faculty, as well as from the Departments of Molecular and Microbiology, Public and International Affairs, Chemistry and Biochemistry, Economics, Geography, Earth Systems and Geoinformation Sciences, and Sociology and Anthropology; as well as the School of Public Policy, the Volgenau School of Information Technology and Engineering, and the College of Education and Human Development.
Our graduates contribute to the solution of complex environmental problems, which require the development of knowledge and skills in the collection, analysis, and interpretation of scientific data, as well as in the integration of scientific understanding into the public policy process.

Admission Requirements

Applicants should have a bachelor’s degree with an overall GPA of at least 3.00. They should have taken at least two semesters of chemistry and three semesters of biology, including a course in ecology. The application deadline is February 15 for admission to fall semester; admission to spring semester is not available.

In addition to the materials required of all applicants for graduate study at Mason, applicants should submit the following:

• Scores on aptitude portion of GRE (may be waived for applicants with a master’s degree in an appropriate field)
• Three letters of recommendation, with at least two from individuals with doctorates
• Recent résumé
• Substantial statement of interest that includes a description of the specific area of proposed dissertation research, the potential focus (environmental science or environmental public policy), contacts that have been made with potential faculty advisors, and an explanation of career and research goals

Applicants should schedule an interview with the graduate coordinator or an environmental faculty member in their proposed area of research. Admission decisions are based on the student’s qualifications and the availability of a faculty advisor.

Degree Requirements

The doctoral program requires a minimum of 78 graduate credits beyond the bachelor’s degree. Students with a master’s degree in an appropriate field may obtain a reduction of credit for appropriate course work of up to 30 graduate credits. To ensure that all students obtain the necessary skills and knowledge to function as environmental professionals, the program requires all students to fulfill the following four category requirements:

• Natural sciences: At least 12 credits are required in biology, chemistry, environmental science, geology, geography, or environmental engineering.
• Public policy: At least 12 credits are required in public affairs, economics, sociology, and business. A course in environmental law is also required as part of this category.
• Research methods and technology: At least 9 credits are required in statistics, remote sensing, geographic information systems, analytical chemistry, modeling, or information technology. Students should carefully choose course work to ensure they have the necessary skills to support dissertation research. Course work for the first two categories, with a substantial methods component, may be used to meet some of this requirement, subject to approval of the student’s committee.
• Doctoral seminar: EVPP 991 must be taken twice, and students must present a total of 4 graduate seminar credits.

• Emphasis course work: Beyond these basic requirements, students focus their study on environmental science or environmental public policy. Those focusing on environmental science should take a total of 24 credits in natural science; those focusing on environmental public policy should take 24 credits of public policy course work. A specific set of recommended policy courses is provided for students in the environmental science focus. Previous thesis research courses may not be applied to this degree.

Before admission to the program, students are responsible for identifying a member of the environmental faculty willing to serve as their advisor. The advisor guides the student through course selection. An advisor may be changed by mutual consent of student and advisor, or petition to the graduate program director and the COS dean. Students are required to complete a course work proposal by the end of the second semester of courses. The proposal must be approved by the advisor and program director. In keeping with the general philosophy inherent in a PhD degree, students adopt an individual program that focuses on a specific area of research. The students’ course work must provide the knowledge base from which original research projects in their specific areas of interest can be successfully completed.

Before the end of the fourth semester of course work, students should assemble a dissertation committee of at least four members, three of whom must be from the Mason graduate faculty with representation from at least two academic departments. After reviewing the student’s course work proposal, progress to date, and area of research, the committee makes final recommendations concerning course work that will be codified in the program of study to be signed by all committee members and the graduate program director.

On completion of all or nearly all course work, students may request to take the qualifying or candidacy exam. The qualifying exam has both oral and written parts. The written portion consists of questions submitted by each member of the dissertation committee. Successful completion of the written exam should be followed by the oral portion within one month. The qualifying exam may be repeated once at the discretion of the student’s committee. On completion of all course work, passage of the qualifying exam, and submission of the program of study, the student is recommended for advancement to candidacy by the graduate coordinator. Students must advance to candidacy within six years of admission to the program.

Dissertation

Students must complete a dissertation (12 to 24 credits) by registering for credit in a combination of EVPP 998 and 999. No more than half the credits specified for dissertation credit on the student’s program of study may be taken as EVPP 998 Doctoral Dissertation Proposal. The dissertation is an original written work, demonstrating mastery of subject matter, methodologies, and conceptual foundations on a specific problem in the general field of environmental science and public policy. The dissertation generally involves collection and analysis of original data or the substantially new analysis and reinterpretation of existing data.

Before students may enroll in dissertation research, they must have advanced to candidacy and have a dissertation proposal approved by the dissertation committee, graduate program director, and dean of the college. Students must present the completed dissertation in a public seminar and
defend the work before the dissertation committee. Awarding of the degree is contingent on approval of the dissertation by the dissertation committee, graduate coordinator, and dean. The dissertation and defense must be completed within five years of advancement to candidacy.

### Geography and Geoinformation Science

Phone: 703-993-1210 or 703-993-1212  
Web: esgs.gmu.edu, www.gmu.edu/departments/geog

#### Faculty

**Professors:** Agouris, Di, Falconer, Haack, Taylor, Singh, Waters (director, GIS Center), Wong  
**Associate professors:** Beach, Boybeyi, Chiu, Curtin, Qu, Stefanidis, R. Yang, S. Yang  
**Assistant professors:** Cervone, Kronenfeld, Leslie, Manca, Rice, Sun, C. Yang, W. Yang, Zolnik  
**Research or contract professors:** Gomez, Pilon, Resmini, Self, Sommers, Wood  
**Term instructors:** Boudinot, Hallden

#### Course Work

This department offers all courses designated EOS and GEOG in the Course Descriptions chapter of this catalog.

#### UNDERGRADUATE PROGRAMS

**Geography, BA**

In addition to university-wide general education requirements and requirements for a BA degree from COS, candidates for a degree in geography must complete 28 credits in geography with a minimum GPA of 2.00. Requirements are as follows:

- Core courses (16 credits): GEOG 102, 103, 300, 310, and 415 (GEOG 103 fulfills the university requirement in social science)
- 12 credits of systematic (GEOG 301, 303, 304, or 305), geographical applications (GEOG 308, 311, 412, 416, or 463), and regional courses at the 300 level or above (some regional courses fulfill the college-level, non-Western culture requirement)
- 18 or more credits consisting of an approved double major, disciplinary minor, interdisciplinary minor, or certificate, or any other coherent 18-credit (minimum) package of courses approved by the advisor and the department chair. No more than 7 credits used to meet the 28-credit requirement may be used to meet this requirement. (Some of these courses may fulfill university-wide general education or college-level requirements.)

**Geography, BS**

In addition to the university-wide general education requirements, candidates for a BS degree in geography must complete the following with a minimum GPA of 2.00 for courses that fulfill requirements under the first two bulleted items.

- 28 credits in geography, including 16 credits of core courses GEOG 102, 103, 300, 310, and 415 (GEOG 103 fulfills the university requirement in social science); and 12 credits of systematic (GEOG 301, 303, 304, or 305) and regional courses at the 300 level or above. (Some of the regional courses fulfill the college-level, non-Western culture requirement.)
- 18 or more credits as a sequence of geographical applications courses, including GEOG 311, 411, 412, 416 or 463; and 6 additional credits of geography electives, which may also include an internship (GEOG 480) approved by the program advisor before enrollment
- 25 or 26 credits of required science, mathematics, statistics, and computer science courses, including GEOL 101, 102, and 317 (12 credits); or BIOL 103, 104, and 377 (11 credits, fulfills the university general education requirement in natural science); MATH 113 and 114 (8 credits, fulfills the university quantitative reasoning requirement); STAT 250 (3 credits); and IT 103 (3 credits, fulfills the university information technology proficiency requirement)

#### Minor in Geography

To receive the minor, students must complete 18 credits in geography, 8 credits of which must be unique to the minor, with a minimum GPA of 2.00, distributed as follows:

- 6 credits of GEOG 101 (fulfills the university requirement in global understanding); or GEOG 103 (fulfills the university requirement in social science) and GEOG 102 (nonlaboratory natural science credit)
- Four courses (12 credits) at the 300 and 400 level, including one systematic course (GEOG 301, 303, 304, 305, 306, or 309) and one regional course (GEOG 315, 316, 320, 325, 330, or 380)

#### Minor in Geographic Information Systems

To receive this minor, students must complete 18 or 19 credits in geography beyond the prerequisite of GEOG 102 or 103, with a minimum GPA of 2.00:

- Four required courses (12 credits): GEOG 110, 300, 311, 463
- Two elective courses (6–7 credits) chosen from GEOG 310, 411, 412, 416

With departmental permission, one course with significant geographic information systems (GIS) content may be substituted for one of the above. Eight credits of course work must be unique to the minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

#### Writing-Intensive Requirement

The university requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in geography fulfill this requirement by successfully completing GEOG 415.

#### Teacher Licensure

Students who wish to become teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.
Global and Environmental Change, BS

This interdisciplinary undergraduate program, one of the first of its kind in the nation, distinguishes itself from other degrees in the natural sciences in that it examines, from local, regional, and global scales the dynamics of Earth’s systems and their interactions: the geosphere, the atmosphere, the hydrosphere, and the lithosphere. In addition, it emphasizes the dynamic and changing Earth systems and the use of Earth observing and remote sensing and related geoinformation technologies in detecting changes. It is jointly offered with the Department of Environmental Science and Policy (ESP) (esp.gmu.edu).

Through the course work listed below, Global and Environmental Change majors satisfy university-wide general education requirements in natural science, quantitative reasoning, information technology, global understanding, social science, and synthesis:

- Six required core courses in global and environmental change (22 credits): EOS 121–122 or EVPP 110–111; plus EOS 353; EOS 305 or GEOL 305; GEOG 300 or BIOL 312; and EOS 304
- Four required courses in geosphere and atmosphere (13 credits): GEOL 101(4) or PHYS 243–244 (4); plus three courses from EOS 310, 312, 320; GEOG 309, 399; GEOL 317, 306, 309, 303; EVPP 490
- Four required courses in ecosphere and sociosphere (12 credits): GLOA 101 or GEOG 101 or CEIE 100; and GEOG 103 or ANTH 135; and BIOL 371 or EVPP 377; and one from BIOL 318, BIOL 345, EOS 322, EOS 306, EVPP 336, EVPP 337, EVPP 350, EVPP 449 or GEOG 303
- Two required courses in the applications and techniques of detecting global change (6 credits): choose two from EOS 303, 354, 410, 455, 495, GEOG 412, 416, 463, GEOL 303
- Two required supporting sciences sequence courses beyond the general education requirements (8 credits): CHEM 211, 212 (8); or PHYS 243–244 (3–1), 245–246 (3–1); or ASTR 111–112 (4), 112–114 (4); or GEOL 101–102 (8); or BIOL 103–104 (8)
- Four required supporting mathematics and IT courses (14 credits): MATH 113 & 114 (8), STAT 250/IT 250 (3), IT 103 (3)
- General electives (27–31 credits)

In meeting the above requirements, students may choose a focus in environmental or global change.

Graduate Programs

Earth Systems Science, MS

This interdisciplinary master’s program is offered jointly with the Department of Environmental Science and Policy. The program addresses the growing demand for trained professionals in Earth systems science and applications. The degree emphasizes a research-oriented, global systems approach to studying the atmosphere, hydrosphere, and lithosphere, including their interrelationships and interactions with the biosphere. Emphasis is on the observation and quantitative analysis of Earth systems. Students completing the program are qualified to pursue careers that require knowledge of the basics of Earth systems science and the requisite tools. Students are encouraged to undertake an optional master’s thesis for more in-depth studies or a research project. In the latter case, students must pass a comprehensive exam.

Admission Requirements

Applicants should have a BS degree in Earth, environmental, or physical science. Previous course work should include two semesters each of calculus, chemistry, and physics, and one semester of statistics. They should have a minimum GPA of 3.00 in their undergraduate degree. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Graduate Admissions Processing Center. Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE-GEN. The GRE-SUB is recommended if it is given in the student’s undergraduate major. The GRE requirement will be waived if the student holds a master’s degree from a U.S. institution. TOEFL scores are required of all foreign applicants.

Degree Requirements

Candidates must successfully complete 30 credits as follows:

- 9 credits of Earth science core: CSI 655; EOS 656 and 657
- 3 credits of Earth observation courses: EOS 753 or GEOG 579
- 3 credits of quantitative techniques courses: CSI 654, EOS 754 or GEOG 585
- 3 credits of human and biological perspectives courses: one of EOS 704; EOS 721; EVPP 577, 636; GEOG 575
- 3 credits of colloquium or seminar: EOS 792 and EOS 900
- 3–6 credits of research: EOS 798 or 799
- General electives

Geographic and Cartographic Sciences, MS

The focus of this program is to prepare students for careers in geography, remote sensing, and GIS and its increasing applications in diverse fields, as well as cartography, visualization, and modeling. This expertise is useful to civil and defense federal agencies, state and local government agencies, private corporations, and educational institutions. Courses concentrate on the techniques of compilation, display and analysis of spatial data, and their applications. Students are also encouraged to select internships as part of their program. More than 400 of our alumni from this program have entered employment in the Washington, D.C., area since 1978.

Research Facilities

The department’s laboratories house SUN workstations, PCs, and Macs with multiple input and output devices to support ARCGIS, ARCMAP, ARCVIEW, IDRISI, ERDAS, and other cartography, GIS, and image-processing software packages. In addition, the department houses an extensive collection of spatial data in different formats. Enriching the program is a network of alumni, students, guest lecturers, and adjunct faculty who work in geography-related organizations in the greater Washington, D.C., area. Specialized instructional space for geographic information science is housed in In-
novation Hall on the Fairfax Campus. The department also is home to the Center of Excellence in GIS.

Admission Requirements
In addition to meeting all admission requirements for graduate study at Mason, applicants should have a bachelor’s degree in geography, cartography, or equivalent. Applicants without an undergraduate degree in geography may be required to take one course in each of the following: physical geography, human geography, and cartography. All applicants must have a course in statistics. The program also requires GRE aptitude scores, three letters of recommendation, transcripts of all college course work, and a statement of interest in the degree. Credit from courses taken at other departments and other universities may be applied to the program with prior approval.

Degree Requirements
Students must complete 30 graduate credits to include 3 to 6 credits of thesis or 36 graduate credits without a thesis. If the nonthesis option is selected, students are required to pass a comprehensive exam.

- Four required courses (12 credits)
  - GEOG 553 Geographic Information Systems
  - GEOG 579 Remote Sensing
  - GEOG 585 Quantitative Methods
  - GEOG 680 Seminar in Thought and Methodology
- 12–15 credits (thesis option) or 24 credits (nonthesis option) of elective courses in geography
- 3–6 credits of thesis (thesis option)
- Comprehensive exam (nonthesis option)

Electives should be selected in consultation with an advisor. With departmental approval, up to 9 credits from closely related disciplines may be applied to the degree.

Graduate Certificate in Geographic Information Sciences

This graduate certificate prepares students for employment in federal, state, and local government positions that require GIS skills. Graduates have typically been employed in major mapping programs of the Department of the Interior and in the related land management agencies at the federal and state level. The certificate has been found suitable for the needs of business and industry, including those corporations that serve as contractors to governments in the United States and overseas.

Admission Requirements
Applicants should submit an application for graduate studies and must meet all requirements for graduate study at Mason. All applicants should have a working knowledge of, or prior education or training in, computer technology. Knowledge of GIS, remote sensing technology, and cartography are preferred. Students from any discipline are welcome to apply, but students with a background in one of the physical sciences (atmospheric science, hydrology, or geology), geography, environmental science, or engineering are particularly well-suited to undertake this program.

Students with no knowledge of geospatial technology are required to take GEOG 550 prior to admission to the program.

Program Requirements
Students must successfully complete 15 graduate credits, distributed as follows:

- 9 credits of required core courses: GEOG 553 or CEIE 510, GEOG 563 or EOS 771, GEOG 653
- 6 credits of electives chosen from GEOG 505, GEOG 531, GEOG 556, GEOG 655, GEOG 664, EOS 772, 773; CEIE 685; INFS 614, 755, 795

Other courses may be used as electives with prior written approval of the department.

Graduate Certificate in Geospatial Intelligence

This graduate certificate program is for persons employed in geospatial intelligence applications (i.e., federal agency and/or corporate or association personnel) or those interested in entering this field. Our program offers fundamental knowledge on geospatial intelligence and the ability to apply this knowledge to a diverse range of constantly evolving geospatial intelligence situations.

Admission Requirements
Applicants to this graduate certificate program should hold a BA or BS degree in a discipline related to the certificate’s theme from an accredited university with a minimum GPA of 3.00. Applicants must submit a completed Mason graduate application, along with official transcripts, résumé, Virginia domicile classification form, and TOEFL scores if they are foreign nationals. GRE scores and letters of recommendation are not required but will considerably strengthen an application, if available.

Applicants should have undergraduate backgrounds that include courses in differential and integral calculus, and they should possess working knowledge of a computer programming language. Depending on the background of the individual student, the coordinator may recommend remedial or preparatory courses tailored to the student’s needs. Students may not pursue this certificate concurrent with any other graduate degree programs or certificates offered by COS (because this certificate will charge students a differential tuition rate). However, students enrolled in academic programs outside COS may enroll in this certificate program concurrently. Students may transfer no more than 3 credits into the certificate program with the approval of the academic director.

Program Requirements
The Geospatial Intelligence (GI) certificate requires a total of 18 credits, or 6 courses. These comprise five mandatory core courses and one elective. The mandatory core courses reflect the three key science concentration areas (CA) of this program, namely geospatial image analysis, spatial analysis, and information technology, as reflected in the following list:

Mandatory core courses:

- EOS 684 Select Topics in Geospatial Intelligence
- EOS 685 Capstone Course in Geoinformatics
- EOS 758 Earth Image Processing (CA: image analysis)
- GEOG 553 Geographic Information Systems (CA: spatial analysis)
- INFS 590 Program Design and Data Structures (CA: information technology)
Graduate Certificate in CERG-RSIP
Remote Sensing and Earth Image Processing

The Certificate in Remote Sensing and Earth Image Processing Program focuses on the skills needed to take advantage of the enormous increase in the availability and use of remotely sensed data related to the Earth. The certificate requires students to complete 15 credits of EOS graduate courses. Ideal candidates for this certificate are those who have a background in Earth and environmental sciences and are working in or planning to enter into the field of remote sensing, Earth observing, or image processing.

This professional certificate program charges students at a differential (premium) tuition rate, with an additional $100 per credit added to the standard Mason graduate tuition. This rate applies to all students who enroll in this certificate program, regardless of in-state or out-of-state status. The differential tuition will be used to fund continuing improvements in the departmental computational facilities used to support the certificate program.

Admission Requirements

Applicants should hold a BA or BS degree in a discipline related to the science and applications of remote sensing from an accredited university, with a minimum GPA of 3.00. Applicants should have some prior education or training in remote sensing or image processing. Students with a background in one of the physical sciences (physics, chemistry, atmospheric science, hydrology, or geology), geography, or environmental science will be particularly well-suited to undertake this program. Applicants should have an undergraduate background that includes courses in differential and integral calculus, and they should possess working knowledge of a computer programming language. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, and a current résumé to the COS Graduate Admissions Processing Center. TOEFL scores are required of all international applicants.

Program Requirements

Required Core Courses:
- EOS 740 Hyperspectral Imaging Systems
- EOS 753 Observations of the Earth and Its Climate
- EOS 757 Techniques and Algorithms in Earth Observing and Remote Sensing
- EOS 758 Digital Processing of Remote Sensing Imagery

Elective Courses (one of the following or another course approved by coordinator):
- EOS 754 Earth Observing/Remote Sensing Data and Data Systems
- EOS 756 Physical Principles of Remote Sensing
- EOS 760 Remote Sensing Applications
- EOS 840 Hyperspectral Imaging Applications
- GEOG 562 Photogrammetry
- GEOG 580 Digital Remote Sensing

Earth Systems and Geoinformation Sciences, PhD

The innovative PhD in Earth Systems and Geoinformation Sciences (ESGS) Program is based on the integration of the scientific disciplines in geosystems, geosciences, and geography, with the two slightly more technology-oriented scientific disciplines in geoinformation sciences, remote sensing, and geographic information systems (GIS). Graduates from the ESGS doctoral program will be qualified to serve as lead scientists in a wide range of activities involving geosciences, geography, GIS, and remote sensing.

The continual expansion of the NASA Earth observation satellite constellation, the development and expansion of the geospatial data infrastructure at federal agencies, and the need to analyze these Earth-oriented data to achieve environmental and economic objectives ensure a constant need in the foreseeable future for qualified scientists in these fields. Students receive broad-based training in the geosciences and geography, as well as concentrated courses in computation and geoinformation sciences.

The ESGS doctoral program represents a gateway to an academic career for some students; for others, it facilitates career advancement in the public sector or private industry. Graduates are equipped to participate in interdisciplinary research, which is the norm in today’s research arena. In addition, students also receive training in teaching, qualifying them to join academic units in more traditional disciplinary and instruction-oriented settings or in multidisciplinary programs.

Admission Requirements

This program is intended for graduates who hold a BS or BA degree in atmospheric science, climatology, meteorology, Earth science, geology, environmental science, remote sensing and Earth observing, hydrology, oceanography, geography, or a related field with a minimum GPA of 3.00. Applicants should have knowledge of calculus and a working proficiency with a computer programming language.

Knowledge of mathematics through ordinary differential equations is preferred. Interested applicants should contact the academic coordinator or the ESGS chair for more specific advice. To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goals statement to the COS Fairfax Campus Graduate Admissions Processing Center.

Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE-GEN. The GRE-SUB is recommended if it is given in the student’s undergraduate major. The GRE requirement for admission to the doctoral programs will be waived if the student holds a master’s degree from a U.S. institution. TOEFL scores are required of all international applicants.

Degree Requirements

The curriculum consists of 72 credits: 48 credits of course work and 24 credits of dissertation research. The 48-credit requirement may be reduced by up to 30 credits for a qualified student holding a previous master’s degree. Up to 24 credits of previous, relevant graduate course work may be transferred into the program as long as those credits have not been applied toward a previous degree. The curriculum is organized into the four areas of emphasis listed below:

- Geosciences (GSC)
- Geography (GEOG)
- Remote sensing and Earth observation (RS)
- Geographic information systems (GIS)
Students may select one of the four areas listed above, or they may opt to develop a curriculum that combines elements from two or more areas, subject to the program director’s approval. All students are required to select courses from a set of three core areas: computational-quantitative, geosciences-geography, and geoinformation. Additional requirements include courses in the area of emphasis, a single credit of colloquium taken three times, and electives relevant to the student’s focus.

In recognition of the diverse interests in this scientific area, students are given considerable flexibility to construct their curriculum under the guidance of a faculty advisor. To provide the desired level of flexibility and encourage interdisciplinary education and research, the following seven program elements are required:

- 6 credits of computational-quantitative core courses
- 6 credits of geosciences-geography core courses
- 6 credits of geoinformation sciences core courses
- 6 credits of emphasis courses
- 3 credits of colloquium (1 credit, taken three times)
- 21 credits of electives
- 24 credits of dissertation research

For a complete list of various courses in each category, go to cos.gmu.edu or esgs.gmu.edu.

All students will be assigned a temporary academic advisor when they first enroll in the program. No later than the end of the second year, each student should identify a dissertation advisor and form a doctoral committee. After completing all required courses, each student must take a candidacy exam administered by the dissertation committee.

The exam will have written and oral components. Its purpose is to determine whether the student has acquired adequate general knowledge in the selected subject area, as well as much more detailed knowledge of the specific research topic planned for the dissertation. After students have completed all required courses and passed the candidacy exam, they should prepare an acceptable dissertation proposal. After the dissertation proposal is approved, the student is formally advanced to doctoral candidacy. The degree will be awarded on completion of the required course work and approval of a PhD thesis that makes an original and significant contribution to the field.

PhD Studies in Other Programs

The department participates in other programs that provide opportunities for geographical research. A popular example is the Environmental Science and Public Policy PhD Program where faculty members serve as both dissertation committee members and chairs. Geographic studies fit well with many issues related to public policy, planning, conservation, and sustainable development. Program description and degree regulations are listed under the Department of Environmental Science and Policy.

The department also participates in the Public Policy PhD Program, along with some of the university’s leading geographers who are members of the School of Public Policy. In addition, geography faculty members provide joint supervision and serve as committee members to support those pursuing research primarily geographic in nature. Program description and degree regulations can be found under the School of Public Policy listing. Several departments participate in supervisory committees providing a rich opportunity for students to expand their interdisciplinary interests with these departments.

Mathematical Sciences

Phone: 703-993-1460
Web: math.gmu.edu

Faculty

Professors: Alligood, Colonna, Fischer (chair), Kulesza, B. Lawrence, J. Lawrence, Levy, Morris, Polyak, Sachs, Saperstone, Sauer (COS Distinguished Scholar), Shapiro (undergraduate coordinator), Singman, Soltan, Walnut (graduate coordinator)

Associate professors: Anderson, Gabel, Goldin, Kiley, Lamba, Lim, Lin, Sander, Seshaiyer, Wanner, Zoltak

Assistant professors: Agnarsson, Emelianenko, Griva, Napoletani

Adjuncts: Chouikha, Crain, Hiles, Lightbourne, Manigault, Morris, Moumen, Nefessi, Perencevich, Roberts, Shaw, Surina, Taylor, Wallace, Zampedro

Admin professional: O’Brien

Term instructors: Crossin, Goldman, Granfield, Matveev, Nuttall, O’Beirne, Orlova-Shokry

Affiliates: Loutstaunau, Peterson

Emeritus: Cabell

The department offers undergraduate and graduate degree programs in mathematics for students with various interests and career goals. Students may pursue the standard program or pursue a program focused on either actuarial mathematics or applied mathematics. Students may complement other interests by taking a double major in mathematics and a related field, such as chemistry, economics, physics, computer science, or engineering.

Graduating seniors are required to have an exit interview.

Course Work

The Mathematical Sciences Department offers all course work designated MATH in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

- Mathematics, BA
  BA-MATH

In addition to satisfying university-wide general education requirements and requirements for the BA degree in COS, students must present the following:

- 26 credits of required MATH courses: MATH 113, 114, 125, 203, 213 or 215, 214 or 216, 290, and 322
- 12 credits of electives in MATH numbered above 300
- CS 112 is recommended.

The above courses satisfy the university-wide requirement in quantitative reasoning. A maximum of 6 credits of grades below 2.00 in course work designated MATH may be applied toward the major.

- Mathematics, BS
  BS-MATH

Students may select an optional concentration in actuarial mathematics (AMT) or applied mathematics (ACTM). Stu-
Students who do not select a concentration study traditional mathematics. In addition to satisfying the university-wide general education requirements for the BS degree, students majoring in mathematics must present the following. (These courses satisfy the university-wide requirement in quantitative reasoning and natural sciences. A maximum of 6 credits of grades below 2.00 in course work designated MATH may be applied toward the major.)

- Mathematics core requirements: MATH 113, 114, 203, 213 or 215, 214 or 216, 290, and 322
- Science, accounting, and economics requirements:
  - For all students, a one-year sequence of a laboratory science selected from one of the following:
    - BIOL 213, and 303 or 304
    - CHEM 211 and 212
    - GEOL 101 and 102
    - PHYS 160, 260, 261
  - Computational requirement: 4 credits of CS 112 for all students; for students in the actuarial concentration, 3 credits of STAT 362
  - Program and concentration-specific requirements

Departmental Nonmathematical Requirements
- Students with no concentration or those with the applied mathematics concentration must select a second year of science from one of the following three options: a second sequence from the list above; 6 credits from more advanced courses in biology, chemistry, geology, or physics (but only courses acceptable for credit toward a natural science major); or the 4-credit option PHYS 262, 263.
- Students with an actuarial concentration must have 3 credits of ACCT 203 and 6 credits of economics, including ECON 103 (3 credits) and either ECON 306 or 310, or FNAN 321. (The Economics Department has agreed to waive ECON 104 as a prerequisite for ECON 306 for mathematics majors.)

Mathematical Requirements
- Students with no concentration must have 24 credits of MATH (MATH 125, 315, 316, and 321 or 431) and 12 credits of course work above MATH 300.
- Students with an applied mathematics concentration must have 24 credits of MATH (MATH 125, 315, 351, 413, 414, and 446) and 6 credits of course work above MATH 300.
- Students with an actuarial concentration must also have 24 credits of MATH (MATH 351, 352, 551, 554, 555, 556) and 6 credits from MATH 441, 442, or 446.
- The department recommends proficiency in French, German, or Russian.

General Comments
For math majors:
- MATH 105, 106, 108, 110, 111, 112, 271, and 272 cannot be used as substitutes for any requirements of the major in mathematics.

For nonmath majors:
- MATH 108, 110, and 111 are designed for students in the social and behavioral sciences.

- Liberal arts majors are advised to take MATH 106, 110, or 111.
- Students in the natural sciences who plan to do graduate work are advised to add courses from MATH 313, 314, 351, 352, 382, 441, 442, 446, and 447.

For both majors and nonmath majors:
- MATH 105, 106, 108, 110, 111, 112, 113 have a qualifying score on the Math Placement Test as a prerequisite. The Math Placement Test is given frequently; for the schedule, inquire at the department office or check the Mason website.
- Students who do not achieve the necessary test score needed to take a math course may go to the Math Learning Center (see below), or they may study and retake the test on their own. If they do not complete the relevant program in the Learning Center or do not achieve the necessary score after retaking the test, they are dropped from the course. Depending on their test scores, students who do not place into MATH 113 will be advised to take MATH 105 or visit the Math Learning Center to prepare for MATH 105.
- MATH 105 does not fulfill the university quantitative reasoning requirement.
- Students may not receive credit for both MATH 214 and 216; both MATH 213 and 215; both MATH 351 and STAT 344; and both MATH 352 and STAT 345.
- After receiving a grade of C or better in one of the courses listed below on the left, students may not receive credit for the corresponding course on the right:
  - MATH 113 MATH 105 or 108
  - MATH 351 or STAT 344 MATH 108
  - MATH 441 MATH 111
  - MATH 125 MATH 112

Writing-Intensive Requirement
Mason policy requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in mathematics fulfill this requirement by successfully completing MATH 290.

Minor in Mathematics
To receive a minor in mathematics, students must complete 21 credits that include a total of 8 hours of math that are not applied toward the major. These courses must have a minimum GPA of 2.00, distributed as follows:
- five required courses (15 credits): MATH 125, 203, 213 or 215, 214 or 216, and 290
- 3 credits from any math course that requires MATH 290 as a prerequisite
- One elective course in math at the 300 or 400 level, or STAT 344.

Students must earn a 2.00 or better in MATH 290 and the courses chosen to fulfill the second requirement.

Minor in Mathematics for School of Management Students
To receive this minor, students must complete 20 credits with a minimum GPA of 2.00, including MATH 113, 114, 203,
Mathematics, Bachelor’s/Accelerated Master’s Degree

This five-year degree program allows academically strong students to obtain a BS and MS by successfully completing 144 credits within five academic years and one summer. Well-prepared students are admitted to this program on completion of 90 credits, take selected graduate courses during their senior year, and are able to use up to 6 graduate credits to partially satisfy requirements for the undergraduate degree. On completion of that degree and with satisfactory graduate-level performance (3.00) in graduate courses, students are given advanced standing in the master’s program and complete an additional 24 credits to receive the master’s degree. All other master’s degree requirements must be met.

GRADUATE PROGRAMS

| Mathematics, MS | MS-MATH |

The Department of Mathematical Sciences offers courses in pure and applied mathematics leading to the master of science degree in mathematics. The program offers a standard mathematics program and an emphasis in computational and applied mathematics.

Assistantships

A limited number of merit-based teaching assistantships are available for students taking at least 6 graduate credits each semester. Other sources of support, such as research assistantships, are available as funding permits. Graduate students also have the opportunity to work in the Math Tutoring Center and Math Learning Center.

Admission Requirements

In addition to fulfilling admission requirements for graduate study, applicants must submit three letters of recommendation. GRE scores are not required.

Students intending to pursue the MS degree must have taken an upper-division course in advanced calculus (equivalent to MATH 315) and an upper-division course in linear algebra (equivalent to MATH 322). Students intending to go into the computational and applied mathematics emphasis must have some computer knowledge.

Degree Requirements

Standard Program

In addition to fulfilling degree requirements for graduate study, students must complete 30 credits distributed as follows:

- 6 credits of MATH 621 and 675
- Six approved graduate courses (18 credits), at least four of which are MATH. All six courses must be approved by the student’s advisor. Courses not listed as MATH courses must be approved by the Graduate Committee. Different rules apply if the student wishes to count graduate actuarial courses toward his or her degree (see below).
- Research and creative component (see below)

Emphasis in Computational and Applied Mathematics

The emphasis in computational and applied mathematics provides students with the analytical skills and background in computational techniques most relevant to the needs of business, industry, and government. The large number of high-technology firms, telecommunications firms, and government laboratories in the Washington, D.C., metropolitan area gives students an opportunity to gain practical experience and secure employment after graduation.

In addition to fulfilling degree requirements for graduate study, students must complete 30 credits distributed as follows:

- 12 credits of MATH 621, 675, 677 or 678, and MATH 685
- Four approved graduate courses (12 credits), at least two of which are MATH courses. All four courses must be approved by the student’s advisor. Courses not listed as MATH courses must be approved by the Graduate Committee.
- Research/creative component (see below)

Research and Creative Component

A student may fulfill the research and creative component of the MS degree in any one of the following three ways:

- Thesis Option. In preparation for this option, the student must form a committee comprising a chair and two other faculty members. The chair and at least one other member must be from the department; one member may be from a related field.

The student completes a thesis under the direction of the committee chair. The thesis work is typically completed while students are registered for 6 credits of MATH 799. A thesis proposal and thesis are submitted in accordance with university rules. The student must give an oral defense of the thesis to the committee and the Mason community at large. Students are expected to respond to questions on the thesis and related material. The committee determines whether the defense is satisfactory.
• Paper presentation option. In preparation for this option, the student must form a committee comprising a chair and two other faculty members. The chair and at least one other member must be from the department; one member may be from a related field. The student gives an oral presentation of a paper (or series of papers or book chapter) chosen in consultation with the chair of the committee and approved by the full committee. The chosen material must be distinct from work done in fulfillment of course requirements. Students choosing this option take 6 additional credits of electives. The oral presentation is given to the committee and the Mason community at large. Students are expected to respond to questions on the paper and related material. The committee determines whether the defense is satisfactory.

• Preliminary exam for the PhD. The research and creative component of the MS degree can be fulfilled by passing the preliminary written examination for the PhD degree (see below).

Graduate Certificate in Actuarial Sciences

The certificate in actuarial sciences is designed to serve students and professionals in the Washington, D.C., area who are interested in pursuing careers as actuaries. The course content provides students with specific training related to the Society of Actuaries (SOA) Exam FM (formerly Course 2), SOA Exam M (formerly Course 3), SOA Exam C (formerly Course 4), VEE for applied statistics (formerly part of Course 4), and Exam EA-1 and EA-1A (for those pursuing EA designation from the U.S. Treasury). The courses also provide a solid foundation for the corresponding Casualty Actuary Society (CAS) exams. Preparation for the first exam is achieved in meeting the prerequisites for the certificate courses in the area of probability and statistics.

Admission Requirements

In addition to fulfilling admission requirements for graduate study, applicants must submit three letters of recommendation. GRE scores are not required.

Students intending to pursue a certificate in the actuarial sciences must have three semesters of calculus, a course in linear algebra (equivalent to MATH 203), a calculus-based course in probability (equivalent to MATH 351), and statistics (equivalent to MATH 352). Completion of the SOA Exam P is also sufficient preparation for the certificate program.

Requirements

Students must complete six courses (18 credits): MATH 551, 554, 555, 556, and two courses chosen from MATH 653, 654, or 655 (MATH 655 is recommended only for students who wish to pursue a career as a pension actuary). Substitutions for the elective courses may be made with approval of the Graduate Committee. The graduate certificate course work provides preparation for SOA and CAS exams as follows. MATH 551 is the SOA VEE for Applied Statistics and is preparation for part of the CAS Exam 3. MATH 554 covers all of the SOA Exam FM material (as well as CAS Exam 2). MATH 555, 556, and 653 cover all of the Exam M material and much of the CAS Exam 3 as well as the EA1 exam.

MATH 654 covers most of the SOA Exam C material (as well as CAS Exam 4). MATH 655 covers all of the EA2-A Exam material and some of the SOA Exam 8.

Counting Actuarial Courses for Other Mathematics Degrees

A student enrolled in the certificate program in actuarial sciences and another graduate degree program in mathematics can count actuarial mathematics courses toward that degree according to the following rules:

• None of the actuarial mathematics courses MATH 551, 554, 555, 556, 653, 654, and 655 can count toward the PhD degree in mathematics.

• None of the actuarial mathematics courses MATH 551, 554, and 655 can count toward the MS degree in mathematics.

• Up to four of the actuarial mathematics courses MATH 555, 556, 653, and 654 can count toward the MS degree in mathematics provided that all other courses counted toward that degree are MATH courses. An exception can be made if the student wishes to count only one actuarial mathematics course from the list toward the MS degree. In this case, at most one other non-MATH course can be counted toward the degree with approval of the graduate coordinator.

Counting Actuarial Courses toward the Statistical Sciences MS Degree

A student enrolled in the certificate program in actuarial sciences and in the MS program in statistical science can count MATH 555 and 556 as approved non-STAT elective courses and can count MATH 653 and 654 as STAT electives when designing a curriculum for this degree. The full curriculum should be designed in consultation with the student’s Statistics Department advisor.

Certificate in College Teaching

A student enrolled in the MS or PhD program in mathematics who is primarily interested in pursuing a career in undergraduate education at the college level is encouraged to consider enrolling in Higher Education Program’s Certificate in College Teaching, offered through the College of Humanities and Social Sciences (LA-CERG-CTCH). Students must complete 18 credits as follows: CTC 602, 603, 604 or 605 (or equivalents with a specific disciplinary focus), 685, and 6 credits of CTC 650 (practice) by working one semester as a graduate teaching assistant in the Mathematics Department.

Mathematics, PhD

The Department of Mathematical Sciences offers a PhD in mathematics. The program begins with graduate course work and advanced seminars and culminates in a thesis consisting of original research in mathematics. The PhD program in mathematics is designed to train students as research mathematicians for careers in academia, government, and private industry.

Fellowships and Assistantships

The Department of Mathematical Sciences offers a limited number of merit-based teaching assistantships. Other sources of support, such as research fellowships and assistant-
ships, are available as funding permits. Graduate students also have the opportunity to work in the Math Tutoring Center and the Math Learning Center.

**Admission Requirements**

It is expected that all applicants have a recent bachelor’s degree in mathematics or an equivalent amount of undergraduate mathematics preparation, with a GPA of at least 3.00 in their last 60 credits of study. Students without this background who have had an upper-division course in linear algebra (equivalent to MATH 322), an upper-division course in advanced calculus (equivalent to MATH 315), and familiarity with basic group theory (such as presented in MATH 321) are encouraged to apply to the MS program in mathematics. Such students may subsequently apply to the PhD program when all background issues have been addressed. It is recommended that all applicants have some familiarity with mathematical software.

To apply, prospective students should forward a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, three letters of recommendation, and a goals statement to the COS Fairfax Campus Graduate Admissions Processing Center. TOEFL scores are required for all international applicants. GRE scores are recommended but not required.

**Degree Requirements**

The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work and 12–24 credits of dissertation research. For those holding master’s degrees, the 72 required credits may be reduced by up to 30 credits, depending on graduate courses completed. Students must complete the following curriculum requirements:

- **Core courses**: 12 credits in MATH 621, 631, 675, and 677
- **Seminar (MATH 795)**: 6–9 credits
- **Preliminary written exam based on material in three core courses**
- **Qualifying exam**
- **Dissertation proposal and research**: 12–24 credits of MATH 998 and 999

All PhD students are required to take a 1-credit seminar (MATH 795) each semester. A student entering without a master’s degree in mathematics should expect to take a total of 8 to 9 credits of MATH 795. Portions of the preliminary written exam may be waived with approval of the graduate coordinator if the student enters the PhD program with a master’s degree in mathematics. Graduate mathematics courses taken elsewhere may be counted toward the degree either as transfer credit or through reduction of credit. Classes at the 500 level and actuarial classes MATH 653, 654, and 655 cannot be used for credit toward a PhD in mathematics.

**Preliminary Written and Qualifying Exams**

Students are required to take a preliminary written exam after completing the core courses, usually by the end of their second year. The exam is based on material presented in three of the four required courses (the student may choose which topic to exclude). These exams are offered two times a year. Students may take the exam as often as they like. A grade of “pass” on the preliminary written exam is sufficient to satisfy the creative component of the master’s degree in mathematics.

Students are required to take a qualifying exam after passing the preliminary written exam. This exam will have oral and written components. After passing the preliminary written exam, the student chooses a dissertation advisor and a three-person examination committee. In consultation with the advisor and committee, the student chooses a major and a minor area of study (the major and minor areas are presumed to be in two different branches of mathematics). The qualifying exam will cover the equivalent of approximately four courses of material from the major area and three courses from the minor area.

**Dissertation and Committee**

Approximately one semester after passing the qualifying exam, each doctoral student prepares a written dissertation proposal while taking MATH 998 (Doctoral Dissertation Proposal). The proposal must be approved by the thesis committee, which consists of the three qualifying exam committee members, plus a fourth member from outside the department. After successfully completing this requirement, the student advances to doctoral candidacy.

After advancing to candidacy, the student will work on a doctoral dissertation while enrolled in MATH 999. The dissertation is a written piece of original mathematics that demonstrates a doctoral candidate’s mastery of the subject matter. A student is expected to produce new and original research worthy of publication in a peer-reviewed journal. After the thesis is completed, the committee will review the thesis and examine the student in a public oral thesis defense.

**Molecular and Microbiology**

Phone: 703-993-1050
Web: gmu.edu/departments/mmb

**Faculty**

**Chair**: Willett

**Professors**: Bailey (distinguished), Chandhoke, Liotta, Petricoin, Popov, Sofer (distinguished university), Willett

**Associate professors**: Baranova, Christensen, Fryxell, Grant, Royt

**Assistant professors**: Cox, van Hoek, Wu

**Term assistant professors**: Beck (associate chair), Coss, Cupo, Fondufe, Kocache, Madden, Polayes

**Research professor**: Isbister

**Research assistant professor**: Popova

**Adjunct faculty**: McClintock, Tondi

**Affiliate faculty**: Anderson, Burgess, Connors, Cook, Dressick, Edmiston, Frank, Gunasinghe, Hearing, Hicks, Hunt, Karginov, Kulesh, Liu, McCreight, Monroe, Niemeyer, Patrick, Reilly, Schultz, Singh, Volfchikina, Wilhelmson, Wu

**Course Work**

The department offers all course work designated BIOL, BIOS, and MITCH in the Course Descriptions chapter of this catalog.

**UNDERGRADUATE PROGRAMS**

The bachelor degree programs in biology provide a sound liberal arts education with substantial experience in quantitative and analytical thought, along with preparation for a related profession. In addition to ensuring the strong background
necessary for graduate study in the many fields of biological science, the broad range of courses available at Mason allows students to develop careers in many areas, including secondary school teaching, environmental management, microbiology, molecular biology, biotechnology, genetics, and natural history. Alternatively, students may prepare for postgraduate studies in medicine, dentistry, veterinary medicine, wildlife management, fisheries biology, or marine science. The department also offers a BS in medical technology. Additional information can be found at the Molecular and Microbiology Department’s web site at gmu.edu/departments/MMB or by contacting the department, David J. King Hall, Room 3005, 703-993-1050.

Advising
All biology majors are strongly urged to see an academic advisor regularly to help them plan their schedule, so they can graduate on time. Biology majors should see an advisor for permission to register prior to their first semester and again as they complete 60 credits and 90 credits. Medical technology majors must see the medical technology advisor to obtain permission to register each semester. Call 703-993-1050 or visit David J. King Hall, Room 3005, to make an advising appointment.

Residence Requirement for Transfer Students
Students majoring in biology are required to complete 16 credits in the major at the 300 and 400 levels at Mason in addition to meeting the university residency requirement of at least 30 credits at Mason.

■ Biology, BA

In addition to satisfying the university-wide general education requirements and the requirements for a BA degree in COS, students must complete the following credits with a minimum GPA of 2.50 in the 32 credits of BIOL courses and a minimum GPA of 2.00 in the supporting courses listed below. No more than 8 credits of 100-level BIOL courses (103, 104, 124, 125) may be applied toward the 32 credits of required BIOL courses. (Through the course work below, biology majors satisfy the university-wide requirements in natural science, quantitative reasoning, and information technology proficiency.)

- 32 credits of biology, including BIOL 213, 303, 304, 305, 306, 307, 311, 492 or 494
- 8 credits of chemistry: CHEM 103, 104 or 211, 212
- 6 credits of STAT 250 and IT 103
- 6 credits from the following: ASTR 103, 111, 113; GEOL 101, 102; PHYS 243, 245

Students expecting to enter graduate or professional school are strongly urged to complete MATH 113 and 114. Organic chemistry and PHYS 243, 244, 245, and 246 are recommended.

■ Biology, BS

In addition to satisfying the university-wide general education requirements for the BS degree, students must complete the following course work with a minimum GPA of 2.50 in the 44 credits of BIOL courses and a minimum GPA of 2.00 in the supporting courses listed below. No more than 8 credits of 100-level BIOL courses (103, 104, 124, 125) may be applied toward the 44 credits of required BIOL courses. (Through the course work below, biology majors satisfy the university-wide requirements in natural science, quantitative reasoning, and information technology proficiency.)

- 44 credits of biology, including BIOL 213, 303, 304, 305, 306, 307, 311, and 492 or 494
- 13 credits of chemistry: CHEM 211, 212, 313, 315
- One of the following options:
  - CHEM 314 and 318 (5 credits)
  - One chemistry course at the 300 or 400 level (3 credits)
  - GEOL 101 and 102 (8 credits)
- 8 credits of physics: PHYS 243, 244, 245, 246
- At least 6 credits from the following: MATH 110, 111, 113, 114, or STAT 250
- 3 credits of computer skills: IT 103

Students are encouraged to consult with a biology faculty advisor to determine which option best meets their career goals. Students who wish to take biochemistry must take BIOL 483 to receive credit toward the major in biology. Students may choose to complete the requirements of one of the concentrations described below. Or, they may take biology elective courses of their choice to complete the requirement of 44 credits of biology.

▲ Concentration in Biotechnology (BT)

The biotechnology concentration consists of a selection of courses that provide essential skills to students who seek employment in the field or wish to include an applied component in their undergraduate training in biology.

In addition to satisfying the university-wide general education requirements for the BS degree, students majoring in biology with a concentration in biotechnology must complete the following. (Through the course work below, they satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- 24 credits in biology, including BIOL 213, 303, 304, 305, 306, 307, 311

*Laboratories associated with courses are required.
**Subject to approval by program coordinator.
- 18 credits in chemistry, including CHEM 211, 212, 313, 314, 315, 318
- 8 credits of physics: PHYS 243, 244, 245, 246
- At least 6 credits from the following: MATH 110, 111, 113, or 114; or STAT 250
- 3 credits of computer skills: IT 103

▲ Concentration in Environmental and Conservation Biology (ESCB)

This concentration is offered to students seeking a biology degree that focuses on ecology and organismal biology, and prepares them for graduate work or employment in environmental and conservation fields, such as natural resources management, fisheries, forestry, water quality management, aquatic and wetland ecology, and conservation biology. The concentration is staffed and supported by the Department of Environmental Science and Policy.
In addition to satisfying university-wide general education requirements for the BS degree, students must complete the following. (Through the course work below, they satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- **20 credits** in environmental and conservation biology, including BIOL/EVPP 377, 471; EVPP 318; a field course (either EVPP 350 or BIOL 345); and other courses chosen from the following: BIOL 309, 326, 331, 332, 333, 342, 344, 345*, 440, 472, 449; EVPP 350*, 415, 451; NCLC 401

*If not used for field course requirement.

- **13 credits** of chemistry, including CHEM 211, 212, 313, 315
- One of the following options:
  - CHEM 314 and 318 (5 credits)
  - GEOL 101 and 102 (8 credits)
- **8 credits of physics**: PHYS 243, 244, 245, 246
- **At least 6 credits** from the following: MATH 110, 111, 113, 114, STAT 250
- **3 credits of computer skills**: IT 103

**Concentration in Microbiology (MIB)**

This concentration offers lecture and laboratory courses in microbiology to prepare students for employment or advanced study in microbial genetics, physiology, diversity, and related fields.

In addition to satisfying university-wide general education requirements for the BS degree, students must complete the following. (Through the course work below, they satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- **12 credits** in microbiology: BIOL 405, 406, 407
- **8 credits** in elective courses: BIOL 385, 402, 403, 404, 418, 452, 453, 459, 483, 506, 563, 580
- **18 credits** of chemistry, including CHEM 211, 212, 313, 314, 315, 318
- **8 credits** of physics: PHYS 243, 244, 245, 246
- At least **6 credits** from the following: MATH 110, 111, 113, 114, STAT 250
- **3 credits of computer skills**: IT 103

**Concentration in Molecular Biology (MOB)**

The molecular biology concentration provides basic knowledge of the structure of macromolecules, and chemical processes that occur in living cells. The concentration prepares students for employment or further advanced study in molecular biology.

In addition to satisfying university-wide general education requirements for the BS degree, students majoring in biology with a concentration in molecular biology must complete the following. (Through the course work below, they satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- **12 credits in molecular biology**: BIOL 385, 482, 483, and 486
- **8 credits** of elective courses chosen from BIOL 322, 402, 403, 452, 453, 563, 568, 575, 580
- **18 credits** of chemistry, including CHEM 211, 212, 313, 314, 315, 318
- **8 credits** of physics: PHYS 243, 244, 245, 246
- At least **6 credits** from the following: MATH 110, 111, 113, 114, STAT 250
- **3 credits of computer skills**: IT 103

**Policy on Using Departmental Laboratories**

Only authorized experiments and exercises may be carried out in any departmental research or teaching laboratory and must be done under the supervision of a university faculty or staff member. No unauthorized work is allowed in any laboratory.

**Policy on Using Organisms in Classes**

Direct observations of actual organisms are considered an essential part of learning biology at all levels. Direct observations of organisms may involve the use of living or preserved specimens, dissections of organisms or parts of organisms, and microscopic examination of organisms or parts of organisms. All use of live animals conforms to National Institutes of Health guidelines for the use and care of laboratory animals. Activities specified above may be a required part of a course and thus serve as a basis for grading in the course. Any questions about the administration of this policy should be directed to the course coordinator or instructor.

**Writing-Intensive Requirement**

Mason requires all students to complete at least one course designated as “writing intensive” in their majors at the 300 level or above. Students majoring in biology fulfill this requirement by successfully completing BIOL 307. Students not taking BIOL 307 at Mason should consult the biology undergraduate coordinator for a course to fulfill this requirement.

**Honors Program in Biology**

**Admission Requirements**

Minimum requirements for invitation:
- GPA in biology courses must be 3.50 or better
- GPA in supporting requirements (math and other science) must be 3.00 or better
- Grade of B or better in Biol 213

Ideally, we would like to recruit students in their freshman or sophomore year.

**Retention Requirements**

Students in honors biology must maintain a biology GPA of 3.50 or better and a supporting GPA of 3.00 or better from the time they have accumulated 30 hours and thereafter.

Students who fall below this standard will be given a one semester probationary period in which to bring their GPA back up to the minimum standard.
Requirements to Graduate with Biology Honors
Students are required to take 6 to 7 credits in honors courses in BIOL including three semesters of BIOL 494 (honors seminar, 1 credit) or two semesters of Biol 494 and one semester of BIOL 493 (honors research, 1 credit).

The GPA requirements are as follows:
- Minimum 3.50 GPA in honors biology courses
- Minimum 3.50 GPA in biology requirements
- Minimum 3.00 GPA in supporting requirements
- Minimum 3.00 GPA overall

Minor in Biology
Candidates for the minor in biology must complete 19 to 20 credits in biology with a minimum GPA of 2.00, including BIOL 213, 303, 304, and either 307 or 311, in addition to one other 3- to 4-credit biology course at the 300, 400, or 500 level (not BIOL 301). Eight credits of course work must be unique to the minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Premedical, Predental, Prepharmacy, and Preveterinary Students
Web: prehealth.gmu.edu

Many students planning to enter medical, dental, pharmacy, veterinary, optometry, or other health professional schools choose to pursue a major in biology. These students should consult the health professions advising web site on required course work and overall preparation.

Teacher Licensure
Students who wish to become teachers should consult the College of Education and Human Development chapter of this catalog and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

Biology for Nonmajors
Students who are not majoring in science or mathematics and wish to fulfill their natural science requirement with a two-semester laboratory sequence in biology should enroll in BIOL 103 and 104. With permission of the instructor, nonmajors may enroll in BIOL 213 and then take one of the following to complete the requirement: BIOL 303, 304, or 305/306. Chemistry, physics, and mathematics majors should consult their faculty advisor to determine which biology courses to take.

Medical Technology, BS — BS-MTCH

This program requires the equivalent of three years of full-time preprofessional study at the college level preceding a senior year of professional education in an affiliated school of medical technology. All affiliated schools are accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

Responsibility for applying to schools of medical technology and gaining admission rests with the student; however, guidance is provided by the medical technology program director in the Molecular and Microbiology Department. Admission to medical technology schools is selective, so candidates should strive for strong academic standing. Students who fail to gain admission to a NAACLS-approved school are unable to complete the degree program. Such students may transfer to a biology major without loss of credits.

Application to medical technology schools should be initiated about a year before the desired entrance date. This fact, coupled with the large number of required courses in the preprofessional curriculum, makes it imperative that students in the program consult regularly with their faculty advisor. All medical technology majors and prospective majors are urged to enroll in MTCH 200 as early as possible. This course provides information on the profession, as well as the educational demands placed on candidates.

Students should be aware that the senior year spent off campus requires the following special interpretation of university policies. Transfer students must present at least 16 credits of 300- to 400-level biology or chemistry course work taken at Mason. Students may present no more than 6 credits of D grades in biology and chemistry courses required in the three years of preprofessional study. No unsatisfactory grades may be presented for courses in the senior year of professional study. Transfer students entering with more than 45 transfer credits are often unable to complete the preprofessional phase of their program in the usual three years of full-time study.

Senior students are registered at the university through special procedures. For details, consult the program director.

In addition to satisfying university-wide general education requirements for the BS degree and completing MTCH 200, candidates must present the following courses in their preprofessional programs with a minimum GPA of 2.00. (Through the course work below, majors satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.) Because of the extensive professional education requirements stipulated by NAACLS, students majoring in medical technology are exempt from the university-wide general education requirement in the fine arts.

- Biology: minimum 20 credits, including BIOL 213, 303, 305, 306, 311, 452, and 453
- Chemistry: minimum 18 credits, including CHEM 211, 212, 313, 314, 315, and 318
- Mathematics: minimum 6 credits (STAT 250 recommended; MATH 106 not applicable)
- Computer skills: IT 103

Students are encouraged to elect additional basic science courses during their preprofessional years. Recommended courses are BIOL 380, 465, 483, 484, and 485; CHEM 321; and PHYS 243, 244, 245, and 246.

Professional study during the senior year involves clinical education at an affiliated school of medical technology. Thirty credits of course work are required, including MTCH 401, 402, 403, 404, 405, and 406. The distribution of credits in these courses varies with the school of medical technology. No more than 30 professional credits may be applied toward the degree.

Medical Laboratory Technician Articulation Program

A special program is available for Medical Laboratory Technicians (MLTs) who are graduates of associate degree programs. This program provides substantial credit for the scientific and clinical aspects of the associate degree but requires students to meet clinical requirements for national...
certifying exams through approved work experience. For details, contact the program director.

**Major in Medical Technology as a Second Bachelor’s Degree**

While the standard program for medical technologists is three years on campus followed by a fourth year at a clinical affiliate (3 + 1), many students elect to complete a bachelor’s degree before entering the clinical program (4 + 1). Students who have completed a BS in biology or chemistry at Mason and then undertake a fifth year at a clinical affiliate may be eligible for a second bachelor’s degree with a major in medical technology. Students wishing to receive the second degree must apply before entering their fifth year. For further information, contact a medical technology advisor.

**Premedical Honor Society**

Alpha Epsilon Delta Zeta Premedical Honor Society is a national student support group, providing professional school tours, educational programs, and lectures on health topics and the professional school admissions process to students interested in such health-related fields as medicine, dentistry, optometry, and veterinary medicine. Active membership is awarded to students who have completed at least three semesters with a minimum scholastic GPA of 3.00. Associate membership is also available.

**Predental Society**

Mason students who are interested in pursuing careers in dentistry are encouraged to participate in the Predental Society. This student organization organizes supplemental programming focused toward dentistry as a career.

**Biology, Bachelor’s/Accelerated Master’s Degree**

Qualified undergraduates may be admitted to an accelerated master’s program and obtain both a BS and an MS within an accelerated time frame. This program is open only to those students who wish to pursue the master’s degree concentrations in microbiology or molecular biology. Students admitted to this program may take graduate courses after completing 90 undergraduate credits, and up to 6 credits of graduate work may be used in partial satisfaction of the requirements for the undergraduate degree. If students earn at least a 3.00 in these classes, they are granted advanced standing in the master’s program and must then complete an additional 24 credits to receive the master’s degree. All other master’s degree requirements must be met, including a minimum of 18 credits taken for the master’s after the bachelor’s degree is complete.

Students with an overall GPA of at least 3.00 may apply for provisional acceptance to the accelerated master’s program after completing BIOL 213, 303, 304, 305/306, 307, and 311; and CHEM 315 and 318; or after completing 75 undergraduate credits including BIOL 494. Three letters of recommendation, including one from a prospective thesis or project advisor, are required.

After completing 120 credits and all requirements for the bachelor’s degree, students are awarded a bachelor’s degree. Accelerated master’s students must then submit scores on the GRE and biology subject exam to have the provisional qualifier removed. Ordinarily, students should receive a minimum combined score of 1,100 on the verbal and quantitative portions of the general test and be in at least the 50th percentile on the subject exam.

**GRADUATE PROGRAMS**

**Biodefense, MS, PhD**

The interdisciplinary graduate degrees in biodefense are offered by the College of Science and the College of Humanities and Social Sciences (LA-MS-BIOD, LA-PHD-BIOD). For details, see the CHSS chapter in this catalog.

**Biology, MS**

This program provides advanced training for college graduates or professionals seeking careers in the biotechnology industry or biodefense, as well as more traditional careers in biomedical research, teaching, evolutionary biology, and animal biology. Master’s level concentrations are available in molecular biology, microbiology and infectious disease, bioinformatics and computational biology (BCB), and systematics and evolutionary biology. Alternatively, students may choose the program in biological sciences, which allows flexibility to specialize in additional areas.

**Admission Requirements**

Applicants must have a bachelor’s degree in biology or its equivalent, except for students who choose the BCB concentration. Students who choose the BCB concentration must have an undergraduate degree in any natural science, mathematics, engineering, or computer science. It is preferred that students who choose the BCB concentration have some undergraduate course work in cellular biology, molecular biology, genetics, and biochemistry (two to four upper-division courses), plus some undergraduate course work in computer science (two to four courses that include substantial programming projects). Students without this background may be asked to remedy their deficiencies. Students who choose the concentration in microbiology and infectious disease must have a lecture and lab course in microbiology and a lecture course in biochemistry. All MS concentrations require a GPA of 3.00 in biology course work or in the last 60 credits of undergraduate study is required. Students must also submit three letters of recommendation and scores on the GRE. Successful applicants usually score at least 1,100 on the verbal and quantitative sections of the GRE (1,200 for the BCB). Applicants to all concentrations except BCB must submit scores on the GRE subject exam in biology or biochemistry. Applicants to the BCB concentration must submit a GRE subject score in an area of their choosing (such as mathematics, computer science, physics, biology, or biochemistry). Admission is contingent on acceptance by a faculty research advisor.

**Degree Requirements**

An advisory committee and the student work together to develop a program of study that best fits the student’s background and interests. At least one member of the committee must be a member of the Molecrular and Microbiology Department. The student must submit a program of study to the program director for approval within the first 12 credits of graduate work and must complete at least 30 graduate credits.

Students have the option to write a thesis (3 to 6 credits of BIOL 799) or project (1 to 3 credits of BIOL 798). According to Mason graduate policies, the same quality of work is expected of students regardless of their chosen option; that is,
the MS thesis option or the MS project option. In general, the MS thesis is most appropriate for students planning or considering a research career. The MS project is most appropriate for students who have scheduling commitments, such as a full-time job, that may preclude performing a complete series of laboratory experiments. The requirements differ primarily at the conclusion of the project, when students pursuing the project option must successfully complete written and oral comprehensive exams. Students pursuing the thesis option must write a formal thesis that meets the requirements of the graduate school, as well as defending their thesis and presenting their results in a public seminar.

Students in the molecular biology, microbiology and infectious disease, and the bioinformatics and computational biology concentrations are required to present one research paper at the Departmental Journal Club meeting any time before graduation.

Program in Biological Sciences
This program is for students who wish to specialize in an area not covered by the concentrations described below.

Requirements
2–3 credits of BIOL 690 or BIOS 702
2 credits of BIOL 692 or 695
1–6 credits of BIOL 798 or 799
19–25 credits of electives in BIOL, BIOS, or related areas as approved by the student’s advisor

▲ Concentration in Bioinformatics and Computational Biology (BCB)

Requirements
2–3 credits of BIOL 690 or BIOS 702
2 credits of BIOL 692 or 695
1–6 credits of BIOL 798 or 799
3 credits of BIOL 580 or BINF 630
3 credits of BINF 634
3 credits of BIOS 741
2–4 credits in molecular techniques (see below)
5–15 credits in BIOL, BIOS, or related areas as approved by the student’s advisor, graduate committee, and the program director

▲ Concentration in Microbiology and Infectious Disease (MID)

Requirements
2–3 credits of BIOL 690 or BIOS 702
2 credits of BIOL 695
1–6 credits of BIOL 798 or 799
3 credits of BIOL 669 Pathogenic Microbiology
3 credits of BIOL 715 Microbial Physiology
3 credits of BIOL 718 Techniques in Microbial Pathogenesis
3 credits of BIOL 563 Virology
7–13 credits of electives to be chosen from the following:
BIOL 564 Techniques in Virology (2 credits)
BIOL 553 Advanced Topics in Immunology (3 credits)
BIOL 682 Advanced Eukaryotic Cell Biology (3 credits)
BIOL 720 Microbial Metabolism (3 credits)
BIOS 743 Genomics, Proteomics, and Bioinformatics (3 credits)
BIOS 710 Current Topics in Bioscience (1–3 credits)

▲ Concentration in Molecular Biology (MOB)

Requirements
2–3 credits of BIOL 690 or BIOS 702
2 credits of BIOL 695
1–6 credits of BIOL 798 or 799
4 credits of BIOL 583
6 credits of BIOL 568, 682
3 credits of BIOL 579 or BIOS 767
2–4 credits in molecular techniques (see below)
3 credits in bioinformatics (BIOL 580, BINF 630 or 634)
7 credits of electives in BIOL, BIOS, or related areas as approved by the student’s advisor, graduate committee and program director

▲ Concentration in Systematics and Evolutionary Biology (SEB)

Requirements
2–3 credits of BIOL 690 or BIOS 702
2 credits of BIOL 692 or 695
1–6 credits of BIOL 798 or 799
3 credits of BIOL 574
3 credits of BIOL 579 or BIOS 767
2–4 credits in molecular techniques (see below)
3–4 credits in organismal biology
5–14 credits of electives in BIOL, BIOS, or related areas as approved by the student’s advisor

Molecular Techniques Requirement
Students may satisfy the molecular techniques requirement with BIOL 668 or BIOS 740. Special topics courses, such as BIOL 575 or 691, may be approved for this requirement by the program director but only in semesters in which they are primarily a laboratory course with substantial content of techniques in molecular biology.

Recommended Electives
The following list, for students in molecular biology, bioinformatics, and computational biology, is provided as a suggestion only and is not intended to be complete. Note that two courses covering substantially similar topics may not both be counted in the student’s course plan. Students should consult their faculty research advisor when preparing a course plan.

BIOL 553, 568, 575, 578, 579, 583, 585, 682, 793
BIOS 740, 741, 742, 743, 744, 767

■ Biosciences, PhD

This program is a research-oriented field of study that prepares students for significant contributions in academic or industrial settings. The area of emphasis in functional genomics and biotechnology includes microarray analysis of gene expression, sequencing and analysis of genes, gene family evolution, mechanisms of toxicology and mutagenesis, and biotechnological applications. The concentration in microbiology and infectious disease stresses molecular mechanisms of infectious disease, genomic and proteomic analysis of pathogens, and the physiology and metabolism of pathogens. The academic component is a three-tiered structure. The first tier provides a set of four core courses designed to advance research skills across all disciplines. The second tier comprises four or five core courses and elective courses. The first two tiers are designed to be completed in approximately two
years, including the comprehensive exam. Only on completion of these requirements, the comprehensive exam, and a successful thesis proposal can the students advance to candidacy status. The third tier focuses on research and culminates in a dissertation.

**Admission Requirements**

In addition to materials required of all applicants for graduate study, the following is also required:

- Minimum 3.25 GPA in previous course work with significant training in the biological sciences. A TOEFL score of 575 on the paper-based exam or 230 on the computer-based exam is required of international students.
- Three letters of recommendation from faculty members or individuals who have firsthand knowledge of the applicant’s academic or professional capabilities.
- Statement of purpose consistent with the research interests of at least one faculty member in the program.
- Scores on GRE taken within the past five years prior to date of application submission.

An interview may be required. Applications should be submitted by February 1 for fall admission. Under unusual circumstances, applications may be considered for spring admission if they are received by October 1. Applications will be considered until positions are filled. Students are encouraged to meet application deadlines to be considered for scholarships and stipends. Strong candidates who lack several prerequisites may be admitted to provisional status. Removal from provisional status and continuation in the program is contingent on earning a GPA of 3.25 in the program’s fundamental courses, plus completion of missing prerequisites.

Students who have not taken a course in basic biochemistry will be required to complete one prior to BIOS 701.

**Degree Requirements**

Candidates for the PhD in biosciences must complete a minimum of 72 graduate credits.

- **Core courses:** 12 credits in BIOS 701, 702, 703, 704.
- **Emphasis or concentration:** 12–16 credits required courses (see below).
- **Elective:**
  - Two presentations at departmental Journal Club.
  - Qualifying exam.
  - Dissertation: 12–24 credits in proposal (BIOS 998) and research (BIOS 999).

On admission to the program, each student is assigned an advisor from the bioscience faculty. The advisor may be changed by mutual consent of student and advisor, or petition to the program director and dean. With their advisor, students adopt an individual program that focuses on a specific area of research.

By the end of the fourth semester of course work, students assemble a dissertation committee of four graduate faculty members with representation from at least two academic departments. The committee and the program director approve the program of study.

On nearing completion of course requirements, students take a qualifying exam with a written and an oral component. At the discretion of the committee, the written qualifying exam may be retaken once if the student’s performance was deemed below satisfaction. On successful completion of the qualifying exam, the majority of all course work, and an accepted thesis proposal, students will be recommended for advancement to candidacy by the committee and the program director.

After advancement to candidacy, students are eligible to enroll in dissertation (999). Students must present their dissertation results to their graduate committee on a regular basis until graduation. For graduation, students will present their results to their graduate committee and defend their dissertation publicly.

For students entering the doctoral program with a master’s of science degree, the number of credits required may be reduced by a maximum of 30 with approval of the advisor and the program director. Graduate credits taken previously and not used toward another degree may be transferred, subject to the approval of the advisor, the program director, and the dean.

Students in the doctoral program are required to present two research papers at the departmental Journal Club meeting any time before graduation.

**Emphasis in Functional Genomics and Biotechnology**

This emphasis prepares students for significant contributions in an academic or industrial research career. Areas of emphasis include microarray analysis, cancer genomics, molecular studies of disease mechanisms, and biotechnology.

**Requirements**

All students must take the following 15 graduate credits as their emphasis courses:

- BIOS 740 Current Lab Methods in Functional Genomics and Biotechnology
- BIOS 741 Genomics
- BIOS 742 Biotechnology
- BIOS 743 Genomics, Proteomics, and Bioinformatics
- BIOS 744 Molecular Genetics

Electives may include graduate-level courses relevant to the student’s research and authorized by the student’s advisor and program director.

▲ **Concentration in Microbiology and Infectious Disease (MID)**

Students in this concentration will be prepared for employment in academia, government, or industry. By stressing mechanisms of pathogenicity, physiology, metabolism, and genomics of pathogens, students will have a firm foundation for future research in infectious disease. Students will also be introduced to advanced laboratory practices, such as animal research methodologies and biocombustion laboratory work.

**Requirements**

In addition to the degree requirements stated previously, students are required to take the following:

- BIOL 563 Virology
- BIOL 669 Pathogenic Microbiology
- BIOL 715 Microbial Physiology
- BIOL 720 Microbial Metabolism
- BIOL 718 Techniques in Microbial Pathogenesis

Electives to complete 72 credits

To be chosen from BIOL 553, 564, 568, 578, 579, 580, 682, BIOS 710, 740, 741, 742, 743, 744, 760, 898, 899; or EVPP 551 or BINF 633, 636, 705
Neuroscience

**Neuroscience, BS**

The interdisciplinary undergraduate program in neuroscience is offered by the COS and the College of Humanities and Social Sciences (CHSS). For details, see the CHSS chapter in this catalog.

**Neuroscience, PhD**

The interdisciplinary doctoral program in neuroscience is offered by the COS, CHSS, and the Krasnow Institute for Advanced Study.

The program focuses on the complexity of the human brain and addresses the challenge of developing an integrative understanding of human cognition and higher brain function. In response to this challenge, the rapidly developing field of neuroscience has produced an exponential increase in the amount of data available to investigators as they develop new theories of brain function and new hypotheses to test. The main objective of the program is to prepare students to participate at the cutting edge of this exciting field in academia, industry, and government. The program provides students with a rich interdisciplinary intellectual environment that fosters the development of the skills they will need to successfully pursue research careers.

Current faculty research focuses on the broad areas of behavioral, anatomy, physiology, biochemistry, molecular biology, computational modeling, and informatics. External research collaborations exist with federal agencies, private and not-for-profit corporations, and other universities. The scope of research ranges from the subcellular and molecular level (in the context of such phenomena as drug addiction and the biological basis of schizophrenia) to the systems and behavioral level (including cognitive studies on great apes in collaboration with Great Ape Trust of Iowa).

Current research projects include the effects of drugs and alcohol on behavioral and neurological development, cellular organization and connections of sensory processing areas in fish, plasticity mechanisms supporting network formation and information processing, cellular and subcellular models of associative learning, biochemical dynamics in disorders of the basal ganglia, computational methods for simulation of complex biological systems, role of metals in memory and Alzheimer’s disease, dynamical behavior of neurons and networks of neurons, and adaptive control for stabilization of epilepsy.

**Admission Requirements**

Applicants should have a bachelor’s degree in a relevant field and undergraduate courses in chemistry, cell biology, and integral calculus. Admission requires a minimum GPA of 3.25 in undergraduate work and acceptable GRE scores. In addition, applicants must submit a statement of purpose consistent with the research interests of at least one faculty member in the program and the names of two faculty members who may be suitable as advisors or supervisory committee members. To apply, prospective students should forward to the COS Fairfax Campus Graduate Admissions Processing Center a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current résumé, and a statement of purpose. Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE-GEN. The GRE-SUB is recommended if it is given in the student’s undergraduate major. TOEFL scores are required of all international applicants.

**Degree Requirements**

The curriculum consists of 72 credits: 48 credits of course work and 24 credits of dissertation research. The 48-credit requirement may be reduced by up to 30 credits for a qualified student holding a previous master’s degree. Up to 24 credits of previous, relevant graduate course work may be transferred into the program provided those credits have not been applied toward a previous degree. Additional requirements for graduation include a dissertation and at least one publication (in print or in press) in a refereed journal.

Two areas of emphasis are included in the program: behavioral, anatomical, and molecular neuroscience, and theoretical, computational, and physiological neuroscience (TCP). All students will follow almost the same curriculum for the first two years, although emphasis prerequisites may vary slightly. For example, students in the TCP emphasis must have basic knowledge of integral calculus. It is expected that the selection of elective thesis topics will vary widely between the two areas of emphasis; however, students will be allowed to mix and match electives from both areas, with guidance and consent from the advisor or program director.

The courses, seminars, and laboratory rotations and readings (comprising a total of 48 credits) are organized as follows:

- Core science: NEUR 604, 611, 702
- Core neuroscience: NEUR 601, 602, 603, 701
- 9 credits of rotations and readings: NEUR 703
- 24 credits of dissertation research: NEUR 998, 999
- 17 credits of electives
- 1 credit of seminar: NEUR 709

When course work is nearing completion, students should form a doctoral committee and have their thesis proposal ready to defend. Candidacy exams include written and oral components. After passing the candidacy exam and receiving committee approval of the dissertation proposal, students are advanced to doctoral candidacy. The degree will be awarded after completion of the required course work and approval of a PhD thesis that makes an original and significant contribution to the field.

**Physics and Astronomy**

Phone: 703-993-1280  
Web: www.physics.gmu.edu

**Faculty**

**Professors:** Aharonov, Becker*, Bialetan-Barojas*, Dvorzecka, Ehrlich (chair), Ellsworth, Kafatos, Lieb, Mishin, Satija, Summers, Trefil (Robinson Professor)  
**Associate professors:** Barreto, Ceperley, Rubin, Satyapal, Sauer, So, Wallin*  
**Assistant professors:** Cressman, Opher, Rosenberg, Tian, Tollakken*, Weigel*, Weingartner, Zhang*  
**Term associate professor:** Oerter  
**Term assistant professors:** Geller, Goldman, Iacozetti, Jazaeri, Wyczalkowski  
**Term instructors:** Ericson, Ewell  
**Emeriti:** Ceperley, Evans, Mielczarek  
**Research faculty:** Gliozzi, Meier, Poland, Richards

*These guest faculty hold primary appointments in other departments.
Course Work
The Physics and Astronomy Department offers all course work designated ASTR and PHYS in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Astronomy, BS  BS-ASTR
The BS in astronomy prepares students for graduate school or one of the many careers in research or teaching positions, or employment in industry, business, or education fields where analytical skills and a scientific background are advantageous. Students who are considering a double major in the fields of mathematics, science, computer science, and engineering should talk to the undergraduate coordinator. Note that at least 18 credits used to fulfill an astronomy BS cannot be used to fulfill another major or minor. Some course substitutions are allowed for double majors, but these must be approved in writing in advance.

In addition to satisfying the university-wide general education requirements for the BS degree, students must complete a total of 39 credits in physics and astronomy and 17 credits in mathematics with a minimum GPA of 2.00. Through the course work below, astronomy majors satisfy the university-wide requirements in natural science and quantitative reasoning. Also, by taking ASTR 402, they satisfy the university’s writing-intensive requirement.

- Seven required core astronomy courses (21 credits): ASTR 103 or 113, 328, 402, 403, 404, 428, and 490
- Eight required physics courses (18 credits): PHYS 160, 161, 260, 261, 262, 263, 305, and 308
- Five required math courses (17 credits): MATH 113, 114, 213, 214, and 313 or 314
- 9 credits from the following (at least 6 credits must be in upper-level courses): ASTR 302, 401, 408, 409, 530, 535; CS 112; MATH 203, 446, 447; PHYS 121, 122, 123, 124, 251, 303, 307, 510, and 575, or any preapproved BIOL, CHEM, MATH, or PHYS courses

In meeting the above requirements, students may choose an area of emphasis. Students who wish to complete an emphasis should plan a program of study in consultation with their advisors. Some emphases listed below require more than 9 credits in the last category above.

Emphasis in Astrobiology
This emphasis prepares students for careers in research, teaching, or science journalism. Students must take BIOL 213, 305, and 506 (The Origin of Life), and complete a senior project (ASTR 408) or internship (ASTR 409).

Emphasis in Computational Astronomy
This emphasis prepares students planning for computation and information-related jobs in industry and government labs. Students must take 9 credits of the following: ASTR 401; PHYS 251 or 310; and MATH 446 or 447. In addition, they should complete a senior project (ASTR 408) or internship (ASTR 409).

Emphasis in Graduate School Preparation
This emphasis prepares students for graduate study in observational or theoretical astronomy. Student must take two courses from ASTR 530 or 535, and MATH 446. They should complete a senior project (ASTR 408) or internship (ASTR 409) in the specialty that they intend to pursue in graduate school.

Sample Schedule for Astronomy BS
(excluding general education courses)

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 113 Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 101 Composition</td>
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</tr>
<tr>
<td>ASTR 103 Astronomy</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 122 Relativity</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 123 Inside the Quantum World</td>
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<table>
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<tr>
<th>Second Semester</th>
<th></th>
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<tbody>
<tr>
<td>MATH 114 Calculus II</td>
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</tr>
<tr>
<td>PHYS 160 University Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 161 University Physics I Lab</td>
<td>1</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Third Semester</th>
<th></th>
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<tbody>
<tr>
<td>ASTR 302 Foundations of Cosmology</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 260 University Physics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 261 University Physics II Lab</td>
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</tr>
<tr>
<td>MATH 213 Calculus III</td>
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</table>

<table>
<thead>
<tr>
<th>Fourth Semester</th>
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<tbody>
<tr>
<td>ASTR 301 Astrobiology</td>
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</tr>
<tr>
<td>PHYS 262 University Physics III</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 263 University Physics III Lab</td>
<td>1</td>
</tr>
<tr>
<td>MATH 214 Elementary Differential Equations</td>
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<table>
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<tr>
<th>Fifth Semester</th>
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<tbody>
<tr>
<td>ASTR 328 Introduction to Astrophysics</td>
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</tr>
<tr>
<td>PHYS 305 Electromagnetic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 302 Advanced Composition</td>
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<tr>
<th>Sixth Semester</th>
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<tbody>
<tr>
<td>MATH 313 Introduction to Applied Mathematics</td>
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</tr>
<tr>
<td>PHYS 307 Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 308 Modern Physics</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Seventh Semester</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>MATH 446 Numerical Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>ASTR 401 Computation in Astronomy</td>
<td>3</td>
</tr>
<tr>
<td>ASTR 403 Planetary Sciences</td>
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</tr>
<tr>
<td>ASTR 490 Astronomy seminar</td>
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</table>

<table>
<thead>
<tr>
<th>Eighth Semester</th>
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</thead>
<tbody>
<tr>
<td>MATH 447 Numerical Analysis II</td>
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<tr>
<td>ASTR 404 Galactic Astronomy</td>
<td>3</td>
</tr>
<tr>
<td>ASTR 408 Senior Project</td>
<td>3</td>
</tr>
<tr>
<td>ASTR 428 Relativity and Cosmology</td>
<td>3</td>
</tr>
</tbody>
</table>

Astronomy, BA  BA-ASTR
The BA in astronomy prepares students for a career in industry, business, science education, and science writing, where analytical skills and scientific background are necessary. This degree is not suitable for students who intend to pursue a graduate degree in astronomy.

Students in the fields of mathematics, science, computer science, and engineering who are considering a double major should discuss this option with the undergraduate coordinator. Some course substitutions are allowed for such majors, but they must be approved in writing in advance.

In addition to satisfying university-wide general education requirements for the BA degree, students must complete a minimum of 26 credits in physics and astronomy and 6 credits in mathematics, with a minimum GPA of 2.00. Through the course work below, astronomy majors satisfy university-
wide requirements in natural science and quantitative reasoning. ASTR 402 also satisfies the university’s writing-intensive requirement.

- Eight required core astronomy courses (20 credits): ASTR 111, 112, 113, 114, 301, 302, 402, and 490
- One of the following physics sequences:
  - PHYS 243, 245 (6 credits)
  - PHYS 160, 161, 260, 261, 262 (11 credits)
- One of the following mathematics sequences:
  - MATH 106, 108 (6 credits)
  - MATH 113, 114 (8 credits)
  - MATH 115, 116 (8 credits)

Electives (15 credits, at least 3 credits in upper-level courses) drawn from the following list (or with permission of the department and course instructor) from advanced ASTR, PHYS, or MATH courses: ASTR 390, 403, 408; PHYS 121, 122, 123, 124; CS 112; BIOL 103, 104, 213; CHEM 101, 102, 103, 104, 155, 156, 201, 202, 211; GEOL 101, 102.

**Note:** Students who take the 10-credit physics sequence and one of the 8-credit math sequences can count the additional 6 credits beyond required minimum credits toward elective credit in the major.

**Minor in Astronomy**

The minor requires completion of a physics prerequisite and 15 credits in astronomy, with a minimum GPA of 2.00. Eight credits of course work must be unique to the minor. The physics prerequisite consists of one of the two sequences: PHYS 243, 244, 245, 246, or PHYS 160, 161, 260, 261, 262, 263. After the introductory physics sequence, students are required to take ASTR 111, 112, 113, and 114, and two astronomy courses chosen from ASTR 301, 302, 328, 402, 403, 404, 428, and 530.

For policies governing all minors, see the Academic Policies chapter of this catalog.

**Physics, BS**

**BS-PHYS**

The BS in physics prepares students for graduate school and careers in business or industry. Students in the fields of mathematics, science, and engineering who are considering a double major in physics should discuss this option with the undergraduate coordinator. Note that at least 18 credits used to fulfill a physics BS cannot be used to fulfill another major or minor. Some course substitutions are allowed for double majors, but these should be discussed in advance.

In addition to satisfying the university-wide general education requirements for the BS degree, students must complete a total of 45 credits in the major and 20 in mathematics, with a minimum GPA of 2.00, distributed as follows. Through the course work below, physics majors satisfy the university-wide requirements in natural science and quantitative reasoning, and the intensive writing requirement by taking PHYS 407.

- Eleven required core physics courses (27 credits): PHYS 160, 161, 260, 261, 262, 263, 303, 305, 308, 402, and 407 (Students double majoring in engineering and physics may substitute ECE 305 for PHYS 305.)
- Six credits from PHYS 251, 306, 307, 405 or 406, 408 or 409, 416; and ASTR 328 or 428
- 12 credits from PHYS 121, 122, 123, 124; CS 112; or any approved upper-level physics, astronomy, chemistry, electrical engineering, or mathematics courses
- Six required math and statistics courses (20 credits): MATH 113, 114, 203, 213, 214, and 313 or 413; or STAT 344

In meeting the requirement for 6 credits outside the core, students have the option of electing an emphasis. The courses required for each emphasis are listed below. Students who wish to complete an emphasis should plan a program of study in consultation with their advisor.

**Emphasis in Applied Solid State Physics**

This emphasis is for students who wish to pursue a career in the semiconductor industry. To complete this emphasis, students should take the following courses: PHYS 512, and ECE 430 and ECE 431. In addition, students should complete a senior project (PHYS 408 or 409) or honors thesis (PHYS 405 and 406) in applied solid state physics.

**Emphasis in Astrophysics**

This emphasis is for students who wish to pursue a career that applies computers to the solution of physical problems and data analysis. To complete this emphasis, students should take at least 9 credits from the following courses: PHYS 428; ASTR 328, 404, 530, 532, 535; and MATH 446. In addition, students should complete a senior project (PHYS 408) or honors thesis (PHYS 405 and 406) on an astrophysics problem.

**Emphasis in Computational Physics**

This emphasis is for students who wish to pursue a career in electronics. To complete this emphasis, students should select four courses from the following: PHYS 412; ASTR 328, 404, 530, 532, 535; and ECE 442, and ECE 446. In addition, students should complete a senior project (PHYS 408) or honors thesis (PHYS 405 and 406) on a problem that involves using a computer for the solution of a physical problem.

**Emphasis in Medical Physics**

This emphasis is for students who wish to pursue a career in industry, applying a strong background in electronics to physical problems. To complete this emphasis, students should take at least 9 credits from the following courses: ECE 301, 333, 430, 431, and 433. In addition, they should complete a senior project (PHYS 408) or honors thesis (PHYS 405 and 406) on an electronics problem.

**Emphasis on Graduate School Preparation**

Although any of the options listed here provide the successful student with a fully adequate background to enter graduate school, this emphasis is for students whose career goals definitely include graduate work in physics. To complete this emphasis, students should take at least 9 credits from the following courses: PHYS 510, 512, 540; and ASTR 530, and a senior project (PHYS 408) or honors thesis (PHYS 405 and 406) in the specialty that they intend to pursue in graduate school.

**Emphasis in Medical Physics**

Physics majors generally have an excellent acceptance record in applying to medical, dental, or veterinary schools. Although there is no formal set of courses within physics that is uniquely suitable, students should meet with a physics advi-
sor and a health sciences advisor for information about the university’s Medical Sciences Advisory Committee. For more information, call 703-993-1050.

Because schools in the health sciences vary both in their philosophies and specific requirements, it is wise for students to become aware of such information well in advance of applying for admission. Although specific requirements vary, most programs do require applicants to complete at least one year of biology. Other requirements generally include organic chemistry (CHEM 313, 314, 315, and 318 or 320).

Emphasis in Physics Education

This emphasis is intended for students wishing to pursue a career teaching high school physics. The goal of the program is to allow students to receive a license to teach physics in Virginia secondary schools within 120 credits. In addition to the standard requirements for the physics major, students should enroll in 3 credits of directed study in physics laboratory instruction under PHYS 390. The students must also take the following education courses: EDUC 422, 472, EDCI 472, 473, 491, EDRD 419, and pass the Praxis I and II exams to qualify for the teaching license. EDCI 472 also satisfies the social and behavioral science general education requirement, and EDCI 491 satisfies the synthesis general education requirement.

Sample Schedule for Physics BS
(excluding general education courses)

**First Semester**
- MATH 113 Calculus I .............................................4
- ENGL 101 Composition ........................................3
- CHEM 211 or BIOL 213 ........................................3
- PHYS 122 Relativity .............................................1
- PHYS 123 Inside the Quantum World ....................1

**Second Semester**
- MATH 114 Calculus II ............................................4
- PHYS 160 University Physics I ..............................3
- PHYS 161 University Physics I Lab ........................1
- CS 112 Computer Science I ...................................4

**Third Semester**
- PHYS 251 Introduction to Computer Techniques ........3
- PHYS 260 University Physics II ................................3
- PHYS 261 University Physics II Lab ........................1
- MATH 213 Calculus III .........................................3

**Fourth Semester**
- PHYS 262 University Physics III ..........................3
- PHYS 263 University Physics III Lab ........................1
- MATH 214 Elementary Differential Equations ...........3

**Fifth Semester**
- PHYS 303 Classical Mechanics .............................3
- PHYS 305 Electromagnetic Theory ........................3
- PHYS/MATH elective
- MATH 313 Introduction to Applied Mathematics ........3
- ENGL 302 Advanced Composition ........................3

**Sixth Semester**
- PHYS 306 Wave Motion and Electromagnetic Radiation 3
- PHYS 307 Thermodynamics ................................3
- PHYS 308 Modern Physics ....................................3
- MATH 314 Introduction to Applied Mathematics 3

**Seventh Semester**
- PHYS 402 Introduction to Quantum Mechanics ........3
- PHYS 407 Senior Lab in Modern Physics .................3
- PHYS 416 Special Topics in Modern Physics ............3
- PHYS 510 Computational Physics ........................3

**Eighth Semester**
- PHYS 408 Senior Project ........................................3
- PHYS 512 Solid State Physics and Applications ..........3
- PHYS 540 Nuclear and Particle Physics ................3

Honors Program in Physics

Physics majors who have maintained an overall GPA of at least 3.50 in physics courses and a GPA of 3.50 in all courses taken at Mason may apply to the departmental honors program when they complete the first semester of their junior year. To graduate with honors in physics, a student is required to maintain a minimum GPA of 3.00 in physics courses and successfully complete PHYS 405 and 406 with a GPA of at least 3.50 and a grade of at least A- in PHYS 406.

Alternative Introductory Sequence

Normally, students who intend to major in physics should take the physics introductory sequence (PHYS 160, 161, 260, 261, 262, and 263). Students who decide to major in physics after completing PHYS 243, 244, 245, and 246 may do so but only with written permission of the Physics and Astronomy Department. Those students are required to take at least 4 additional credits in approved physics courses.

Physics for Nonmajors

PHYS 243, 244, 245, and 246 are recommended for biology, geology, and premedical students, and mathematics students who seek a BA degree. PHYS 101, 102, 103, and 104 are intended for nonscience majors. PHYS 160, 161, 260, 261 or 265, 262, and 263 constitute a calculus-based sequence in general physics to be taken by physics and engineering majors, and chemistry, computer science, and mathematics students who are pursuing a BS degree. Students may receive credit for only one of the following three sequences: PHYS 243, 244, 245, 246; PHYS 103, 104; or PHYS 160, 161, 260, 261, 262, 263.

Minor in Physics

The minor requires 18 credits with a minimum GPA of 2.00, including PHYS 160, 161, 260, 261, 262, and 263, and any two courses from PHYS 303, 306, 307, 308, 402, 428, and 305 or 513.

Eight credits of course work must be unique to the minor. For policies governing all minors, see the Academic Policies chapter of this catalog.

Physics, Bachelor’s and Accelerated Master’s Program

This program allows academically strong undergraduates with a commitment to research to obtain BS and MS degrees by successfully completing 144 credits within five academic years plus summers their last two years. On completion, students are exceptionally well prepared for entry into a professional school or a PhD program in physics or a related discipline. Well-prepared students are encouraged to apply to this program after they complete 90 credits. Admitted students take selected graduate courses during their senior year (when they have successfully completed prerequisites) and are able to use up to 6 graduate credits in partial satisfaction of requirements for the undergraduate degree. On
completion of that degree and with satisfactory performance (3.00) in the graduate courses, students are given advanced standing in the master’s program and complete an additional 24 credits to receive the master’s degree. All other master’s degree requirements must be met. See the department for further details.

Research Opportunities

The department offers many opportunities for undergraduate students to get involved with research. Students should consult with faculty working on research of interest to them, based on their examination of the Physics Department web site.

Teacher Licensure

Students who wish to become teachers should consult the College of Education and Human Development chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2078, e-mail gacline2@gmu.edu, or go to gse.gmu.edu.

GRADUATE PROGRAMS

Applied and Engineering Physics, MS

This degree contains elements of traditional physics programs and the application of physics to a diversity of critical societal problems. The program is divided into three areas of emphasis. The standard emphasis is intended for students who may wish to pursue further graduate study in physics leading to a PhD degree in preparation for a career in basic research. The applied physics emphasis is intended for those who wish to apply the techniques and subject areas of physics to multifaceted problems encountered in the workplace, particularly in physics, engineering, computational science, and other related areas. The engineering physics emphasis allows students to select a larger number of courses from electrical engineering or nanotechnology, and other areas.

Many courses are offered during late afternoon or evening hours to allow students with full-time employment to attend easily. Students employed at area high-technology organizations may take up to 6 credits (out of 30) for work done on the job under the guidance of a faculty member. This employment-related research may be conducted under an optional 3-credit research project or an optional 6-credit master’s thesis. Master’s students who are not employed full time may apply for financial aid or a limited number of research assistantships.

Admission Requirements

Individuals holding a baccalaureate degree in physics or a related field from an accredited institution and who earned a GPA of 3.00 (out of 4.00) in their last 60 credits are invited to apply for admission. If the baccalaureate degree is in a field other than physics, applicants should have taken several courses beyond the introductory physics courses, such as junior-level classical mechanics, electricity and magnetism, or electronics. Applicants may be required to make up one or two deficiencies, based on a graduate physics advisor’s assessment, and still be permitted to enroll in the program. Three letters of recommendation must be submitted, preferably from former professors. The general GRE and the GRE subject test in physics are recommended for applicants who received their baccalaureate degrees within the past five years. Those with less recent bachelor’s degrees may present a statement of their work experience in lieu of the GRE.

Degree Requirements

Candidates for the degree must successfully complete 30 credits in the categories shown below:

- 6 credits of required core courses: PHYS 684 and PHYS 685. For the applied and engineering physics emphasis, students may substitute PHYS 502 for PHYS 684 and PHYS 513 for PHYS 685.
- 15 credits described below for each emphasis:
  
  Standard emphasis: Students should take any five of the following courses: PHYS 510, 512, 533, 540, 575, 612, 613, 620, 676, 701, 705, 711, 785, 728, 784, and 736; ASTR 530, 761, 764, 765, and 766
  Engineering physics emphasis: Students should take PHYS 510, PHYS 533 and 9 credits of ECE graduate courses.
  Applied physics emphasis: Students should take PHYS 510 and 533, and any 9 credits from this list: ASTR 535, 660, 760; BINF 731, 740, 741; CLIM 710, 711, 712, 713, 714, 715, 750; CSI 660, 721, 722, 728, 763, 783; ECE 500, 521, 528, 548, 565, 584, 699; NANO 500, 510; PHYS 512, 540, 575, 585, 612, 613, 640, 660, 767, 736, 760
- 9 credits of electives chosen from courses in physics, chemistry, mathematics, engineering, information technology, and computational sciences and informatics. No more than 6 credits may be chosen from areas outside ASTR, CSI, ECE, NANO, and PHYS. Elective credits can include a project (PHYS 798) or thesis (PHYS 799). Students may choose to do either ECE/PHYS 798 Research Project (3 credits) or ECE/PHYS 799 Master’s Thesis (6 credits), but not both. The research project may be conducted at a student’s place of employment with the concurrence of a faculty advisor. The thesis is a more substantial piece of work performed under the supervision of a major professor and requires students to make an oral defense. ECE/PHYS 798 may be taken only once. No more than 6 credits of PHYS 799 may be applied to the degree. In addition to the requirements stated above, students may also select an emphasis in astrophysics, atmospheric physics, biological applications of physics, computational physics, condensed matter, instrumentation (engineering physics), or nonlinear dynamics. An emphasis requires that students complete 15 credits of approved courses. Students in the master’s degree program can earn a graduate certificate in computational techniques and applications from the Department of Computational and Data Sciences by choosing an approved sequence of courses.

A sample list of courses for various emphases:

- Astrophysics: PHYS 711; ASTR 530, 680, 701, 767
- Atmospheric physics: PHYS 510, 676; CLIM 710, 713; CSI 721
- Biophysics: PHYS 510, 630, 711; BINF 731; NEUR 751
- Computational physics: PHYS 510, 728, 736, 764, 780
- Instrumentation/engineering physics: PHYS 510, 533; NANO 500, 510; ECE 699
- Material physics: PHYS 784, 785, 711, 512, 614
- Nonlinear dynamics: PHYS 510, 701, 705; MATH 673; NEUR 751
- Physics: PHYS 784, 785, 701, 705, 711
Physics, PhD (pending SCHEV approval)

A PhD in physics is pending approval by the State Council of Higher Education in Virginia. If approved, the program would begin in fall 2008. Answers to frequently asked questions about the new program and its relation to the existing PhD in physical sciences can be found on the department web site: physics.gmu.edu. All doctoral students accepted into the physics PhD program take a common core of four courses. By working with the Dissertation Committee, a student may choose to specialize in an emphasis area such as astrophysics, biophysics, nonlinear physics, planetary sciences, material physics, space weather physics, or others according to his or her particular interests. By the end of their first year, all students will pair with a faculty advisor who will guide them toward candidacy.

Admission Requirements

Those holding a baccalaureate degree in physics or astronomy from an accredited institution, who earned a GPA of 3.00 (out of 4.00) in their last 60 credits, and received acceptable scores on the GRE-GEN are invited to apply for admission. Three letters of recommendation must be submitted, preferably from former professors. The GRE subject test in physics is recommended for all interested applicants who received their baccalaureate degrees within the past five years. A degree-seeking graduate applicant with a baccalaureate degree who has not met all admission requirements may be offered provisional admission if sufficient evidence is presented to suggest the applicant has the ability to pursue graduate work. For more details concerning admission requirements to George Mason University, please refer to the Graduate Admission Policies and Admission of International Students sections of this catalog.

Degree Requirements

All students in the physics PhD program must earn a minimum of 72 graduate credits. Of these, 48 are required course work and preliminary research credits, and 24 are doctoral dissertation proposal (PHYS/ASTR 998) and doctoral dissertation research (PHYS/ASTR 999) credits. For students entering the doctoral program with previous graduate work, the 48 credits of course work may be reduced by a maximum of 30 credits. The required 48 credits of course work are divided among core courses, physics and astronomy elective courses, and seminar. The 12 credits of core courses include PHYS 684, 685, 705, and 711. Note that doctoral candidacy (qualifying) examinations will be given on the topics covered in these core courses. The remaining 36 credits includes 3 credits of PHYS 703, a 1-credit seminar that is repeated three times, 6 credits of physics or astronomy specialty courses, and 27 credits of general electives, which may be chosen from physics and astronomy, or other related disciplines. These elective courses may include research credits (PHYS/ASTR 796, PHYS/ASTR 798) in preparation for the Doctoral Dissertation. These research courses may be repeated with the approval of the student’s advisor or Dissertation Committee in order to be applied toward the degree requirements.

Qualifying examinations. All students must successfully pass the qualifying examinations for the four core courses. The qualifying exam is offered twice per year and is divided into four sections corresponding to the four topics in the core courses (Quantum Mechanics, Electromagnetic Theory, Classical Mechanics, and Statistical Mechanics). Grades of “Pass” or “Unsatisfactory” will be given individually for the four separate sections of the exam. If students receive a grade of “Unsatisfactory” in a given section of the exam, they will be allowed to retake that section a maximum of two times. Students can choose to take a particular section or a combination of sections at one sitting, but they must successfully pass all sections by the end of their third year. Students entering the program with equivalent courses taken at another institution may satisfy the core requirement by taking the qualifying exam directly. There is a written and an oral component for each section of the qualifying exam. A student must satisfactorily pass both components of the exam. The oral component may be waived by unanimous consent of the Qualifying Examination Committee for exceptional performance on the written component. At the beginning of each academic year, the program director will appoint members to the Qualifying Examination Committee (typically from faculty who most recently taught the core courses), and the committee is responsible for the creation and grading of the qualifying exam to be offered in that year.

Advancement to candidacy. After the successful completion of the qualifying examination, a Dissertation Committee should be formed as soon as possible. This committee consists of a graduate faculty member (see the Graduate Faculty section in the catalog) from the Department of Physics and Astronomy and at least two other members of the graduate faculty, one of whom must be from outside the student’s department or degree program. The composition of the committee must be approved by the program director. Qualified individuals who are not members of the graduate faculty (i.e., faculty at another university) may serve on a dissertation committee with the approval of the program director and the associate dean for graduate programs. The Dissertation Committee is responsible for directing students in their chosen field of research. The Dissertation Committee should work with the student to select specialty courses and electives to form a cohesive program of study. Preliminary research credits (PHYS/ASTR 796 and PHYS/ASTR 798) can be taken as a part of the electives to prepare for the student’s dissertation. Advancement to candidacy implies that a doctoral student has demonstrated both breadth and depth of knowledge in the field of study and is capable of conducting research on the boundaries of knowledge. Before doctoral students may be advanced to candidacy by the dean, they will need to have had completed all required course work, passed the qualifying examinations, and been recommended by the Dissertation Committee. A doctoral student has six years from the time of first enrollment as a degree-seeking student to advance to candidacy.

Doctoral dissertation. After advancing to candidacy, doctoral candidates will work with the Dissertation Committee to formalize their preliminary research into a doctoral dissertation. The dissertation research should represent a significant contribution to its scientific field and should be deemed publishable in refereed scientific journals. A total of 24 credits in the following two courses must be taken: PHYS 998 or ASTR 998 Dissertation Proposal (0 to 12 credit hours), and PHYS 999 or ASTR 999 Doctoral Dissertation (12 to 24 credit hours). Note that before the student may enroll in PHYS/ASTR 999, the dissertation proposal must be approved by the Dissertation Committee and evidence of its approval sent to the dean for approval. Before that time, the student may enroll in PHYS/ASTR 998 (Dissertation Proposal). Students
working on their Doctoral Dissertation (999) must register for a minimum of 3 credits of 999 per semester (excluding summers) until they have completed the 12-credit minimum requirement for 999, after which they must register for 1 credit of 999 until the dissertation is completed and accepted. The dissertation must be defended in a public forum before the Dissertation Committee and other interested faculty. After the candidate successfully defends the dissertation, the Dissertation Committee recommends to the Graduate Faculty of George Mason University the awarding to the candidate the degree of doctor of philosophy in physics. Students have five years from the time of advancement to candidacy to graduate.

### Physical Sciences, PhD

**PHD-PSCI**

This interdisciplinary doctoral program is offered by the Department of Physics and Astronomy and the Department of Chemistry and Biochemistry. The degree focuses on preparing scientists to perform research either in the separate disciplines listed above or as members of interdisciplinary science teams, primarily involving astronomy, biophysical sciences, chemistry, and physics. The main emphasis is on theoretical, experimental, or laboratory research. The program is not intended to produce graduates who are scientific generalists; however, the areas of specialization often cut across traditional disciplines, as in the research fields mentioned above.

The degree is built on a foundation of several interdisciplinary courses that expose students to fundamental research problems in modern science and provide them with an introduction to each of the general physical areas that compose the degree (physics, chemistry, biochemistry and biophysics, and astronomy). The program curriculum, however, has been designed to provide enough flexibility to accommodate students seeking a fully interdisciplinary program, as well as those with interests more closely aligned with one of the traditional physical sciences disciplines. Students who are seeking a program with a heavy emphasis on computational methods may alternatively consider the doctoral program in computational sciences. This program includes concentrations in computational physics and in space sciences and computational astrophysics. See the Department of Computational and Data Sciences chapter for degree and admission requirements.

### Admission Requirements

The physical sciences PhD program is intended for students who have completed an undergraduate program of study in one of the physical sciences, have taken math to the level of differential equations, and are computer literate.

Applicants are expected to have a BS degree with a minimum GPA of 3.00 and acceptable GRE and TOEFL scores. The undergraduate degree should be in a scientific field, such as physics, chemistry, astronomy, mathematics, or engineering. Applicants with insufficient undergraduate records may be accepted provisionally and required to successfully complete selected remedial courses, some of which may not be applicable to the 48-credit total for the PhD course work requirement.

Interested students should submit a completed Mason graduate application, three letters of recommendation, official reports of GRE and TOEFL scores, and a goals statement reflecting their general research interests and career plans. Mason’s Educational Testing Service code is 5827.

### Degree Requirements

All students in the 72-credit physical sciences PhD program are required to take 48 credits of course work and 24 credits of dissertation research. For students entering the doctoral program with previous graduate work, the 48 credits of course work may be reduced by a maximum of 30 credits. Of the 48 credits of course work, 9 credits will consist of core courses to be taken by all students in the program, and at least 15 credits will be selected as part of a student’s contract with a three-member faculty committee (explained below). At least five of the contract core courses will be selected from the list presented below. Thus, the program consists of:

- 3 credits of PSCI 703 (a 1-credit course that must be repeated three times)
- a minimum of 15 credits of course work chosen as part of a contract
- up to 24 credits of electives (approved by committee)
- 24 credits of dissertation research

A three-member predissertation faculty committee will be formed by the student as soon as possible after admission but not later than after completion of the 9-credit core. The composition of the student’s committee must be approved by the program director. At this point, the student is expected to have selected a rather broad area of future research interest; typically, the area may not yet be specific enough to define an actual dissertation project.

Because students entering the program will have diverse backgrounds and goals and the program is explicitly designed to accommodate students preparing for a range of fields of research, it is not possible to have a completely standardized set of degree requirements. Instead, the student and his or her committee will decide on a set of at least five courses (15 credits) that will best meet the student’s goals and future research direction. This portion of the program will be set up in the form of a contract between the student and the committee. The contract will include courses that the student should take and books and articles that should be read. Fifteen of the contract credits must be chosen from the following list; however, no more than three classes can be taken in any one area, unless the student obtains special permission from the program director. Furthermore, no more than two classes at the 500 level can be selected.

- Astronomy courses: ASTR 530, 701, 766, 767
- Biochemistry and biophysics courses: CHEM 646, 660, 661, 662, 665
- Chemistry courses: CHEM 617, 625, 633, 641, 651
- Physics courses: 684, 685, 705, 784, 785
- Interdisciplinary courses: PHYS 510, 512, 533, 575, 701, 711; ASTR 660, 760, 765; CHEM 563, 564, 648, 667, 728, 732, 737

Students can choose their elective classes more widely, but these courses need to be approved by the faculty committee to be applied toward satisfaction of the degree requirements. As an example, a student planning to pursue interdisciplinary research in the general area of bioinorganic chemistry would form a committee headed by a bioinorganic scientist and would have a contract that probably required taking at least these five courses:

- CHEM 617 Organic Structural Spectroscopy
- CHEM 633 Chemical Thermodynamic and Kinetics
- CHEM 646 Bioinorganic Chemistry
- CHEM 660 Protein Biochemistry
- CHEM 662 Drug Design
The contract is an interactive document agreed to between the student and the committee. It can be revised, but any revisions must be approved by the program director. For purposes of the written preliminary exam, the scope of the contract will be narrowed to cover particular courses, books, and such as the committee sees fit. The final contract must be signed by the student and all committee members.

Students are encouraged to undertake research under close faculty supervision in a number of potential areas, including the following examples:

- Analysis of complex dynamical systems
- Studies of the role of greenhouse gases in Earth’s atmosphere
- Modeling astrochemical processes in star-forming regions
- Searches for extrasolar planets
- Modeling the production of high-energy gamma rays from cosmic sources
- Analysis and prediction of space weather
- Quantum computation: theory and applications
- Solid state physics, including applications to materials science
- Interaction of organic molecules with solid surfaces
College of Visual and Performing Arts

Performing Arts Building, Room A407
Phone: 703-993-4551
Web: gmu.edu/cvpa
College Code: AR

Departments
• Art and Visual Technology
• Dance
• Music
• Theater

Program
• Arts Management
• Film and Video Studies

Degrees
• Art and Visual Technology BA, BFA, MA, MAT, and MFA
• Arts Management MA
• Dance BA, BFA, and MFA
• Film and Video Studies BA
• Music BA, BM, and MM
• Music Education PhD (pending SCHEV approval)
• Musical Arts DMA (pending SCHEV approval)
• Theater BA

Minors
• Art and Visual Technology
• Arts Administration
• Dance
• Jazz Studies
• Multimedia
• Music
• Theater
• World Music

Graduate Certificates
• Artist Certificate in Instrumental Performance
• Artist Certificate in Piano Performance
• Artist Certificate in Vocal Performance
• Arts Entrepreneurship

“Mason is deeply committed to the arts and educating our students about the significance the arts have in all our lives. This is why the arts are integral to our institution. We encourage active student participation in the many programs and related courses in the arts that are scheduled throughout the year. Students are able to receive a more balanced education, develop a deeper appreciation of the arts, and achieve a more enlightened perspective of the world.”

—Alan G. Merten
President, George Mason University

The College of Visual and Performing Arts (CVPA) creates an academic environment in which the arts are considered as individual disciplines as well as interdisciplinary forms that strengthen each other. Courses of study are designed to lead to careers as creators, performers, teachers, managers, and scholars of the arts, as well as prepare students for the challenges of a rapidly changing world. In addition to providing strong programs for arts majors and minors, CVPA strives to ensure that Mason’s entire student population has the opportunity to experience and study the arts as a key component of a well-rounded liberal arts education.

Studying the arts goes hand in hand with creation and performance. CVPA provides the theaters, studios, rehearsal spaces, computer laboratories, recital halls, and performance classrooms in which students hone their skills. The college’s faculty of practicing artist-teachers works closely with students in a variety of curricular and cocurricular creative projects. Once basic techniques are established, students are encouraged to stretch, grow, and experiment within this supportive environment. Students regularly perform, create, exhibit, and otherwise develop their art forms in a wide variety of public venues, enhancing their experience as working artists while enriching the cultural life of the campus community.

An education in the arts is deepened by regular contact with the work of distinguished visiting artists. The college is home to the Center for the Arts, which comprises a variety of professional presenting and producing units that provide a diverse program of cultural experiences for the entire university community, as well as Northern Virginia and the greater Washington, D.C., area. Artists from across the country and around the world regularly perform in the Concert Hall, give master classes, work with students during extended residencies, and interact with the community in a variety of other ways. The accessibility and vitality of the Concert Hall, TheaterSpace, the Fine Arts Building and Johnson Center
Academic Programs

CVPA houses the four academic departments of Art and Visual Technology, Dance, Music, and Theater; and programs in Arts Management, and Film and Video Studies. Each major features strong academic preparation in the history and theory of the art form, and a wide range of discipline-based technique courses offered by professional artist-teachers. Opportunities for creative work and performance are at the core of most courses of study.

Graduate Degree Programs

CVPA’s graduate programs offer highly focused study designed to prepare students for professional work in the arts and education. The requirements for each graduate degree are described in the sections that follow.

Transfer of Credit

Graduate credit earned prior to admission to a certificate, master’s, or doctoral program may be eligible to be transferred into the program and applied to a CVPA graduate certificate or degree. The total amount of credits that may be transferred into a CVPA graduate program is 12 credits; these may be Mason nondegree graduate credits, or graduate credits from another qualified college or university. Please see the Graduate Policies/Transfer of Credit portion of the catalog for more detailed information about the requirements.

Undergraduate Degree Programs

The undergraduate degree consists of course work in university general education, a major area of study, and electives. To earn a bachelor’s degree, students must complete a minimum of 120 credits, of which at least 45 must be upper-level courses (numbered 300 and above). At least one course at the 300 or 400 level must be designated “writing intensive.” All entering students who have not yet satisfied the university-wide requirement in quantitative reasoning are required to take the math placement test prior to enrollment.

Minimum Cumulative GPA in Major

Undergraduate students earning CVPA degrees must earn a minimum 2.00 cumulative GPA in their major or higher, if required by their program.

Physical Education Courses

Activity courses offered by the Health, Fitness, and Recreation Resources Department cannot be counted toward credits required for a degree in CVPA. Students may take nonactivity PHED courses for elective credit for CVPA degrees.

Academic Course Load

Undergraduate students earning degrees in CVPA may register for 18 credits per fall and spring semester without the dean’s permission. Students are advised that they will be required to pay additional tuition beyond the 16-credit, university full-time academic load. Graduate students earning degrees in CVPA may register for a maximum of 13 credits per fall and spring semester. Students should be cognizant of the time commitment when they register for their courses, especially if they register for high numbers of credits. Students are urged to consult with their advisor and familiarize themselves with Mason guidelines for work and academic load. Students are reminded that employment must not take priority over course work.

Advising

Students are assigned advisors and encouraged to meet with them on a regular basis. Undeclared CVPA students and undergraduate students in academic difficulty (cumulative GPA under 2.00) are required to see an advisor prior to registration for the semester following registration restriction.

Minors

University policy states that students must earn 8 distinct credits that are not used for their major toward their minor. Some departments have more specific criteria for applying credits to a minor.

Academic Policies

Students are strongly advised to consult the Academic Policies chapter of this catalog for information concerning university-wide requirements for degrees and requirements for nondegree students.

General Education Program

The baccalaureate degree requires students to take a range of courses that provide a broad knowledge of the world, develop the ability to think both conceptually and critically, acquaint them with many different methods of inquiry, and provide the skills to continue intellectual growth throughout their lives. Students select from a range of courses outlined in the University General Education chapter. Students accepted into the Honors Program in General Education fulfill their core general education requirements with completion of that program of study. The Mason Topics Program provides a way for students to register for two or more complementary general education courses at the same time for four semesters. The professors who teach in this program have coordinated readings and assignments. Students are strongly advised to consult the University General Education chapter of this catalog for information concerning general education.

Foreign Language Requirement

Some degrees within CVPA require intermediate-level proficiency in one foreign language. This requirement may be fulfilled by completing a course in a foreign language numbered 202, 209, or 210 (or higher level courses taught in the language) or achieving a satisfactory score on an approved proficiency test. International students should consult the CVPA Student Academic Affairs Office about a possible waiver of this requirement.
CVPA Courses
Some CVPA courses transcend individual disciplines. These courses are administered by the Dean’s Office and are designated CVPA in the Course Descriptions chapter of this catalog.

Minor in Arts Administration
Performing Arts Building
Room A407
Phone: 703-993-1321

Faculty
Miller, Coordinator
The field of visual and performing arts offers many career paths that rely on a strong foundation in one or more art forms and require specific knowledge and skills in administration and management. The minor in arts administration consists of 18 credits, including CVPA 305 Seminar in Arts Management (3 credits) and CVPA 489 Field Experience in the Arts (3-6 credits). All other credits are selected in consultation with a program advisor from relevant courses in CVPA, the Nonprofit Management Program in the Department of Public and International Affairs, the School of Management, the Department of Communication, or other appropriate areas of study. The minor is open to all CVPA majors as well as art history majors. All other students must complete 9 credits of arts-related course work to be eligible for this minor. See the program coordinator for more information.

Art and Visual Technology
College Hall, Room C200
Phone: 703-993-8898
Web: www.avt.gmu.edu

Faculty
Harold Linton, Chair
Professors: Carbonneau, Frederick, Kravitz (gallery director), Linton (chair), Mandes, Sandell
Associate professors: Ashcraft (associate chair), Crawford, Feerick, Frenn, White
Assistant professors: Cooley, Cui, Endress, Rothstein, Sheridan, Wrbican
Term assistant professors: Constantine (associate chair), Del Popolo, Karametou, Malone, Stanley, Starr, Winant
Adjunct professors: Anderson, Bradley, Bulisova, Carr-Shaffer, Castellana, Chao, Clements, Cook, Cushner, DeLuca, Dicko, Ewers, Fairfax, Ferreira, Garland, Goldman, Gorman, Guerrieri, Herce, Hicks, Ho, Hoffmann, Ihnken, Kennedy, Kems, Kirk, Kojima, Nahidian, Organ, Petzwinkler, Plisker, Ratnapala, Rodrigue, Rozario, Sapsford, Serafin, Tomhave, Watson, Wiseman, Yilmaz

Mission
The Department of Art and Visual Technology (AVT) offers students an environment in which the pursuit of a degree is a commitment to a way of life that centers on creative thought processes and the production of artworks. The curriculum and the faculty focus on cultivating students’ appreciation of and expertise in studio and digital arts. Students are encouraged to dedicate themselves to academic excellence, skilled artistry, and employing visual literacy within an atmosphere of creative freedom. The faculty’s ongoing engagement with artistic practice forms a vital part of the student-instructor relationship. By offering instruction in traditional and contemporary technologies for art making, faculty members help students develop a strong foundation to realize their personal and professional goals.

A principle that underlies the AVT Program is its focus on fostering student understanding and experience of interdisciplinary in the visual arts. This focus is important because today crosses the boundaries of traditional disciplines and integrates traditional and technology-based media into the creation of new art forms. All AVT undergraduates are introduced to this interdisciplinary focus in such required courses as AVT 307 Aesthetics and AVT 395 Writing for Artists.

Course Work
The Department of Art and Visual Technology offers all course work designated AVT in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS
Undergraduate studio degrees offered by the Department of Art and Visual Technology include the bachelor of arts (BA) and the bachelor of fine arts (BFA). The department also offers an undergraduate minor in AVT, an interdisciplinary minor in multimedia, and a departmental honors program for selected AVT majors.

Neither the BA nor the BFA program satisfies all requirements for teaching in the public schools. Undergraduate students interested in this field should contact the department’s art education advisor to learn more about teacher preparation. Nonmajors may also take course work in AVT. Consult the course listings for prerequisites.

Requirements
All students are admitted to AVT programs of study separately from their admission to the university and only by portfolio review. Students may be admitted to study in the BA program by one of three ways:

- Presenting a portfolio and any other requested credentials at designated portfolio review days before each semester and before applying for admission
- Completing the sequence of AVT 104, 105, and 222 with a 3.50 or higher average, and applying for admission
- Completing the sequence of AVT 104, 105, and 222, 323 or 324, or one 200-level course with a 3.00 or higher GPA; and applying for admission

BFA Portfolio Review
BA students who wish to apply for admission to the BFA degree program do so by presenting a substantive college-level portfolio and other requested credentials during the designated application period, usually the sixth week of the semester. See BFA requirements below.

Artsbus Requirement
All AVT students must meet the department’s requirement of travel to galleries and museums aboard the AVT Artsbus. Students meet this requirement by enrolling in AVT 300 Artsbus Attendance.

Freshmen who enroll as AVT majors must take AVT 300 for five semesters. Transfer students and students who change
their majors to AVT must take AVT 300 each semester they are enrolled at Mason, up to a maximum of five semesters. Semesters of enrollment in AVT 300 do not have to be consecutive. Students may take AVT 300 up to three times in a semester if they wish to accelerate their completion of the requirement.

The total number of bus seats for the term will meet or exceed class enrollment; tickets for each trip will be available on a first-come, first-served basis. Students have no guarantee that they will be able to attend the trip of their choice. The best way for students to attend their preferred trip is to secure the ticket as soon as the box office has them available.

Please note that there are no ticket refunds at the end of the semester for students who fail to attend one of the available Artsbus trips, just as there are no tuition refunds for students who fail courses.

**Writing-Intensive Requirement**

Mason requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. AVT students fulfill this requirement by successfully completing AVT 395 (or AVT 494 for BFA students planning to pursue the MAT in art education).

**Upper-Level Credits**

All undergraduate students are required to complete a minimum of 45 credits of upper-division courses at the 300–499 level.

**Major GPA**

All AVT undergraduate students must earn a minimum 2.00 cumulative GPA in their major.

**Studios**

Studios are open to students for extended periods mornings, evenings, and weekends whenever classes are not in progress. Policies, procedures, and schedules for studio use are established by the AVT studio faculty and are posted in the studios.

**Programs of Study**

**Art and Visual Technology, BA**

This program offers a broad background for students who want a liberal arts education with a major in studio or new media art. Students can concentrate a portion of their study in drawing, graphic design, interdisciplinary arts (InterArts), new media art, painting, photography, printmaking, or sculpture.

**Degree Requirements**

<table>
<thead>
<tr>
<th>General Education</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Requirements</td>
<td></td>
</tr>
<tr>
<td>Written communication: ENGL 101 and 302</td>
<td>6</td>
</tr>
<tr>
<td>Nonnative speakers of English with limited proficiency in the language may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.</td>
<td></td>
</tr>
<tr>
<td>Oral communication</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative reasoning</td>
<td>3</td>
</tr>
</tbody>
</table>

Information technology .......................................................... 3

**Core Requirements**

<table>
<thead>
<tr>
<th>Literature</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area 3</td>
<td>3</td>
</tr>
</tbody>
</table>

Natural science (including at least one laboratory science) .......................................................... 7

Western civilization .......................................................... 3

**Global understanding .......................................................... 3

Social and behavioral sciences ................................................. 3

*AVT majors may not choose AVT courses to meet this requirement, and they may not double-count ARTH courses toward both the AVT major and the university general education arts requirement.

**AVT majors may not double-count ARTH courses toward both AVT major requirements and the university general education global understanding requirement.

**AVT Major Requirements .................................................... 63

<table>
<thead>
<tr>
<th>Studio Foundation</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVT 101 New Majors Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>AVT 104 and 105 Studio Fundamentals I and II</td>
<td>8</td>
</tr>
<tr>
<td>AVT 222 and 323 or 324 Drawing I and II, or Figure Drawing</td>
<td>8</td>
</tr>
</tbody>
</table>

**Art History, Critical Analysis, Contemporary Practice .................................................. 18

| ARTH 200 Survey of Western Art I, ARTH 203 Survey of Asian Art, or ARTH 204 Survey of Latin American Art | |
| ARTH 201 Survey of Western Art II | 3 |
| ARTH 374 Art Now | 3 |
| AVT 301 Visual Voices Colloquium | 3 |
| AVT 307 Aesthetics | 3 |
| AVT 395 Writing for Artists | 3 |

**Breadth and Experience ..................................................... 12

Choose three of the following classes; at least one course must be a 200-level studio course: AVT 215 Typography, AVT 232 Painting I, AVT 243 Printmaking I, AVT 252 Photography I, AVT 253 Introduction to Digital Photography, AVT 262 Sculpture I, AVT 272 Interdisciplinary Arts, AVT 280 Two-Dimensional Digital Art, AVT 396 Introduction to Art Teaching and Learning, AVT 399 Special Topics in Art and Visual Technology

<table>
<thead>
<tr>
<th>Synthesis</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVT 497 Senior Project or AVT 498 Senior Design Project</td>
<td>12</td>
</tr>
</tbody>
</table>

12 credits in one of the following areas:

**Drawing (DRW):** AVT 422, 423; 4 credits from AVT 324, 326, 333, 336, 337, 432, 433. Note: All AVT majors concentrating in drawing must complete AVT 232 (Painting I) under Breadth and Experience.

**Graphic Design (GD):** AVT 311, 313, 414

**InterArts (IA):** AVT 375, 473; 4 credits from 372, 374, 376, 377, 378, 491

**New Media Art (NMA):** 12 credits from AVT 382, 383, 390, 482, 483, 487

**Painting (PNT):** AVT 333, 432, 433

**Photography (PHO):** AVT 353, 459; and 4 credits from AVT 452, 453, 454, 455, 456, 457, 458**
Courses but are recommended as electives for BA students.

General Electives .......................................................... 20
BA students must use general electives to either complete a minor program outside the major field of study (15–20 credits) or demonstrate intermediate-level proficiency in one foreign language (0–12 credits).* After fulfilling one of these options, the remaining general electives may be taken inside or outside of the department. All students are required to take a minimum of 45 credits of upper-division courses (300 and 400 level); most students will require at least 13 elective credits at the 300 level or above. Note: AVT 393 Field Experience in the Arts and AVT 489 Internship are not required courses but are recommended as electives for BA students.

* See beginning of CVPA chapter for foreign language requirement.

Total ............................................................................... 120

Art and Visual Technology, BFA

BFA-AVT Total ..................................................................... 81

This intensive, 120-credit studio production program emphasizes analytical, creative, and experiential aspects of studio and new media art. It is designed to prepare students professionally as visual artists or for graduate study in the fine arts. Students devote a significant portion of their college careers to an in-depth study in one of the following concentrations: drawing, graphic design, interdisciplinary arts (InterArts), new media art, photography, painting, printmaking, or sculpture.

Application deadlines are at the end of the sixth week of the fall and spring semester of each year. Students planning to apply must meet with the coordinator of their AVT concentration in the semester prior to their application to discuss the portfolio.

Admission to the BFA program is highly competitive. Applicants must be a current BA student in art and visual technology and have completed AVT 104 and 105 or the equivalent. Other BFA admission requirements include the following:

- Portfolio of 10 to 15 original examples of college-level art work
- One-page, double-spaced essay
- Transcripts of all college-level study
- Must have at least a 3.00 cumulative GPA overall and in the major

Students interested in applying should contact the Department of Art and Visual Technology for an application and specific directions on presenting the portfolio.

Degree Requirements

General Education .......................................................... 37

Foundation Requirements

Written communication: ENGL 101 and 302 ................. 6
Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101.

Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Oral communication ....................................................... 3
Quantitative reasoning ..................................................... 3
Information technology ..................................................... 3

Core Requirements

Literature ............................................................................. 3

*Arts3

Natural science (including at least one laboratory science) .................. 7
Western civilization ................................................................ 3
**Global understanding ..................................................... 3
Social and behavioral sciences ............................................ 3

*AVT majors may not choose AVT courses to meet this requirement, and they may not double-count ARTH courses toward both the AVT major and the university general education fine arts requirement.

**AVT majors may not double-count ARTH courses toward both AVT major requirements and the university general education global understanding requirement.

Synthesis options specified and counted under AVT major requirements.

AVT Major Requirements ...................................................................... 81

Studio Foundation ...................................................................... 17
AVT 101 New Majors Colloquium ......................................... 1
AVT 104 and 105 Studio Fundamentals I and II ..................... 8
AVT 222 Drawing I and 323 Drawing II or 324 Figure Drawing ..................................................... 8

Art History, Critical Analysis, Contemporary Practice......... 24
ARTH 200 Survey of Western Art I, ARTH 203 Survey of Latin American Art ..................................................... 3

ARTH 201 Survey of Western Art II ..................................... 3

One course from the following:

*ARTH (300 or 400 level) or AVT 305, 309, 318, 371, 372, 377, 493 ........................................... 3

ARTH 374 Art Now ............................................................ 3

AVT 301 Visual Voices Colloquium ....................................... 3
AVT 307 Aesthetics ............................................................ 3
AVT 395 Writing for Artists ................................................ 3
AVT 472 Critical Theory in the Visual Arts ......................... 3

*Students concentrating in graphic design must take AVT 318 to meet this requirement.

Breadth and Experience ......................................................... 12

Any three of the following:

AVT 215 Typography
AVT 232 Painting I
AVT 243 Printmaking I
AVT 252 Photography I
AVT 253 Introduction to Digital Photography
AVT 262 Sculpture I
AVT 272 Interdisciplinary Arts
AVT 280 Two-Dimensional Digital Art
AVT 396 Introduction to Art Teaching and Learning
AVT 399 Special Topics in Art and Visual Technology

Synthesis .................................................................................. 4

AVT 497 Senior Project or AVT 498 Senior Design Project

Concentration .......................................................................... 24

24 credits in one of the following areas:
Visual and Performing Arts

Written communication: ENGL 101 and 302 ......................6

Foundation Requirements

General Education .......................................................... 37

Credits

Degree Requirements

Concentration .................................................................... 24

Art and Visual Technology, BFA Curriculum for Students Intending to Pursue the MAT Degree in Art Education

Students who intend to seek licensure to teach art in Virginia public schools or apply for entrance to the master of arts in teaching program for art education should pursue a BFA (any concentration) with the following suggested course work:

Degree Requirements

Credits

General Education ..............................................................37

Foundation Requirements

Written communication: ENGL 101 and 302 .................6

Non-native speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Oral communication ......................................................3

Quantitative reasoning ..................................................3

Information technology ...............................................3

Option recommended for BFA/MAT: AVT 180, plus either CS 105 or PHIL 112

Core Requirements

Literature ..............................................................................3

Arts (outside the major) ..................................................3

Required for BFA/MAT: ARTH 200, Survey of Western Art I

Natural science (including at least one laboratory science) .................................................................7

Western civilization ..............................................................3

Global understanding .......................................................3

Option recommended for BFA/MAT: ARTH 203

Social and behavioral sciences ........................................3

Option recommended for BFA/MAT: PSYC 100

Synthesis options are specified and counted under AVT major requirements.

AVT Major Requirements .............................................80

Studio Foundation ..........................................................17

ARTH 101 New Majors Colloquium .................................1

AVT 104 and 105 Studio Fundamentals I and II ..............8

ARTH 222 Drawing I and AVT 323 Drawing II or 324 Figure Drawing ......................................................8

Art History, Critical Analysis, Contemporary Practice ...24

ARTH 200 and 201 Survey of Western Art I and II ..........6

*Only for students who complete all five of the required undergraduate art education courses (ARTH 396, 493, 494, EDUC 301, 301), credits for ARTH 200 may be counted toward the major and the arts university general education requirement

ARTH 374 Art Now .............................................................3

ARTH 301 Visual Voices Colloquium ...............................3

ARTH 307 Aesthetics .........................................................3

ARTH 472 Critical Theory in the Visual Arts ...................3

ARTH 493 Teaching Visual Thinking through Media/ Processes K–12 (Meets the ARTH 300+ requirement) ....3

ARTH 494 Teaching Critical Response to Art, K–12 (Meets the ARTH 395 writing-intensive requirement) .........3

Breadth and Experience .................................................11

AVT 262 Sculpture I or another three dimensional-focused course .................................................4

ARTH 396 Introduction to Art Teaching and Learning .......3

One of the following courses: ........................................4

ARTH 215, 232, 243, 252, 253, 272, 280, 399

Synthesis .............................................................................4

AVT 497 Senior Project or AVT 498 Senior Design Project

Concentration......................................................................24

24 credits in one of the following areas:

Drawing (DRW): AVT 422 and 423; 4 credits from AVT 324, 326, 333, 336, 337, 432, 433; and 12 credits from AVT 300–499. Note: All AVT majors concentrating in drawing must complete AVT 232 (Painting I) under Breadth and Experience.

Graphic Design (GD): AVT 311, 313, 414, 415; and 8 credits of AVT 419 Topics in Graphic Design*

InterArts (IA): AVT 373, 473; and 12 credits from 372, 374, 376, 377, 378, 491, or 492; and 4 credits from AVT 300–499

New Media Art (NMA): 12 credits from AVT 382, 390, 482, 483, 487; and 12 credits from AVT 300–499

Painting (PNT): AVT 333, 432, 433; and 12 credits from 300–499

Photography (PHO): AVT 353 and 459; 8 credits from AVT 452, 453, 454, 455, 456, 457, and 458; and 8 credits from AVT 300–499**

New Media Art (NMA): 12 credits from AVT 300–499.

*All AVT majors concentrating in graphic design must complete AVT 252 Photography I or AVT 253 Introduction to Digital Photography under Breadth and Experience.

**All AVT majors concentrating in photography must complete AVT 252 Photography I under Breadth and Experience.

General Electives .........................................................120
**Printmaking (PMT):** AVT 343; and 8 credits from 345, 346, 442, 443; and 12 credits from 300–499  
**Sculpture (SCL):** AVT 363, 462, 463; and 12 credits from 300–499  

*All AVT majors concentrating in graphic design must complete AVT 252 Photography I or AVT 253 Introduction to Digital Photography under Breath and Experience.*

**All AVT majors concentrating in photography must complete AVT 252 Photography I under Breath and Experience.**

**General Electives:** 3  
Take the following art education foundation courses to meet state education requirements:  
EDUC 301 Educationally Diverse Populations .......... 3  
EDUC 302 Human Growth and Development .......... 3  

Total ......................................................... 120  

*Note:* Following this curriculum does not guarantee entry into the MAT Program. Prospective MAT students must meet all MAT admissions requirements as described in the catalog.

**AVT Honors Program**

Students interested in the Honors Program in Art and Visual Technology should contact the chair of the department. Both BA and BFA students are eligible to apply for admission to the program. Honors students must complete at least 4 credits of AVT 394 Honors Seminar.

**Minor in Art and Visual Technology**

The minor in AVT requires 20 credits and offers a core of foundational studies with the opportunity for further study the following areas: digital arts, graphic design, InterArts, painting, photography, printmaking, or sculpture. The requirements are as follows:

AVT 104 and 105 Studio Fundamentals I and II ........ 8  
AVT 222 Drawing I ............................................. 4  
AVT 200–299 ....................................................... 4  
AVT 300–399 ....................................................... 4  

Total .................................................................. 20  

**Interdisciplinary Minor in Multimedia**

For the program section for the multimedia minor, please see the catalog section on Interdisciplinary Minors in the College of Humanities and Social Sciences. This minor is not available to students majoring in AVT with a concentration in new media art (referred to as “digital arts” in previous catalogs).

**GRADUATE PROGRAMS**

**Art and Visual Technology, MA and MFA**

The MA in digital arts features courses that integrate visual information design, two-dimensional imaging, three-dimensional modeling, animation, video production, sound editing, multimedia authoring, and web publishing within a program that is grounded in theory and application.

The MA degree is a 45-credit professional program aimed at preparing students for employment in high-tech industries and businesses, including computer animation and video production firms, graphic design firms, web development and design companies, and computer-related research industries.

The MFA is a terminal degree that prepares students to become professional artists, work in technology or arts-related fields, and teach at the university level. It requires 60 credits, during which time students fulfill 45 credits of core and studio requirements plus an additional 15 credits of comprehensive experience.

MFA students may choose an emphasis in digital arts, painting, photography, printmaking, sculpture, or InterArts. The latter offers students the opportunity to combine art forms in interdisciplinary projects that may be installation, performance, publishing, time-based, or writing-based, and combine creative and critical approaches in their work.

While it is anticipated that students will move through the MFA as described in this catalog, individuals with extensive professional accomplishment may, upon recommendation of the AVT Graduate Committee and with prior approval of the CVPA dean, craft an individualized program that meets curricular requirements.

**Admission Requirements**

In addition to meeting the general university requirements for admission for graduate study, candidates for the MA or MFA must hold a BA or BFA degree. Upon applying, they must submit a portfolio, statement of intent and professional goals, and three letters of reference. Applications will be accepted for the fall semester only. The deadline for receipt of application materials is January 15.

Diversity among students accepted for study is another consideration. Applicants with degrees in areas other than art are welcome, although they may be required to complete undergraduate core courses.

**Portfolio Guidelines**

The applicant’s portfolio is a major selection criterion for graduate admission and should represent the applicant’s most accomplished work. Portfolio requirements are different for each graduate area of emphasis.

All portfolios must include a written image or slide information sheet with the corresponding number, title, date, medium, and size of each work. If included, slides must be labeled with slide number, applicant’s name, title of work, and date. Incomplete portfolios will not be considered.

Applicants’ portfolio items are considered part of the application for admission and, thus, cannot be returned. Please do not send original materials. The portfolio and all other application materials should be submitted to the Office of Graduate Admissions. For more information, contact the AVT Department at 703-993-8898.

**Portfolio requirements by area of emphasis:**

**Digital Arts:** 20 images on a Mac (Apple Macintosh platform)-compatible CD. All images must be numbered according to the printed list. Videos (no more than four minutes for each selection) must be playable from a Mac-compatible CD or DVD. Only the relevant parts of the video should be marked for viewing, with the applicant’s role clearly stated. Digital arts applicants should not submit slides.

Photography and Printmaking: 20 images on a Mac-compatible CD or slides. All images must be numbered according to the printed list. Printmaking also requires a print portfolio of 12 prints.

Sculpture and Painting: 20 slides only. All slides must be numbered and labeled according to the printed list.
InterArts: 20 images (on a Mac-compatible CD or slides), videos, or writing-based materials. All submissions must be numbered according to the printed list. If videos are included, they must contain no more than four minutes for each selection. Also, they must be on a Mac-compatible CD or DVD or, if videotape, VHS in NTSC format. Only the relevant parts of the video should be marked for viewing, with the applicant’s role clearly stated. If writing-based materials are submitted, they should be submitted in printed form.

Supplementary material for all applicants, such as CDs (Mac-compatible only), videos (DVD, VHS in NTSC format), web addresses, press clippings, or reviews of exhibitions may be submitted but will be reviewed only at the discretion of the AVT graduate application reviewers. Supplementary material should be clearly marked as such.

Facilities and Equipment
The Art and Visual Technology Graduate Program is located in the Fine Arts Building, which houses art studios in drawing, painting, photography, printmaking, and sculpture. AVT has four computer-equipped studios that cross platforms and are installed with current software applications used for two-dimensional imaging, three-dimensional modeling, animation, video production, sound editing, multimedia authoring, and web publishing.

MA Degree Requirements

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVT 500+ Art and Visual Technology Course Work</td>
<td>10</td>
</tr>
<tr>
<td>AVT 599 Special Topics in Art and Visual Technology</td>
<td>4</td>
</tr>
<tr>
<td>AVT 600 AVT Research Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>AVT 610 Graduate Seminar</td>
<td>4</td>
</tr>
<tr>
<td>AVT 620 Theory and Criticism in the Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>AVT 693 Apprenticeship</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digital Arts Emphasis</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA students must complete any three of the following courses:</td>
<td>15</td>
</tr>
<tr>
<td>AVT 616 Internet Multimedia Art</td>
<td>5</td>
</tr>
<tr>
<td>AVT 676 Sound and Music for Video and Animation</td>
<td>5</td>
</tr>
<tr>
<td>AVT 678 Interface and CD-ROM Design</td>
<td>5</td>
</tr>
<tr>
<td>AVT 684 Two-Dimensional Digital Art</td>
<td>5</td>
</tr>
<tr>
<td>AVT 686 Three-Dimensional Digital Art</td>
<td>5</td>
</tr>
<tr>
<td>AVT 688 Digital Animation</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>MFA Degree Requirements</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Requirements</td>
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<tr>
<td>AVT 500+ Art and Visual Technology Course Work</td>
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</tr>
<tr>
<td>AVT 599 Special Topics in Art and Visual Technology</td>
<td>4</td>
</tr>
<tr>
<td>AVT 600 Research Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>AVT 610 Graduate Seminar</td>
<td>4</td>
</tr>
<tr>
<td>AVT 620 Theory and Criticism in the Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>AVT 670 Teaching Practicum</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digital Arts Emphasis</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any three of the following courses:</td>
<td></td>
</tr>
<tr>
<td>AVT 616 Internet Multimedia Art</td>
<td>5</td>
</tr>
<tr>
<td>AVT 676 Sound and Music for Video and Animation</td>
<td>5</td>
</tr>
<tr>
<td>AVT 678 Interface and CD-ROM Design</td>
<td>5</td>
</tr>
<tr>
<td>AVT 684 Two-Dimensional Digital Art</td>
<td>5</td>
</tr>
<tr>
<td>AVT 686 Three-Dimensional Digital Art</td>
<td>5</td>
</tr>
<tr>
<td>AVT 688 Digital Animation</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>InterArts Emphasis</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any three graduate studio courses as approved by the division director of InterArts, for a total of 15 credits. InterArts graduate students may combine courses from the studio areas of emphasis and work with faculty to design an interdisciplinary thesis project.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Painting Emphasis</th>
<th>Credits</th>
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<tbody>
<tr>
<td>All three of the following courses:</td>
<td></td>
</tr>
<tr>
<td>AVT 632 Graduate Painting I</td>
<td>5</td>
</tr>
<tr>
<td>AVT 633 Graduate Painting II</td>
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<td>AVT 634 Advanced Graduate Painting</td>
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</table>

<table>
<thead>
<tr>
<th>Photography Emphasis</th>
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<tbody>
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<td>All three of the following courses:</td>
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<tr>
<td>AVT 652 Graduate Photography I</td>
<td>5</td>
</tr>
<tr>
<td>AVT 653 Graduate Photography II</td>
<td>5</td>
</tr>
<tr>
<td>AVT 654 Advanced Graduate Photography</td>
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</table>

<table>
<thead>
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<th>Printmaking Emphasis</th>
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</thead>
<tbody>
<tr>
<td>All three of the following courses:</td>
<td></td>
</tr>
<tr>
<td>AVT 642 Graduate Printmaking I</td>
<td>5</td>
</tr>
<tr>
<td>AVT 643 Graduate Printmaking II</td>
<td>5</td>
</tr>
<tr>
<td>AVT 644 Advanced Graduate Printmaking</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sculpture Emphasis</th>
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</tr>
</thead>
<tbody>
<tr>
<td>All three of the following courses:</td>
<td></td>
</tr>
<tr>
<td>AVT 662 Graduate Sculpture I</td>
<td>5</td>
</tr>
<tr>
<td>AVT 663 Graduate Sculpture II</td>
<td>5</td>
</tr>
<tr>
<td>AVT 664 Advanced Graduate Sculpture</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MFA Comprehensive Experience</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidates must complete all of the above core and studio requirements as well as the following:</td>
<td></td>
</tr>
<tr>
<td>AVT 796 Directed Project</td>
<td>9</td>
</tr>
<tr>
<td>AVT 798 Directed Reading</td>
<td>3</td>
</tr>
<tr>
<td>AVT 799 Thesis</td>
<td>3</td>
</tr>
<tr>
<td>The comprehensive experience involves a study of the historical basis for a studio project; an independent creative production suitable for public viewing; and a written thesis documenting the evolution of the creative problem and exploring the intention, purpose, and relative success of the finished project.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total credits required</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>-----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

Art Education

Renee Sandell, Program Director
Phone: 703-993-8562
Web: arteducation.gmu.edu

Master of Arts in Teaching (MAT) in Art Education

The MAT in art education harnesses George Mason University’s programs and resources to prepare well-trained artists to become artist-teachers for PreK–12 public schools. Because teaching itself is a performing art that serves the individual, the discipline, and the community, the MAT in Art Education
Program links George Mason University with outstanding area school systems and cultural institutions.

The master of arts in teaching in art education is a preservice degree program that prepares students with a BFA degree or equivalent for PreK–12 art licensure by the Commonwealth of Virginia. Using a studio-based approach to art education and working closely with area public school systems, the MAT degree consists of 30 credits of graduate art education, school practicum experience, and studio work prior to preservice teaching internship and seminar.

Geared toward those with a passion for teaching and the visual arts, the MAT in Art Education Program fosters the quality studio breadth and expertise; comprehensive art historical knowledge; access to contemporary, local, and global art forms and artists; and proficiency in art education theory and practice needed to prepare highly qualified art teachers for a lifetime of professional teaching, learning, and leadership.

Admission Requirements

In addition to meeting the general university admission requirements for graduate study, admission to this program is contingent on completion of a BFA in art or approved equivalent. Also, candidates must have a minimum 3.00 cumulative undergraduate GPA; any exceptions will be considered on an individual basis. Eligibility for the MAT in Art Education Program may demand additional coursework to establish proficiency in visual arts. Students lacking a strong background in the visual arts or pedagogy will be required to satisfy prerequisite courses prior to the required graduate courses. Candidates will be selected by a department committee composed of the program director and faculty. Meeting minimum criteria does not guarantee admittance to the program.

Applications will be accepted for fall and spring semesters. The deadline for receipt of application materials is October 15 and March 15. Each applicant must provide the following materials:

- Completed application form
- Certified copies of all undergraduate transcripts and any graduate transcripts
- Statement of intent and professional goals for entering the field
- Three letters of reference from faculty members or individuals who have firsthand knowledge of the applicant’s academic or professional capabilities
- Official score on Praxis I or SAT equivalent
- TOEFL score, if required by Mason policies
- Portfolio of 15 to 20 images is required to reflect artistic breadth and depth, including drawing skills of the applicant’s art. The work should be in Power Point format on a Mac-compatible CD. All portfolios must include a written image sheet with the corresponding number, title, date, medium, and size of each work. Incomplete portfolios will not be considered. Applicants’ portfolio items are considered part of the application for admission and, thus, cannot be returned. Please do not send original materials.

The portfolio and all other application materials should be submitted to the Office of Graduate Admissions. Qualified applicants will be invited to an on-campus interview, portfolio review of original art works, and in-person writing sample.

Diversity among students is another consideration for acceptance into the program. Applicants with degrees in areas other than art are welcome, although they may be required to complete undergraduate core, and studio and art history courses.

MAT matriculants who earned a BFA at an institution other than Mason may be required to take additional undergraduate credits as postbaccalaureate core requirements before acceptance into the program. Without equivalent courses, they will be required to take a set of five BFA foundational courses in art education and education: AVT 396, 493, and 494 and EDUC 301 and 302.

In addition, applicants who did not take equivalent undergraduate courses must also take AVT 472 Critical Theory in the Visual Arts and AVT 180 Computers in the Creative Arts, plus any additional studio or art history course work to meet Virginia licensure requirements.

Degree Requirements

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVT 605 Issues and Research in Art Education</td>
<td>3</td>
</tr>
<tr>
<td>AVT 615 Technology for Art Teachers</td>
<td>3</td>
</tr>
<tr>
<td>AVT 667 Two-Dimensional Art Making: Form, Theme, and Context</td>
<td>4</td>
</tr>
<tr>
<td>AVT 668 Three-Dimensional Art Making across Cultures</td>
<td>4</td>
</tr>
<tr>
<td>AVT 691 Elementary Art Education (with practicum)</td>
<td>3</td>
</tr>
<tr>
<td>AVT 692 Secondary Art Education (with practicum)</td>
<td>3</td>
</tr>
<tr>
<td>AVT 695 Student Teaching: Internship in Art Education...</td>
<td>6</td>
</tr>
<tr>
<td>AVT 696 Seminar for Student Teachers</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 501 Literacy and Curriculum Integration for Specialist Teachers</td>
<td>3</td>
</tr>
<tr>
<td>Total credits required</td>
<td>30</td>
</tr>
</tbody>
</table>

MAT students will receive ongoing evaluation reviews by the MAT faculty to determine whether they have achieved satisfactory progress toward their degree.

All MAT students must pass Praxis II and Virginia Communication and Language Assessment (VCLA) to receive placement for student teaching in the final semester.

Professional Teaching Portfolio and Qualifications Review

The comprehensive experience for the MAT includes the following: (1) a group exhibition, “The Art of Teaching Art Showcase,” in which MAT candidates display and formally present works of PreK–12 student art completed during the internship, along with exemplars of the MAT candidate’s own artwork, and (2) a culminating review of the intern’s competencies as reflected in a professional teaching portfolio, accomplished during the internship seminar course that accompanies student teaching. All process folios, lesson plans, explanations of projects, visual images, and other relevant materials must be made available for the project committee to review. Artworks and all materials should be exhibited in a manner that reveals the student’s aesthetic accomplishments. This exhibition and review will assess the MAT candidate’s final professional teaching portfolio that may be used at interviews for employment. These requirements will be accomplished during the internship seminar course that accompanies student teaching. A committee of MAT faculty will determine whether the student has mastered the field of study. Students who are unable to complete the full student teaching internship in art education and seminar for student teachers will be terminated from the MAT in Art Education Program.
Art Education

The College of Education and Human Development (CEHD) offers educational programs through its Advanced Studies in Teaching and Learning (ASTL) Program for art teachers with current licensure in art PreK–12, who are seeking professional development in art education. See the CEHD chapter of this catalog for information on the concentration in ASTL: Art Education (E1-MED-CRIN/AART) and the Graduate Certificate in ASTL: Art Education (E1-CERG-AART).

Arts Management

4260 Chain Bridge Road
Fairfax, VA 22030
Phone: 703-993-8926
Web: artsmanagement.gmu.edu

Faculty
Richard Kamenitzer, Program Director
Professor: Reeder
Associate professors: Brindle, Marcus, Martin
Term associate professor: Kamenitzer (program director)
Adjuncts: Bienvenu, Carlborg, Hauptle, Hill, Huschle, Kraft, Madden, Richard

Arts Management, MA MA-AMGT

The MA in arts management responds to growing demand for graduates who can manage and coordinate the arts, bridging the world of performing and visual arts with applied managerial skills. The Washington, D.C., region is home to one of the nation’s largest concentrations of performing and visual arts organizations. The demand for arts managers with skills in financial and budgetary management, strategic management and entrepreneurship, and public relations, including marketing and advertising, has arguably never been more acute. The need for arts managers with skills in philanthropy, fund raising, and ongoing relationship-building management among the private and public arts sectors also continues to grow at a fast pace.

The MA is a 36-credit program of study that provides a core curriculum in the fundamentals of arts management. Students complete a 23-credit core and then select courses from a cluster: entrepreneurship in the arts and management; finance and budgeting for the arts; marketing and public relations; or an arts-specific cluster. Students also take internal and external internships. The internal internship affords an in-depth opportunity to work with professionals in residence at Mason’s Center for the Arts. The external internship provides the opportunity to work at one of 60 different visual and performing arts venues in the Washington, D.C., metropolitan area.

Admissions Requirements

The program is geared toward those with a passion for the arts. Diversity among applicants is anticipated and sought, and candidates are evaluated on a case-by-case basis. Work experience is strongly preferred. It is anticipated that applicants will come from the arts community, with experience and training in music, dance, theater, and visual and technical arts and wish to add the skills of marketing, finance, strategy, entrepreneurship, and management to their repertoire. It is also expected that students will enter with more developed skills in the business side of the arts and wish to unite these skills with prior experiences in the arts. Completed applications must be received by March 1 for fall and October 1 for spring.

In addition to meeting general requirements for university admission for graduate study, applicants must submit the following items:

• Official undergraduate transcripts listing a four-year bachelor’s degree from an accredited institution
• Two letters of recommendation from faculty members or individuals who have first-hand knowledge of the applicant’s academic or professional capabilities
• A two-page (maximum) statement of intent and goals

Applicants might be asked to interview with at least one member of the program faculty or Admissions Committee. In addition, applicants may submit a portfolio that demonstrates work experience. Internship experience for recent graduates will also be considered.

Degree Requirements

Core Requirements .......................................................... 23

MAM 601 Fund Raising and Development in Arts .......... 3
MAM 602 Seminar in Arts Management ....................... 3
MAM 603 Arts in Society ............................................... 3
MAM 604 Public Relations and Marketing Strategy for Arts .. 3
MAM 606 Board of Directors ....................................... 3
MAM 704 Budgeting and Finance for Arts Organizations .. 3
MAM 705 Budgeting and Finance for Arts Organizations II 2
MAM 710 Arts Policy .................................................... 3

Internships ......................................................................... 6
MAM 740 Internal Internship-Lab Rotation ................... 2
MAM 790 External Internship ...................................... 4

Clusters of Electives ......................................................... 7
Select a cluster of electives:

Entrepreneurship in the Arts and Management
MAM 712 Grant Writing in the Arts ......................... 1
MAM 750 Arts Entrepreneurship I ......................... 3
MAM 751 Arts Entrepreneurship II .......................... 3
One of the following courses: .................................... 3
PUAD 622 Program Planning and Implementation
PUAD 629 Special Topics in Public Management
PUAD 670 Human Resources Management in the Public Sector
PUAD 720 Performance Measurement
PUAD 732 Managing Technology Transfer

Finance and Budgeting for the Arts
MAM 712 Grant Writing in the Arts ......................... 1
PUAD 661 Public Budgeting Systems ...................... 3
PUAD 769 Issues in Public Financial Management .... 3

Marketing and Public Relations
Select from the following courses:
COMM 601 Communication in Professional Relationships 3
MAM 599 IT for Arts Managers ................................. 1
MBA 623 Marketing Management ............................ 3
PUAD 654 The Community, Marketing, and Public Relations 3

Electives from COMM, AVT, or other
Arts/Arts Management Specific Cluster

Seven credits of course work in arts management, art and visual technology, dance, music, and theater determined in conjunction with the program director.

Total credits required ..................................................... 36

■ Graduate Certificate in CERG-AENT
Arts Entrepreneurship

The 15-credit Graduate Certificate in Arts Entrepreneurship is for early to mid-career professionals working in at least tangentially in an arts-related profit or nonprofit business. Participants will augment their existing knowledge by examining innovative case studies, studying advanced practices and processes, and the actual execution of business models. Certificate courses will address areas of idea generation, market analysis and testing, arts business and revenue modeling, public relations and marketing strategies, budgeting and finance, public policy, and government relations. Learning together in a cohort-modeled certificate program, students will develop strong interpersonal skills, public communication strategies, and team-based problem-solving strategies.

Admission Requirements

For admission into the arts entrepreneurship certificate, prospective students must show graduation from a bachelor’s program (or equivalent) and related work experience. Students apply through Mason’s Office of Admissions, and applications will be approved by a committee established by the Arts Management Program. Courses taken in pursuit of the certificate are eligible to be applied toward the master of arts in arts management, if these courses meet approval.

Core Courses Credits

MAM 604 Public Relations and Marketing Strategies for the Arts ................................................................. 3
MAM 704 Budgeting and Finance for Arts Organizations .................................................................................. 3
MAM 750 Art Entrepreneurship I .................................................. 3
MAM 751 Art Entrepreneurship II .................................................. 3
Three credits of electives as approved by the Arts Management Program ..................................................... 3
Total ................................................................................. 15

Dance

Performing Arts Building, Room A300
Phone: 703-993-1114
Web: dance.gmu.edu

Faculty

Elizabeth Price, Chair
Professors: Lepore, Miller
Associate professors: Price (chair), Shields, Studd
Assistant professors: Dinapoli, Fang, Joyce, Reedy
Adjuncts: Bush, Clancy, Crommiller, Goodson, Kouchearvy, Lee, Lees, Nuamah, Summerall, Volberg, Willis

Course Work

The Department of Dance offers all course work designated DANC in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

The Dance Department offers a BFA and a BA. Entrance to either program is by audition. Information about the audition process, including dates and audition application, can be found on the department web page, dance.gmu.edu, or by calling the department office at 703-993-1114. Admission to the university is determined by the Admissions Office.

Writing-Intensive Requirement

The university requires all students to complete at least one course designated “writing intensive” in their major at the 300-level or above. Students in the BFA and BA in dance fulfill this requirement by successfully completing DANC 390 or 391.

Certification to Teach

This program is approved by the Virginia State Department of Education and administered through the College of Education and Human Development, which is accredited by the National Council for the Accreditation of Teacher Education (NCATE). To be considered for licensure in dance education, a student must successfully complete requirements for a BA or BFA in dance. In addition, students must meet the following requirements:

- Be formally accepted into the program by the Dance Education Committee. Before requesting an interview with the committee, students must complete 45 to 60 credits with a GPA of 2.80 or higher, and submit passing scores for the Praxis I tests (Reading, Writing, Mathematics). It is strongly recommended that students take the Praxis I tests as soon as they have completed ENGL 302, a course in literature, and a course in mathematics.

- Earn no grade lower than a C in dance (see major curriculum) and in professional education courses (EDUC 300, 302; EDRD 300; DANC 453, 454).

- Maintain an overall GPA of 2.80 or higher in all dance course work at Mason and at all other institutions of higher learning combined.

- As dance elective options, complete DANC 118 World Dance, DANC 453 Teaching Creative Movement, and DANC 131 Beginning Jazz Technique or 231 Intermediate Jazz Technique.

- With committee approval, register for and complete EDUC 300 and 302 and EDRG 300.

- After completing all required course work and with committee approval, submit passing scores on the VLCA and complete a full-time 15-week student teaching internship (DANC 455) that includes experiences at both elementary and middle or secondary levels.

For some students, this course of study will require a postbaccalaureate year. Students may design a four-year plan, including summer study, with the assistance of an advisor in the department.

■ Dance, BFA

Because of the professional nature of the BFA degree, the program requires completion of 126 credits of course work. The BFA in dance is a performance-oriented program designed to prepare students professionally as performers, choreographers, and teachers, as well as prepare them for graduate study. Students in this program demonstrate significant
The BFA degree offers a general modern dance major that allows for concentrated study in performance, choreography, or teaching. Technical training includes ballet, a strong emphasis on modern dance, and opportunities to study jazz and world dance forms. Students may request admission into the BFA program during the candidate’s freshman year. Student progress in the BFA program is assessed annually.

**Degree Requirements**

**General Education** .......................................................... 43

**Foundation Requirements**

Written communication
ENGL 101 and ENGL 302 ..................................................... 6
Nonnative speakers of English with limited proficiency in the language may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Quantitative reasoning ......................................................... 3
Information technology ......................................................... 3

**Core Requirements**

Literature .............................................................................. 3
Arts ................................................................. 9
MUSI 101 ............................................................. 3
AVT/ARTH ......................................................... 3
THR 210 .............................................................. 3
Natural science (must include one laboratory science).......... 7
Western civilization ............................................................. 3
Global understanding ......................................................... 3
Social science .................................................................... 3
Synthesis requirement (DANC 490) .................................... 3

**Dance Major Core** .......................................................... 80
DANC 114 Rhythmic Analysis and Music Resources
for Dance ........................................................................... 3
DANC 150 Dance Improvisation ........................................ 3
DANC 170 Introduction to Dance Production ................... 1
DANC 210 Dynamic Alignment .......................................... 3
DANC 251 Dance Composition I .......................................... 3
DANC 252 Dance Composition II ....................................... 3
DANC 270 Dance Production Lab ..................................... 1
DANC 325/425 Intermediate/Advanced Modern Dance .18
DANC 345/445 Intermediate/Advanced Ballet ................. 9
DANC 360 Choreography .................................................... 3
DANC 362 Directed Choreography ..................................... 1
DANC 370 Dance Performance .......................................... 1
DANC 372 Advanced Dance Production ........................... 1
DANC 390 Dance History: Pre-20th Century ...................... 3
DANC 391 Dance History: 20th Century ............................ 3
DANC 454 Teaching Principles of Modern Dance................ 3
(meets general education oral communication requirement)
DANC 480 Introduction to Laban Movement Analysis ....... 3

**Dance Electives** ............................................................... 15

Chosen from the following:
DANC 118 World Dance
DANC 119 Dance in Popular Culture: Afro-Latino Dance
DANC 120 Special Topics in Dance
DANC 131, 231, 331 Beginning Jazz, Intermediate Jazz,
Advanced Jazz
DANC 161 Beginning Tap Dance
DANC 225 Beginning Intermediate Modern Dance
DANC 245 Beginning Intermediate Ballet
DANC 314 Music Accompaniment for Dance
DANC 318 Global Perspectives: World Dance Forms
DANC 325 Intermediate Modern Dance
DANC 326 Dance Performance Practicum
DANC 330 Dance/Movement Therapy I
DANC 345 Intermediate Ballet
DANC 350 Advanced Dance Improvisation
DANC 362 Directed Choreography
DANC 370 Dance Performance
DANC 371 Residency Workshop
DANC 399 Independent Study
DANC 418 Global Dance Intensive
DANC 420 Special Topics in Dance
DANC 425 Advanced Modern Dance
DANC 430 Dance/Movement Therapy II
DANC 445 Advanced Ballet
DANC 453 Teaching Creative Movement
DANC 455 Teaching Practicum

**Electives** ........................................................................ 3

**Total** ................................................................................ 126

- **Dance, BA**

BA-DANC

The BA degree is a 120-credit general program of dance study within a liberal arts degree framework.

**Degree Requirements**

**General Education** .......................................................... 58–67

**Foundation Requirements**

Written communication
ENGL 101 and 302 ............................................................. 6
Nonnative speakers of English with limited proficiency in the language may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Oral communication .......................................................... 3
Quantitative reasoning ......................................................... 3
Information technology ......................................................... 3

**Core Requirements**

Literature .............................................................................. 3
Arts ................................................................. 9
MUSI 101 ............................................................. 3
AVT/ARTH ......................................................... 3
THR 210 .............................................................. 3
Natural science (must include one laboratory science)........ 7
Western civilization ............................................................. 3
Global understanding ......................................................... 3
Social science .................................................................... 3
Philosophy or religion ....................................................... 3
Synthesis requirement (DANC 490) .................................... 3

**Other**

Foreign language* ............................................................... 0–9
Elementary ........................................................................ 6
Intermediate ..................................................................... 3–6

* See beginning of this chapter for foreign language requirement.

**Dance Major Core** .......................................................... 47
DANC 114 Rhythmic Analysis ........................................... 3
DANC 150 Dance Improvisation ...................................... 3
Minor in Dance

The minor (21 credits) offers students an opportunity to study a variety of movement styles and understand dance in its historical and cultural context. A maximum of 4 transfer credits maybe applied to the dance minor.

Dance Electives.................................................................7

Total ............................................................................... 120

Students must choose two or more courses for a total of six credits from the following:

DANC 119 Dance in Popular Culture: Afro-Latino Dance .................................................. 3
DANC 120 Special Topics in Dance......................................................................................... 3
DANC 131, 231, 331 Beginning Jazz, Intermediate Jazz, Advanced Jazz............. 3
DANC 145 Beginning Ballet................................................................................................. 3
DANC 161 Beginning Tap..................................................................................................... 3
DANC 225 Beginning Modern Dance ............................................................................... 3
DANC 245 Beginning Ballet................................................................................................. 3
DANC 314 Music Accompaniment for Dance ................................................................. 3
DANC 318 Global Perspectives: World Dance Forms ..................................................... 3
DANC 325 Intermediate Modern Dance ............................................................................ 3
DANC 326 Dance Performance Practicum ........................................................................... 3
DANC 330 Dance/Movement Therapy I ............................................................................ 3
DANC 345/445 Intermediate/Advanced Ballet .................................................. 3
DANC 350 Advanced Dance Improvisation ................................................................. 3
DANC 362 Directed Choreography .................................................................................... 3
DANC 370 Dance Performance ......................................................................................... 3
DANC 371 Residency Workshop.......................................................................................... 3
DANC 399 Independent Study............................................................................................. 3
DANC 418 Global Dance Intensive ..................................................................................... 3
DANC 420 Special Topics in Dance .................................................................................... 3
DANC 425 Advanced Modern Dance ................................................................................ 3
DANC 430 Dance/Movement Therapy II ........................................................................... 3
DANC 445 Advanced Ballet ............................................................................................. 3
DANC 453 Teaching Creative Movement .......................................................................... 3
DANC 455 Teaching Practicum.......................................................................................... 3

DANC 390 Dance History: Pre-20th Century.................................................. 3
DANC 391 Dance History: 20th Century ...................................................................... 3
DANC 454 Teaching Principles of Modern Dance .................................................... 3
DANC 480 Introduction to Laban Movement Analysis .............................................. 3

All candidates must satisfy the following prerequisites: advanced dance technique, improvisation, two semesters of dance composition, two semesters of dance history, rhythmic analysis or music for dance, anatomy and kinesiology, and dance production. Prerequisite courses may be completed before or concurrent with graduate course work and are usually fulfilled if the applicant has earned a BA or BFA in dance.

Degree Requirements

All students are required to take the following:

DANC 501 Graduate Dance Seminar ................................................................. 3

18 credits of advanced dance technique:

DANC 525 Advanced Modern Dance ........................................................................... 9
DANC 545 Advanced Ballet ....................................................................................... 6–9

DANC 560 Advanced Choreography ............................................................................. 6
DANC 570/571 Advanced Performance/Residency Workshop ..................................... 3

DANC 580 Laban Movement Analysis ........................................................................... 3
DANC 598 Philosophy and Aesthetics of Dance ......................................................... 3
DANC 615 Contemporary Trends .................................................................................. 3
DANC 627 Advanced Teaching Seminar ..................................................................... 3
DANC 680 Dance Management ............................................................................... 3
DANC 790 Internship ................................................................................................. 3
DANC 799 Thesis ......................................................................................................... 6

Electives ......................................................................................................................... 6

Total Credits ................................................................................................................. 60

Mason does not guarantee the availability of these courses every semester; some are offered in alternate years.

GRADUATE PROGRAM

Dance, MFA  MFA-DANC

The MFA in dance is a 60-credit program of study grounded in the modern dance genre that emphasizes performance, choreography, and teaching. Candidates are expected to enter the program with advanced technical proficiency in ballet or modern technique, and professional competence in choreography exemplified by a significant body of work.

Admission Requirements

In addition to fulfilling the admission requirements for graduate study, the applicant must submit directly to the Dance Department a résumé and a 10-minute video that illustrates the applicant’s choreography. All candidates must also demonstrate advanced technical proficiency through an audition. Contact the Dance Department at 703-993-1114 for dates and times.

All candidates must satisfy the following prerequisites: advanced dance technique, improvisation, two semesters of dance composition, two semesters of dance history, rhythmic analysis or music for dance, anatomy and kinesiology, and dance production. Prerequisite courses may be completed before or concurrent with graduate course work and are usually fulfilled if the applicant has earned a BA or BFA in dance.

Credits

DANC 501 Graduate Dance Seminar ................................................................. 3
18 credits of advanced dance technique:

DANC 525 Advanced Modern Dance ........................................................................... 9
DANC 545 Advanced Ballet ....................................................................................... 6–9

DANC 560 Advanced Choreography ............................................................................. 6
DANC 570/571 Advanced Performance/Residency Workshop ..................................... 3

DANC 580 Laban Movement Analysis ........................................................................... 3
DANC 598 Philosophy and Aesthetics of Dance ......................................................... 3
DANC 615 Contemporary Trends .................................................................................. 3
DANC 627 Advanced Teaching Seminar ..................................................................... 3
DANC 680 Dance Management ............................................................................... 3
DANC 790 Internship ................................................................................................. 3
DANC 799 Thesis ......................................................................................................... 6

Electives ......................................................................................................................... 6

Total Credits ................................................................................................................. 60

Mason does not guarantee the availability of these courses every semester; some are offered in alternate years.

College of Visual and Performing Arts

Minor in Dance

The minor (21 credits) offers students an opportunity to study a variety of movement styles and understand dance in its historical and cultural context. A maximum of 4 transfer credits maybe applied to the dance minor.

Dance Electives.................................................................7

Total ............................................................................... 120

Students must choose two or more courses for a total of six credits from the following:

DANC 118 World Dance ............................................................................................. 3
DANC 119 Dance in Popular Culture: Afro-Latino Dance .................................................. 3
DANC 120 Special Topics in Dance......................................................................................... 3
DANC 131, 231, 331 Beginning Jazz, Intermediate Jazz, Advanced Jazz............. 3
DANC 145 Beginning Ballet............................................................................................. 3
DANC 161 Beginning Tap..................................................................................................... 3
DANC 225 Beginning Modern Dance ............................................................................... 3
DANC 245 Beginning Ballet............................................................................................. 3
DANC 314 Music Accompaniment for Dance ................................................................. 3
DANC 318 Global Perspectives: World Dance Forms ..................................................... 3
DANC 325 Intermediate Modern Dance ............................................................................ 3
DANC 326 Dance Performance Practicum ........................................................................... 3
DANC 330 Dance/Movement Therapy I ............................................................................ 3
DANC 345/445 Intermediate/Advanced Ballet .................................................. 3
DANC 350 Advanced Dance Improvisation ......................................................................... 3
DANC 362 Directed Choreography .................................................................................... 3
DANC 370 Dance Performance ......................................................................................... 3
DANC 371 Residency Workshop.......................................................................................... 3
DANC 399 Independent Study............................................................................................. 3
DANC 418 Global Dance Intensive ..................................................................................... 3
DANC 420 Special Topics in Dance .................................................................................... 3
DANC 425 Advanced Modern Dance ................................................................................ 3
DANC 430 Dance/Movement Therapy II ........................................................................... 3
DANC 445 Advanced Ballet ............................................................................................. 3
DANC 453 Teaching Creative Movement .......................................................................... 3
DANC 455 Teaching Practicum.......................................................................................... 3

All candidates must satisfy the following prerequisites: advanced dance technique, improvisation, two semesters of dance composition, two semesters of dance history, rhythmic analysis or music for dance, anatomy and kinesiology, and dance production. Prerequisite courses may be completed before or concurrent with graduate course work and are usually fulfilled if the applicant has earned a BA or BFA in dance.

Degree Requirements

All students are required to take the following:

DANC 501 Graduate Dance Seminar ................................................................. 3

18 credits of advanced dance technique:

DANC 525 Advanced Modern Dance ........................................................................... 9
DANC 545 Advanced Ballet ....................................................................................... 6–9

DANC 560 Advanced Choreography ............................................................................. 6
DANC 570/571 Advanced Performance/Residency Workshop ..................................... 3

DANC 580 Laban Movement Analysis ........................................................................... 3
DANC 598 Philosophy and Aesthetics of Dance ......................................................... 3
DANC 615 Contemporary Trends .................................................................................. 3
DANC 627 Advanced Teaching Seminar ..................................................................... 3
DANC 680 Dance Management ............................................................................... 3
DANC 790 Internship ................................................................................................. 3
DANC 799 Thesis ......................................................................................................... 6

Electives ......................................................................................................................... 6

Total Credits ................................................................................................................. 60

Mason does not guarantee the availability of these courses every semester; some are offered in alternate years.

GRADUATE PROGRAM

Dance, MFA  MFA-DANC

The MFA in dance is a 60-credit program of study grounded in the modern dance genre that emphasizes performance, choreography, and teaching. Candidates are expected to enter the program with advanced technical proficiency in ballet or modern technique, and professional competence in choreography exemplified by a significant body of work.

Admission Requirements

In addition to fulfilling the admission requirements for graduate study, the applicant must submit directly to the Dance Department a résumé and a 10-minute video that illustrates the applicant’s choreography. All candidates must also demonstrate advanced technical proficiency through an audition. Contact the Dance Department at 703-993-1114 for dates and times.

All candidates must satisfy the following prerequisites: advanced dance technique, improvisation, two semesters of dance composition, two semesters of dance history, rhythmic analysis or music for dance, anatomy and kinesiology, and dance production. Prerequisite courses may be completed before or concurrent with graduate course work and are usually fulfilled if the applicant has earned a BA or BFA in dance.

Degree Requirements

All students are required to take the following:

DANC 501 Graduate Dance Seminar ................................................................. 3

18 credits of advanced dance technique:

DANC 525 Advanced Modern Dance ........................................................................... 9
DANC 545 Advanced Ballet ....................................................................................... 6–9

DANC 560 Advanced Choreography ............................................................................. 6
DANC 570/571 Advanced Performance/Residency Workshop ..................................... 3

DANC 580 Laban Movement Analysis ........................................................................... 3
DANC 598 Philosophy and Aesthetics of Dance ......................................................... 3
DANC 615 Contemporary Trends .................................................................................. 3
DANC 627 Advanced Teaching Seminar ..................................................................... 3
DANC 680 Dance Management ............................................................................... 3
DANC 790 Internship ................................................................................................. 3
DANC 799 Thesis ......................................................................................................... 6

Electives ......................................................................................................................... 6

Total Credits ................................................................................................................. 60

Mason does not guarantee the availability of these courses every semester; some are offered in alternate years.

College of Visual and Performing Arts
Performing Arts Building, Room A407
Phone: 703-993-1992
Web: www.gmu.edu/cvpa/favs

Faculty
Cynthia Lont, Program Director
Clayton Austin, Theater; Thomas Britt, Film and Video Studies; Julie Christensen, Modern and Classical Languages; Mark Cooley, Art and Visual Technology; Lynne Constantine, Art and Visual Technology; Edgar Endress, Art and Visual Technology; Peggy Feerick, Art and Visual Technology; Cynthia Fuchs, English; Edward Gero, Theater; Timothy Gibson, Communication; Carma Hinton, Robinson Professor; Richard Kamenitzer, Arts Management; Howard Kurtz, Theater; Alison Landsberg, History and Art History; Scott Martin, Arts Management; Kristina Olsen, Modern and Classical Languages; Paula Petrik, History and Art History; Janine Ricouart, Modern and Classical Languages; Jeanette Roan, English; Mark Sample, English; Jessica Scarlata, English; Gail Scott White, Art and Visual Technology; Martin Winkler, Modern and Classical Languages; Sue Wrbican, Art and Visual Technology

Course Work
The Film and Video Studies Program offers all course work designated FAVS.

UNDERGRADUATE PROGRAM

Film and Video Studies, BA

The Film and Video Studies Program offers a 120-credit multidisciplinary BA degree, which spans many units including Art and Visual Technology, Communication, English, History and Art History, Modern and Classical Languages, New Century College, and Theater. Students study film and video production, theory, criticism, ethics, screenwriting, and business.

The vocabulary of film (broadly defined) now pervades the intellectual, cultural, political, and social landscape. The tools the filmmaker wields apply to an ever-widening range of tasks across the fields of human endeavor, from traditional narrative and documentary productions to academic research and pedagogical applications to projects of personal expression. Emerging technology makes the means of production available to anyone with access to a moderate level of computing power. This combination of factors makes film an important subject for academic inquiry and training.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students seeking a BA in film and video studies should speak with the program director about this requirement.

Degree Requirements*

General Education................................................................. 40

Foundation Requirements..................................................... 10

Written communication: ENGL 101 and 302 ......................... 6

Film and Video Studies Core Requirements .......................... 30

Take 6 credits from the following:

- CHIN 320 Contemporary Chinese Film
- COMM 255 Media Literacy
- COMM 365 Women and Media
- COMM 380 Media Criticism
- ENGL 334 Literary Approaches to Popular Culture (Film and Media)
- ENGL 421 Film History
- ENGL 422 Film Theory
- ENGL 490 Special Topics in Film
- ENGL 493 Special Topics in Popular Literature (Film and Media)
- FREN 470 Topics in French Cinema
- HIST 393 Topics in Film and History
- RUSS 470 Topics in (Post) Soviet Cinema

**Video Production............................................................... 6

Take 6 credits from the following:

- AVT 354 Digital Photo
- AVT 356 Studio Lighting
- AVT 374 Sound and Vision
- AVT 376 Live Movies
- AVT 382 Digital Art and Animation
- AVT 383 Three-Dimensional Digital Arts

- Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements. Students are reminded that the English Department offers proficiency exams for credit and exemption from this requirement.

- Oral communication....................................................... 3
- Quantitative reasoning.................................................... 3
- Either appropriate placement score on quantitative skills and one of MATH 108, 110, 111, 113, 115, 125; or IT 250; or STAT 250; or lower placement score requiring MATH 106.

- Information technology.................................................. 3

- Core Requirements
- Literature............................................................................ 3
- Arts .................................................................................. 3
- Natural science (including one laboratory science).............. 7
- Western civilization.......................................................... 3
- Global understanding....................................................... 3
- Social and behavioral sciences....................................... 3
- Synthesis requirement...................................................... 3
- Foreign language or a minor**

- Major ................................................................................ 48
- Film and Video Studies Core Requirements ........................ 30
- Students must earn a minimum grade of C in all core courses (AVT 204; COMM 355, 454; ENGL 331, 332; FAVS 100, 355, 450, 499; THR 482).
- AVT 204 Visual Thinking................................................ 3
- COMM 355 Video Production: Principles and Practices ...... 3
- COMM 454 Free Speech and Ethics.................................. 3
- ENGL 331 Introduction to Documentary Film.................. 3
- ENGL 332 Introduction to Film........................................ 3
- FAVS 100 Colloquium (1 credit, three times).................... 3
- FAVS 355 Introduction to Business and Distribution of Film and Video......................................................... 3
- FAVS 450 Internship.......................................................... 3
- FAVS 499 Senior Thesis/Project....................................... 3
- THR 482 Advanced Screenplay Workshop.................... 3

- Analysis, History, Theory.................................................. 6
- Take 6 credits from the following:
  - CHIN 320 Contemporary Chinese Film
  - COMM 255 Media Literacy
  - COMM 365 Women and Media
  - COMM 380 Media Criticism
  - ENGL 334 Literary Approaches to Popular Culture (Film and Media)
  - ENGL 421 Film History
  - ENGL 422 Film Theory
  - ENGL 490 Special Topics in Film
  - ENGL 493 Special Topics in Popular Literature (Film and Media)
  - FREN 470 Topics in French Cinema
  - HIST 393 Topics in Film and History
  - RUSS 470 Topics in (Post) Soviet Cinema

- Visual and Performing Arts
AVT 390 Digital Media and Video Arts
AVT 457 Documentary Photography
AVT 482 Advanced Two-Dimensional Digital Arts
AVT 487 Advanced Digital Media
COMM 358 Video II: Producing and Directing
COMM 360 Video Editing
COMM 363 Video II: Intermediate Production
COMM 366 Theories of Visual Communication
COMM 399 Videography
FAVS 365 Documentary Filmmaking I
THR 215 Stage Make-Up
THR 230 Introduction to Technical Theater
THR 235 Fundamentals of Costume Construction
THR 314 Lighting Stagecraft
THR 334 Lighting Design
THR 336 Advanced Theater Technology
THR 423 Audition Techniques: Stage and Camera
Electives in Area of Specialization: 6

Students are required to take two courses demonstrating a focus in subject matter, possibly from the following departments: History, Music, Sociology and Anthropology, or Theater.

General Electives: 32

*FAVS majors may not double-count courses toward both the FAVS major and university general education requirements.

**See beginning of CVPA chapter for foreign language requirements.

***Students may count no more than 16 credits of AVT courses toward their FAVS degree in this category.

Music

Performing Arts Building, Room A417
Phone: 703-993-1380
Web: gmu.edu/departments/music

Faculty

James Gardner, Chair

Professors: Camphouse, Engebretson, J. Gardner (chair), Maiello, Miller, Smith

Term professor: Balakerskaia, Hearden, Johonnott, Lapple, Sternbach

Associate professors:Billingham, Carroll, Monson (associate chair), T. Owens

Term associate professors: Casagrande, Ker-Hackleman, Rendler

Assistant professors: Bergman, Bullard, Nickens, Novak


Applied Music Faculty

Bassoon: Douglas Kahlenbrink, Adjunct Associate Professor. BS, Ball State University; MM, James Madison University. Former faculty member, James Madison University.

Cello: Robert Park, Adjunct Assistant Professor. BS, University of Maryland, College Park; MM, DMA, Catholic University of America; principal cellist, U.S. Army Band of Washington, D.C. (Army Orchestra and Strolling Strings).

Loran Stephenson, Adjunct Associate Professor. BM, Curtis Institute of Music; MM, Catholic University of America; National Symphony Orchestra; former member, U.S. Army Band of Washington, D.C.

David Teie, Adjunct Associate Professor. Cello. BM, Peabody Conservatory of Music of the Johns Hopkins University; cellist, National Symphony Orchestra, Washington, D.C.

Clarinet: Sharon Bonneau, Adjunct Assistant Professor. BM, BME, Eastman School of Music; MA, George Mason University; former clarinetist, U.S. Air Force Band of Washington, D.C.

Lora Ferguson, Adjunct Associate Professor. BM, Oberlin Conservatory; MM, Catholic University of America; clarinetist, Kennedy Center Opera House Orchestra; Capitol Woodwind Quintet.

Bryan Jones, Adjunct Assistant Professor. BME, Florida State University; MM, Baylor University; DMA, Catholic University of America; former member, U.S. Air Force Band of Washington, D.C.; instructor of clarinet, Levine School of Music.

Composition: Steve Antosca, Adjunct Assistant Professor. BA, Tulane University; MM, Peabody Conservatory of Music of Johns Hopkins University; Artist-in-Residence, Duke Ellington School of the Arts; cochair, Composition Department at Levine School of Music.

Glenn Smith, Professor. BA, MA, California State University, Hayward; DMus, Indiana University. Mark Camphouse, Professor. BM, MM, Northwestern University; former director of bands, Radford University.

Conducting: Stanley Engebretson, Professor. BA, MA, University of North Dakota; DMA, Stanford University; artistic director, Masterworks Chorus and Orchestra; music director, New York Avenue Presbyterian Church; former associate conductor, Minnesota Chorale.

Anthony Maiello, Professor. BS, MS, Ithaca College; Director of Instrumental Music Studies, George Mason University; former chairman of performance, Potsdam College of State University of New York; former associate conductor, McLean (Virginia) Orchestra. Mark Camphouse (see Composition)

Euphonium: Roger Behrend, Adjunct Professor. BME, Michigan State University; MA, George Mason University; solo/principal euphoniumist, U.S. Navy Band of Washington, D.C.

Flute: Judith Lapple, Adjunct Professor. BM, Eastman School of Music; MM, Northeast Louisiana University; former principal flutist, U.S. Air Force Band of Washington, D.C.

Thomas Perazzoli, Adjunct Associate Professor. Philadelphia Musical Academy; flutist, National Symphony Orchestra.

Guitar (Classical): Larry Snitzler, Adjunct Professor. Former student of Andres Segovia (guitar) and Nadia Boulanger (theory).

Guitar (Jazz): Richard Whitehead, Adjunct Assistant Professor. Former member U.S. Air Force Airmen of Note.

Harp: Jeanné Chalifoux, Adjunct Assistant Professor. Artist Diploma, Curtis Institute of Music; former harpist, National Gallery Orchestra and National Symphony Orchestra.
Horn: Eric Moore, Adjunct Assistant Professor. BME, BA, Boston University; MM, University of Texas at Austin; principal horn, U.S. Navy Band and Fairfax Symphony.
Edwin Thayer, Adjunct Associate Professor. BM, MM, University of Illinois; hornist, National Symphony Orchestra.
David Whaley, Adjunct Associate Professor. BME, Drake University; MM, DMA, University of Illinois; hornist, National Symphony Orchestra.

Koto: Kyoko Okamoto, Adjunct Assistant Professor. Bachelor in Languages, Kyoto University of Foreign Studies; Toho Kinshu Kai (Koto School).

Oboe: Lorrie Berkshire-Brown, Adjunct Assistant Professor. BM, Arizona State University; MM, Manhattan School of Music; oboist, U.S. Army Band of Washington, D.C.; substitute oboist, New York Philharmonic Orchestra.

Organ: William Neil, Adjunct Professor. BA, Pennsylvania State University; MM, Syracuse University; University of Michigan; Juilliard School; organist and keyboardist, National Symphony Orchestra, Chamber Soloists of Washington.

Percussion: Kenneth Harbison, Adjunct Associate Professor. BM, Eastman School; MM, Catholic University of America; assistant principal percussionist, National Symphony Orchestra.
John Kilkenny, Adjunct Assistant Professor. BM, The Juilliard School; MM, Temple University; music director, Metropolitan Wind Symphony; cochair, University of Maryland Summer Percussion Workshop.

Percussion (Jazz): Harold Summey, Adjunct Assistant Professor. MM, Howard University; member, U.S. Army Band.

Piano: Anna Balakerskaia, Adjunct Artist Professor. MM, DMA, St. Petersburg State Conservatory, Russia; former faculty member, Moscow and St. Petersburg State Conservatories.
Joanne Haroutounian, Adjunct Associate Professor. BA, Trenton State College; MA, American University; PhD, University of Virginia; pedagogy author, lecturer, and clinician.
Linda Apple Monson, Associate Professor. BM, DMA, Peabody Conservatory of Music of Johns Hopkins University; diploma (piano performance), Santiago de Compostela, Spain; former faculty member of Peabody Institute, College of Notre Dame of Maryland, and Northern Virginia Community College.

Piano (Jazz): Wade Beach, Adjunct Assistant Professor. BM, MM, University of Maryland; former member, U.S. Air Force Band Airmen of Note.

Saxophone: Richard Parrell, Adjunct Assistant Professor. BA, BM, George Mason University; MME, North Texas State University; solo principal saxophonist, U.S. Army Band of Washington, D.C.
Timothy Roberts, Adjunct Associate Professor, Saxophone. BM Northwestern University; MM, DMA Catholic University of America; principal saxophonist and a National Tour soloist with the United States Navy Band in Washington, D.C.; coordinator of the Navy Band’s International Saxophone Symposium.
Dale Underwood, Adjunct Professor. Texas Tech University; former saxophone soloist, U.S. Navy Band of Washington, D.C.

String Bass: Glenn A. Dewey, Adjunct Associate Professor. BM, University of Illinois; MM, Northwestern University; bassist, U.S. Marine Band of Washington, D.C.; former double/electric bass instructor, Millikin University.

Trombone: Matthew Neff, Adjunct Assistant Professor. BS, MEd, Pennsylvania State University; MM, Catholic University; bass trombonist, U.S. Navy Band.

Trumpet: Stanley Curtis, Adjunct Associate Professor. BM, University of Alabama; MM, Cleveland Institute of Music; trumpeter, U.S. Navy Band.

Dennis Edelbrock, Adjunct Professor. BM, University of Iowa; MA, DMA, Catholic University of America; trumpeter, U.S. Army Band of Washington, D.C., and National Gallery Orchestra.
Kenneth Ritenhouse, Adjunct Assistant Professor, Jazz Trumpet. BA, Performance, West Virginia Wesleyan College; MM, Jazz Studies, University of Maryland; additional graduate study, Eastman School of Music; member of the United States Army “Blues” Jazz Ensemble in Washington, D.C.; performs regularly with the Smithsonian Jazz Masterworks Orchestra.

Tuba: Roger Behrend (see Euphonium).

Viola: Edwin Johonnott, Adjunct Professor. Former violist, National Symphony Orchestra. Studied at Indiana University and Illinois University.

Ramón Scavelli, Adjunct Associate Professor. Philadelphia Musical Academy; violist, National Symphony Orchestra.

Violin: James E. Gardner, Professor and Chair, Department of Music. BM, Oklahoma City University; MM, DMA, Southwestern Baptist Theological Seminary.

Peter Haase, Adjunct Professor. MM, State Conservatory of Music, Katowice, Poland; postgraduate studies, Moskow Conservatory and the Juilliard School; violinist, National Symphony Orchestra.

Edwin Johonnott (see Violin).

Voice: Samuel Bonds, Adjunct Associate Professor. Faculty member, Duke Ellington School for the Arts.

Carla Rae Cook, Adjunct Associate Professor. BM, University of Utah; MM, Boston University; Postgraduate Studies, Manhattan School of Music; performing dramatic mezzo-soprano.

Stanley Engebretson (see Conducting).

Kathryn Hearden-Botelho, Adjunct Professor. BM, St. Norbert College; MM, Performers Certificate, DMA, Eastman School of Music.

Laura Mann, Adjunct Professor. BM, MM, Eastman School of Music; DMA, University of Maryland.

Patricia Miller, Professor. BM, Boston University; MM, New England Conservatory; Artist Diploma, Accademia di Santa Cecilia (Rome); Advanced Vocal Studies, Mozarteum, Salzburg, Austria.

Seong Nam, Adjunct Assistant Professor. BM, Han-Yang University; MM, University of Maryland; chorus member, Washington National Opera; music director, Gyung Hyang Garden Presbyterian Church.

Richard Novak, Assistant Professor. Tenor. BM, MM, Stephen F. Austin University; DMA, University of North Texas; semifinalist-Metropolitan Opera National Council
Regional Auditions, Singer of the Year-National Association of Teachers of Singing; Wichita Grand Opera, Gilmore International Keyboard Festival, Monroe Symphony, the Living Opera, San Antonio Symphony, Des Moines Metro Opera, American Be Canto Opera. Debby Wenner, Adjunct Assistant Professor. BS, Frostburg State College; MM, George Washington University; graduate work, West Virginia University, Catholic University of America; former member, Metropolitan Opera Apprentice Program; performing mezzo-soprano.

Course Work
The Music Department offers all course work designated MUSI in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS
The two undergraduate degree programs offered through the Department of Music, the bachelor of art (BA) in music and the bachelor of music (BM), prepare students for graduate work in music and music literature; research and professional work in musical activities; and state licensure, or certification, to teach vocal and choral or instrumental music at the elementary and secondary school levels.

Through its strategic plan, Music Outreach and the Teaching Professions, the department enables students to pursue worthwhile vocational goals as teachers, performers, conductors, and composers. The department also seeks to educate its students to reflect a concern for cultural and humanistic values as future ambassadors and advocates of music and other arts. Through innovative learning experiences, the department provides all students in the BA and BM programs with opportunities to become effective musicians, teachers, and advocates of music. Teaching music is the principal area in which students can find employment in private studios, public and private schools, academies, and higher education within the ever-changing workplace. Because of this, all music majors at Mason receive some training in the teaching of music.

The department also recognizes the critical outreach role it provides in serving students from all majors, as well as members of the community who significantly benefit from the values and experiences of an education in music. The department seeks to provide unique educational opportunities through its various course offerings, workshops, presentations, and performances for those seeking music enrichment.

Entrance to all music degree programs is by audition. Arrangements for an audition must be made in advance by contacting the Department of Music before the scheduled audition date. Auditions are held approximately once per month. Audition dates and audition application forms are available through the music department web site: gmu.edu/departments/music.

A fundamentals of music test is given during the first week of classes to all students enrolled in MUSI 115 Theory I. Call the Department of Music at 703-993-1380 for additional information.

Competency placement tests are required of all transfer students who wish to present transfer credit in any of the following areas: sight singing, ear training, and keyboard skills.

Students must earn a minimum 2.00 cumulative GPA in their major or higher, if required by their program.

Writing-Intensive Requirement
Mason requires all students to complete at least one course designated “writing intensive” in their major at the 300 level or above. Students majoring in music may fulfill this requirement by successfully completing MUSI 332. Students who transfer this course into Mason may be required to repeat it or enroll in some other suitable course to fulfill the writing-intensive requirement.

Music, BA

Students pursuing a BA must complete the general education program outlined below. This distribution enables students to develop a breadth of knowledge, as well as the necessary skills to make the in-depth study of a major truly meaningful. In addition to general education requirements, students must also demonstrate intermediate-level proficiency in one foreign language or complete a minor program. A minimum of 57 credits in music course work is required for the music major. A total of 120 credits is required.

Degree Requirements

General Education ............................................................... 25–46

Foundation Requirements
Written communication.....................................................6
ENGL 101 and ENGL 302 Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Quantitative Reasoning (Mathematics)*.................................3

Core Requirements
Literature* ................................................................. 3
Natural science* (two classes; one must contain a lab) .......... 7
Western civilization ..........................................................3

Also have significant elective choices as per general education listing.

Remaining general education requirements are fulfilled with major course work.

Intermediate-level language proficiency* or an academic minor

* See beginning of CVPA chapter for foreign language requirement.

Music Major ............................................................................. 57

Musicianship ............................................................................28
MUSI 115, 116, 215, 216 Music Theory I–IV ......................12
MUSI 113, 114 Sight Singing/Ear Training I and II .............4
MUSI 171, 172, 273 Keyboard Skills I–III .............................3
(Pianists substitute MUSI 371 and 372 for MUSI 171
and 172)
MUSI 331 and 332 Music History in Society I and II ..........6
MUSI 331 and 432 I and IV or MUSI 332 and 432 II and IV
MUSI 431 Music History III .................................................3
(Meets university general education global understanding requirement)

Performance and Music Electives............................................29
Applied music (PMI) ..........................................................8
Large ensemble (Transfer students must earn at least 2 credits at Mason) .........................................................4
Additional ensembles (Large or small; meets university general education fine arts requirement)..........................3
MUSI 415 Music in Computer Technology ..........................3
(Meets university general education technology requirement)
MUSI 251 Art of Teaching Music ........................................3
(Meets university general education communication requirement)
MUSI 351, 352, or 353 Pedagogy ..........................................3
MUSI 395 Teaching Internship ...........................................2
MUSI 490 Synthesis ............................................................3
(Meets university general education synthesis requirement)
MUSI 300 Recital Attendance (five semesters) .......................0

Electives.............................................................................17–38
Can include additional music courses

Total ..................................................................................120

■ Music, BM  BM-MUSI

One hundred twenty credits are required for the BM degree.

Four concentrations are offered: composition, jazz, music education, and performance. Students are required to complete core courses of one of the concentrations plus courses listed below in one of the points of emphasis relative to the concentration. Eligibility to continue in upper-level courses will be assessed during the sophomore year of study.

▲ Concentration in Composition (CPO)

Degree Requirements

General Education ..............................................................21

Foundation Requirements

Written communication .......................................................6
ENGL 101 and ENGL 302 Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as 302, to fulfill degree requirements.
Quantitative reasoning (mathematics)*...............................3
Core Requirements

Literature* ...........................................................................3
Natural science* .................................................................3
Western civilization ...........................................................3
Social or behavioral science* ..............................................3
*Also have significant elective choices as per general education listing.
Remaining general education requirements are fulfilled with major course work.

Music Core Courses ..........................................................72

MUSI 251 Art of Teaching Music .........................................3
general education communications)
MUSI 415 Music in Computer Technology ................................3
general education information technology)
MUSI 431 Music History in Society III .................................3
general education global understanding)
MUSI 324 Junior Recital, MUSI 424 Senior Recital, and MUSI 491 Performance (Synthesis) .................................3
MUSI 113, 114, and 213 Sight-Singing/Ear-Training I–III
MUSI 115, 116, 215 and 216 Music Theory I–IV .....................12
MUSI 273 Keyboard Skills III ..............................................1
MUSI 319 Composition and Arranging .................................3
MUSI 379 Improvisation ......................................................1

MUSI 419 Orchestration ......................................................3
MUSI 331, 332, and 432 Music History I, II, and IV ...............9
MUSI 361 Class Strings ..........................................................1
MUSI 363 or 364 Class Woodwinds ......................................1
MUSI 365 or 369 Class Brass ...............................................1
MUSI 366 Class Percussion ..................................................1
MUSI 454 or 485 Jazz Arranging or Chamber Music ................3
MUSI 300 Recital Attendance (five semesters) .......................0
MUSI 248 Applied Music: Composition ................................2
MUSI 448 Applied Music: Composition (four semesters) .....12
MUSI 485 M3E or Healing Arts Ensemble (four semesters) ...4

Emphasis Requirement (complete one) ..................................27

Composition: Brass emphasis
MUSI 245 Applied Music: Brass (three semesters) ...............6
MUSI 380, 383, 387, or 389 Ensemble ................................1
MUSI 380, 383, 387, or 389 Ensemble (three semesters)
(meets general education fine arts requirement) ....................3
MUSI 171 and 172 Keyboard Skills I and II ............................2
MUSI 353 Instrumental Pedagogy and Literature .................3
MUSI 391 and 396 Instrumental Conducting I and II ............4
General Electives ..............................................................8

Composition: Guitar emphasis
MUSI 246 Applied Music: String (three semesters) ..............6
MUSI 381, 384, 385, or 389 Ensemble .................................1
MUSI 381, 384, 385, or 389 Ensemble (three semesters)
(meets general education fine arts requirement) ....................3
MUSI 171 and 172 Keyboard Skills I and II .............................2
MUSI 353 Instrumental Pedagogy and Literature .................3
MUSI 391 and 396 Conducting I and II .................................4
General Electives ..............................................................8

Composition: Percussion emphasis
MUSI 247 Applied Music: Percussion (three semesters) .........6
MUSI 380, 383, 387, or 389 Ensemble .................................1
MUSI 380, 383, 387, or 389 Ensemble (three semesters)
(meets general education fine arts requirement) ....................3
MUSI 171 and 172 Keyboard Skills I and II .............................2
MUSI 353 Instrumental Pedagogy and Literature .................3
MUSI 391 and 396 Instrumental Conducting I and II ............4
General Electives ..............................................................8

Composition: String emphasis
MUSI 246 Applied Music: String (three semesters) ..............6
MUSI 387 Ensemble ...........................................................1
MUSI 387 Ensemble (three semesters)
(meets general education fine arts requirement) ....................3
MUSI 171 and 172 Keyboard Skills I and II .............................2
MUSI 353 Instrumental Pedagogy and Literature .................3
MUSI 391 and 396 Instrumental Conducting I and II ............4
General Electives ..............................................................8

Composition: Voice emphasis
MUSI 243 Applied Music: Voice (three semesters) ...............6
MUSI 381, 384, or 385 Chorus ..........................................1
MUSI 381, 384, or 385 Chorus (three semesters).................3
(meets general education fine arts requirement)...........3
MUSI 171 and 172 Keyboard Skills I and II..................2
MUSI 352 Vocal Pedagogy...........................................3
MUSI 391 and 396 Choral Conducting I and II...............4
General Electives...................................................8

Composition: Woodwind emphasis  
MUSI 244 Applied Music: Woodwind (three semesters) .6
MUSI 380, 383, 387, or 389 Ensemble....................1
MUSI 380, 383, 387, or 389 Ensemble (three semesters)  
(meets general education fine arts requirement).........3
MUSI 171 and 172 Keyboard Skills I and II.................2
MUSI 353 Instrumental Pedagogy and Literature.........3
MUSI 391 and 396 Instrumental Conducting I and II.....4
General Electives...................................................8

Total .........................................................................120

▲ Concentration in Jazz (JACZ)

Degree Requirements

General Education ....................................................21

Foundation Requirements
Written communication............................................6
ENGL 101 and ENGL 302 Nonnative speakers of English  
with limited proficiency may substitute ENGL 100 for  
ENGL 101. Students must attain a minimum grade of C  
in ENGL 100 or 101, as well as 302, to fulfill degree  
requirements.
Quantitative Reasoning (Mathematics)*.....................3

Core Requirements
Literature*...............................................................3
Natural science*.......................................................3
Western civilization..................................................3
Social or behavioral science*.................................3
*Also have significant elective choices as per general education  
listing.

Remaining general education requirements are fulfilled  
with major course work.

Music Core Courses .................................................74
MUSI 251 Art of Teaching Music...............................3
(general education communications)
MUSI 415 Music in Computer Technology................3
(general education information technology)
MUSI 431 Music History in Society III...................3
(general education global understanding)
MUSI 389 Jazz Ensemble (three semesters)..............3
(general education fine arts)
MUSI 324 Junior Recital, MUSI 424 Senior Recital, and ..3
MUSI 491 Performance (synthesis)
MUSI 389 Jazz Ensemble (five semesters)...............5
MUSI 485 Jazz Chamber Ensemble (four semesters)....4
MUSI 300 Recital Attendance (5 semesters)..............0
MUSI 113, 114, and 213 Sight-Singing/Ear-Training I–III6
MUSI 115, 116, 215, and 216 Music Theory I–IV.......12
MUSI 273 Keyboard Skills III..................................1
MUSI 319 Composition and Arranging....................3
MUSI 379 Intro to Improvisation.............................1
MUSI 454 Jazz Arranging.........................................3
MUSI 107 Development of Jazz................................3
MUSI 311 Jazz Studies............................................3
MUSI 331, 332, and 432 Music History I, II, and IV....9
MUSI 492-J Topics in Jazz Studies.........................3
MUSI 391 Instrumental Conducting.........................2

MUSI 450 and 452 Jazz Improvisation I and II...........4

Emphasis Requirement (complete one).................25

Jazz: Brass emphasis
MUSI 245 Applied Music (four semesters).............8
MUSI 445 Applied Music (four semesters).............12
MUSI 171 and 172 Keyboard Skills I and II...........2
General Electives................................................3

Jazz: Guitar emphasis
MUSI 246 Applied Music (four semesters).............8
MUSI 446 Applied Music (four semesters).............12
MUSI 171 and 172 Keyboard Skills I and II...........2
General Electives................................................3

Jazz: Keyboard emphasis
MUSI 242 Applied Music (four semesters).............8
MUSI 442 Applied Music (4 semesters)...............12
MUSI 371 and 372 Accompanying I–II...................2
General Electives................................................3

Jazz: Percussion emphasis
MUSI 247 Applied Music (four semesters).............8
MUSI 447 Applied Music (four semesters).............12
MUSI 171 and 172 Keyboard Skills I and II...........2
General Electives................................................3

Jazz: Woodwind emphasis
MUSI 244 Applied Music (four semesters).............8
MUSI 444 Applied Music (four semesters).............12
MUSI 171 and 172 Keyboard Skills I and II...........2
General Electives................................................3

Total .........................................................................120

▲ Concentration in Music Education (MUE)

Certification to Teach

The music education concentration is approved by the Vir-  
ginia State Department of Education and administered through  
the College of Education and Human Development, which  
is accredited by the National Council for the Accreditation  
of Teacher Education (NCATE). Minimum scores on the  
Praxis I and II, and VCLA tests must be achieved before state  
licensure is granted.

Students must be formally accepted into the music education  
concentration by the department’s Music Teacher Education  
Committee. They must have earned 45 to 60 credits and  
completed Sight Singing and Ear Training III, Keyboard  
Skills III, and Theory III with a grade of C or higher. Other  
requirements are as follows:

• Submit scores for the Praxis I (Reading, Writing, and  
  Mathematics) tests to the committee. It is strongly recom-  
  mended that students take the Praxis I tests as soon as ENGL  
  302, a course in literature, and a course in mathematics  
  have been completed.

• Maintain an overall GPA of 2.80 in all course work com-  
  pleted at Mason and in course work at all institutions of  
  higher learning combined.

• Earn no grade lower than a C in music and professional  
  education courses needed for graduation.

• Successfully pass sight singing, ear training, keyboard, and  
  conducting proficiency exams during the first music methods  
  course (MUSI 461, 463, 464, 466, or 467). Students in the  
  voice emphasis must also pass a voice proficiency exam, and  
  students in the instrumental emphasis must pass a musical
instrument fingerling proficiency exam during the first music methods course.

- Complete all course work in the program sequence.

On fulfilling the above requirements, students must complete 15 weeks of a full-time internship or student teaching. Applications for placement, subject to approval of the committee, are submitted to the Office of Teacher Education at the beginning of the previous semester. In addition, students must pass the VCLA before student teaching and the Praxis II (Music: Content Knowledge) test during the internship semester.

### MUE Degree Requirements

#### General Education ........................................................ 21
- **Foundation Requirements**
  - Written communication .................................................. 6
  - ENGL 101 and ENGL 302 Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as 302, to fulfill degree requirements.
  - Quantitative reasoning (mathematics)............................... 3

- **Core Requirements**
  - Literature* ................................................................. 3
  - Natural science* ......................................................... 3
  - Western civilization .................................................... 3
  - Social or behavioral science* ........................................... 3
*Also have significant elective choices as per general education listing.

Remaining general education requirements are fulfilled with major course work.

#### Music Core Courses .................................................... 59
- MUSI 251 Art of Teaching Music ........................................... 3
- (general education communications)
- MUSI 415 Music in Computer Technology ............................ 3
- (general education information technology)
- MUSI 431 Music History in Society III ................................. 3
- (general education global understanding)
- MUSI 495 Music Ed Internship ............................................ 6
- (general education synthesis)
- MUSI 323 Music Education Recital ....................................... 0
- MUSI 113, 114, 213 Sight-Singing/Ear-Training I–III ............. 6
- MUSI 115, 116, 215, 216 Music Theory I–IV ......................... 12
- MUSI 273 Keyboard Skills III ............................................ 1
- MUSI 319 Composition and Arranging .................................. 3
- MUSI 331, 332, 432 Music History I, II, and IV ...................... 9
- MUSI 300 Recital Attendance (five semesters) ....................... 0
- MUSI 361 Class Strings .................................................. 1
- MUSI 366 Class Percussion .............................................. 1
- MUSI 393 Music Administration and Management ............... 2
- EDRD 300 Language and Curriculum Integration .................. 3
- EDUC 301 Educationally Diverse Populations ..................... 3
- EDUC 302 or 339 Human Growth/Development ........................ 3

#### Emphasis Requirement (complete one) ............................ 40
- **Music Education: Brass emphasis**
  - MUSI 245 Applied Music (four semesters) ......................... 8
  - MUSI 445 Applied Music (three semesters) ......................... 6
  - MUSI 380, 383, 387, and/or 389 Ensemble (four semesters) ..... 4
  - MUSI 380, 383, 387, and/or 389 Ensemble (three semesters) 
    (meets general education fine arts requirement) ................... 3
  - MUSI 171 and 172 Keyboard Skills ................................... 2
  - MUSI 363 and 364 Class Woodwinds I and II ...................... 2
  - MUSI 365 and 369 Class Brass I and II ................................ 2
  - MUSI 367 Class Guitar ................................................. 1
  - MUSI 368 Class Voice ................................................... 1
  - MUSI 391 and 396 Instrumental Conducting I and II ............ 4
  - MUSI 464 and 466 Instrumental Methods I–II ..................... 6
  - General Elective .......................................................... 1

- **Music Education: Guitar emphasis**
  - MUSI 246 Applied Music (four semesters) ......................... 8
  - MUSI 446 Applied Music (three semesters) ......................... 6
  - MUSI 381, 384, 385, or 389 Ensemble (four semesters) .......... 4
  - MUSI 381, 384, 385, or 389 Ensemble (three semesters)  
    (meets general education fine arts requirement) ................... 3
  - MUSI 171 and 172 Keyboard Skills ................................... 2
  - MUSI 363 and 364 Class Woodwinds I and II ...................... 2
  - MUSI 365 and 369 Class Brass I and II ................................ 2
  - MUSI 367 Class Guitar ................................................. 1
  - MUSI 368 Class Voice ................................................... 1
  - MUSI 391 and 396 Conducting I and II ............................... 4
  - MUSI 464 or 467 Instrumental Methods I or II .................... 3
  - MUSI 466 Instrumental Methods II ................................... 3
  - General Elective .......................................................... 1

- **Music Education: Keyboard emphasis**
  - MUSI 242 Applied Music (four semesters) ......................... 8
  - MUSI 442 Applied Music (three semesters) ......................... 6
  - MUSI 223 Applied Music (Voice, two semesters) ................ 2
  - MUSI 381, 384, and/or 385 Ensemble: Chorus (four semesters) 4
  - MUSI 381, 384, and/or 385 Ensemble: Chorus (three semesters)  
    (meets general education fine arts requirement) ................... 3
  - MUSI 352 Vocal Pedagogy ............................................. 3
  - MUSI 363, 364, 365, or 369 Class Instruments ................... 1
  - MUSI 367 Class Guitar ................................................. 1
  - MUSI 371, 372 Accompanying I and II ................................ 2
  - MUSI 391, 396 Choral Conducting I and II ......................... 4
  - MUSI 461 Teaching General Music .................................... 3
  - MUSI 463 Teaching Vocal Secondary Music ......................... 3

- **Music Education: Percussion emphasis**
  - MUSI 247 Applied Music (four semesters) ......................... 8
  - MUSI 447 Applied Music (three semesters) ......................... 6
  - MUSI 380, 383, 387, and/or 389 Ensemble (three semesters) 
    (meets general education fine arts requirement) ................... 3
  - MUSI 171 and 172 Keyboard Skills ................................... 2
  - MUSI 363 and 364 Class Woodwinds I and II ...................... 2
  - MUSI 365 and 369 Class Brass I and II ................................ 2
  - MUSI 367 Class Guitar ................................................. 1
  - MUSI 368 Class Voice ................................................... 1
  - MUSI 391 and 396 Instrumental Conducting I and II ............ 4
  - MUSI 464 and 466 Instrumental Methods I–II ..................... 6
  - General Elective .......................................................... 1

- **Music Education: String emphasis**
  - MUSI 246 Applied Music (four semesters) ......................... 8
  - MUSI 446 Applied Music (three semesters) ......................... 6
  - MUSI 387 Ensemble: Orchestra (four semesters) ................... 4
  - MUSI 387 Ensemble: Orchestra (three semesters)  
    (meets general education fine arts requirement) ................... 3
  - MUSI 171 and 172 Keyboard Skills ................................... 2
  - MUSI 363 and 364 Class Woodwinds I and II ...................... 2
  - MUSI 365 and 369 Class Brass I and II ................................ 2
  - MUSI 367 Class Guitar ................................................. 1
Music Education: Voice emphasis

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MUSI 243</td>
<td>Applied Music (four semesters)</td>
<td>8</td>
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<tr>
<td>MUSI 443</td>
<td>Applied Music (three semesters)</td>
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<tr>
<td>MUSI 222</td>
<td>Applied Music (Piano, two semesters)</td>
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<tr>
<td>MUSI 381, 384, and/or 385 Ensemble: Chorus (four semesters)</td>
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<td>MUSI 381, 384, and/or 385 Ensemble: Chorus (three semesters)</td>
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<td>MUSI 171 and 172 Keyboard Skills</td>
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<tr>
<td>MUSI 352</td>
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<td>MUSI 363, 364, 365, or 369 Class Instruments</td>
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<td>MUSI 367</td>
<td>Class Guitar</td>
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<td>MUSI 391 and 396 Choral Conducting I and II</td>
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<td>MUSI 461</td>
<td>Teaching General Music</td>
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<td>MUSI 463</td>
<td>Teaching Vocal Secondary Music</td>
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| Music Education: Woodwind emphasis
| MUSI 244    | Applied Music (four semesters)                   | 8     |
| MUSI 444    | Applied Music (three semesters)                  | 6     |
| MUSI 380, 383, 387, and/or 389 Ensemble (four semesters) | 4     |
| MUSI 380, 383, 387, and/or 389 Ensemble (three semesters) | 3     |
| MUSI 171–172 Keyboard Skills                       | 2     |
| MUSI 363 and 364 Class Woodwinds I and II          | 2     |
| MUSI 365 and 369 Class Brass I and II              | 2     |
| MUSI 367    | Class Guitar                                     | 1     |
| MUSI 368    | Class Voice                                      | 1     |
| MUSI 391 and 396 Instrumental Conducting I and II  | 4     |
| MUSI 464 and 466 Instrumental Methods I and II     | 6     |
| General Elective                                   | 1     |

**Total**                                                                                      120

▲ Concentration in Performance (PFM)

**Degree Requirements**

**General Education**                                                                 21

**Foundation Requirements**                                                            6

- ENGL 101 and ENGL 302 Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as 302, to fulfill degree requirements.

**Quantitative reasoning (mathematics)**                                                3

**Core Requirements**                                                                 3

- Literature*                                                                            3
- Natural science*                                                                       3
- Western civilization                                                                   3
- Social or behavioral science*                                                          3

*Also have significant elective choices as per general education listing.

Remaining general education requirements are fulfilled with major course work.

**Music Core Courses**                                                                 43

- MUSI 251 Art of Teaching Music                                                        3

(general education communications)

- MUSI 415 Music in Computer Technology                                                 3

(general education information technology)

- MUSI 431 Music History in Society III                                                 3

(general education global understanding)

- MUSI 324 Junior Recital, MUSI 424 Senior Recital, and MUSI 491 Performance            3

(synthesis)

- MUSI 113, 114, 213 Sight-Singing/Ear-Training I–III                                6
- MUSI 115, 116, 215, 216 Music Theory I–IV                                            12
- MUSI 273 Keyboard Skills III                                                         1
- MUSI 319 Composition and Arranging                                                   3
- MUSI 331, 332, 432 Music History I, II, and IV                                      9
- MUSI 300 Recital Attendance (five semesters)                                          0

**Emphasis Requirement (complete one)**                                                56

**Performance: Brass emphasis**                                                        8

- MUSI 225 Applied Music (four semesters)                                              8
- MUSI 445 Applied Music (four semesters)                                              12
- MUSI 380, 383, 387, and/or 389 Ensemble                                               5
- MUSI 380, 383, 387, and/or 389 Ensemble (meets general education fine arts requirement) 3
- MUSI 171 and 172 Keyboard Skills I and II                                             2
- MUSI 353 Instrumental Pedagogy and Literature                                        3
- MUSI 379 Improvisation                                                              1
- MUSI 391 and 396 Instrumental Conducting I and II                                     4
- MUSI 395 Teaching Internships (two semesters)                                        4
- MUSI 419 Orchestration                                                              3
- General Electives                                                                    11

**Performance: Guitar emphasis**                                                        8

- MUSI 226 Applied Music (four semesters)                                              8
- MUSI 446 Applied Music (four semesters)                                              12
- MUSI 381, 384, 385, and/or 389 Ensemble                                               5
- MUSI 381, 384, 385, and/or 389 Ensemble (meets general education fine arts requirement) 3
- MUSI 171 and 172 Keyboard Skills I and II                                             2
- MUSI 353 Instrumental Pedagogy and Literature                                        3
- MUSI 379 Improvisation                                                              1
- MUSI 391 and 396 Instrumental Conducting I and II                                     4
- MUSI 395 Teaching Internships (two semesters)                                        4
- MUSI 419 Orchestration                                                              3
- General Electives                                                                    11

**Performance: Keyboard emphasis**                                                      8

- MUSI 242 Applied Music (four semesters)                                              8
- MUSI 442 Applied Music (four semesters)                                              12
- MUSI 381, 384, and/or 385 Ensemble                                                   5
- MUSI 381, 384, and/or 385 Ensemble (meets general education fine arts requirement) 3
- MUSI 351 Keyboard Pedagogy                                                           3
- MUSI 373 Adv Accompanying and Musicianship Skills                                   3
- MUSI 382 or 485 Piano Chamber Ensemble                                               1
- MUSI 379 Improvisation                                                              1
- MUSI 391 Conducting I                                                               2
- MUSI 395 Teaching Internship                                                        2
- MUSI 492H Keyboard Literature                                                      3
- General Electives                                                                    11

**Performance: Percussion emphasis**                                                    8

- MUSI 227 Applied Music (four semesters)                                              8
- MUSI 447 Applied Music (four semesters)                                              12
- MUSI 380, 383, 387, and/or 389 Ensemble                                               5
- MUSI 380, 383, 387, and/or 389 Ensemble (meets general education fine arts requirement) 3
- MUSI 171 and 172 Keyboard Skills I and II                                             2

(general education communications)
### College of Visual and Performing Arts

#### Teachers Licensure

Undergraduate students seeking certification to teach vocal and choral or instrumental music at the elementary and secondary levels must earn the BM degree as specified under Concentration in Music Education section in this chapter. Students who have earned a baccalaureate degree and are seeking state licensure to teach music must also complete this sequence of courses, which constitute a state-approved program for teacher education in music.

#### Minor in Music

All music minors must pass a music audition. Music minors in the keyboard area use the Keyboard Skills I credit as a music elective.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 353</td>
<td>Instrumental Pedagogy and Literature</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 379</td>
<td>Improvisation</td>
<td>1</td>
</tr>
<tr>
<td>MUSI 391</td>
<td>and 396 Instrumental Conducting I and II</td>
<td>4</td>
</tr>
<tr>
<td>MUSI 395</td>
<td>Teaching Internships (two semesters)</td>
<td>4</td>
</tr>
<tr>
<td>MUSI 419</td>
<td>Orchestration</td>
<td>3</td>
</tr>
<tr>
<td>General Electives</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

**Total Required**: 120

#### Minor in Jazz Studies

This minor is open to music and nonmusic majors who wish to explore America’s unique art form. It is open to all instrumentalists and vocalists, including students who perform on instruments not normally associated with jazz. No prior experience in jazz is needed, but candidates must pass a music audition. Jazz studies minors in the keyboard area use the Keyboard Skills I credit as a music elective.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 226</td>
<td>Applied Music (four semesters)</td>
<td>8</td>
</tr>
<tr>
<td>MUSI 446</td>
<td>Applied Music (four semesters)</td>
<td>12</td>
</tr>
<tr>
<td>MUSI 379</td>
<td>Applied Music (four semesters)</td>
<td>1</td>
</tr>
<tr>
<td>MUSI 113</td>
<td>SIGHT SINGING/EAR TRAINING I</td>
<td>2</td>
</tr>
<tr>
<td>MUSI 115</td>
<td>Theory I, II</td>
<td>6</td>
</tr>
<tr>
<td>MUSI 171</td>
<td>Keyboard Skills I and II</td>
<td>1</td>
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<tr>
<td>MUSI 300</td>
<td>Recital Attendance (two semesters)*</td>
<td>0</td>
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<tr>
<td>MUSI 384</td>
<td>Jazz Studies</td>
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<tr>
<td>MUSI 387</td>
<td>Jazz Improvisation</td>
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<td>MUSI 387</td>
<td>Ensemble</td>
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<tr>
<td>MUSI 395</td>
<td>Teaching Internships (two semesters)</td>
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</tr>
<tr>
<td>MUSI 420</td>
<td>Advanced Studies</td>
<td>2</td>
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<tr>
<td>General Electives</td>
<td></td>
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</tr>
</tbody>
</table>

**Total Required**: 21

#### Minor in World Music

**Faculty and Staff**

Ballard (coordinator), Carroll, Lepore, Owens

**Course Work**

This program is designed for those who wish to widen their scope of knowledge about music while deepening their understanding of the world’s peoples. Students learn in the classroom, as well as experientially, in the form of applied studies and exercises in field work how music making functions within cultural contexts, conveying varied meanings in bodily action and musical sound worldwide. Students gain skills that will serve them in many fields of endeavor, from developing specific musical expertise to acquiring proficiency with technological and anthropological aspects of ethnomusicology.

**Requirements**

Students must complete 16 to 18 credits, with a 10-credit core and opportunities to take electives in several departments at Mason.

**Prerequisite**

Students must first demonstrate to the coordinator a basic level of knowledge and training in some area of Western or non-Western music, or earn a grade of B or higher in MUSI 103 or 431. Prerequisites for specific courses are indicated below.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MUSI 101</td>
<td>Introduction to Classical Music</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 113</td>
<td>SIGHT SINGING/EAR TRAINING I</td>
<td>2</td>
</tr>
<tr>
<td>MUSI 115</td>
<td>Theory I, II</td>
<td>6</td>
</tr>
<tr>
<td>MUSI 171</td>
<td>Keyboard Skills I and II</td>
<td>1</td>
</tr>
<tr>
<td>MUSI 343</td>
<td>Applied Music (PMI)</td>
<td>12</td>
</tr>
<tr>
<td>MUSI 380</td>
<td>Recital Attendance (two semesters)*</td>
<td>0</td>
</tr>
<tr>
<td>MUSI 419</td>
<td>Orchestration</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Required**: 16–18

**Core**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 103</td>
<td>Musics of the World</td>
<td>10</td>
</tr>
</tbody>
</table>

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 115</td>
<td>Theory I, II</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Required**: 3
in music or another discipline, with courses equaling the music requirements (minus the 7- to 8-credit teaching sequence) for the BA in music offered at Mason. The following admission requirements must also be met:

- Performance: audition (single or multiple instruments)
- Conducting: audition
- Composition: submission of a portfolio of compositions
- Music education: interview with music faculty and submission of a two- to three-page paper on the applicant’s philosophy of music education
- Pedagogy and performance: audition in the primary applied teaching area is required. Applicants are expected to have large and small ensemble experience on the major instrument and presented a full solo recital or equivalent. All music teaching experience should be summarized.

Diagnostic Entrance Exam
All students are required to complete placement examinations in music theory, sight singing and ear training, and basic keyboard skills. These examinations must be taken prior to the beginning of the first semester of graduate study. A sufficient placement score can reduce or eliminate prerequisites for some of the 600-level and above courses in music theory and history. The exam is offered during a three-hour period, usually on the Saturday before the first day of classes of the fall and spring semesters. For the summer schedule, see the director of graduate studies.

Foreign Language Exams
(Vocal Performance Emphasis)
Students in the MM degree program (emphasis in vocal performance) must take proficiency exams in French, German, Italian, and English to demonstrate diction competency. Students may be required to take MUSI 525, 526 Performance Seminar for Singers and Accompanists I, II.

Comprehensive Exit Exam
All students are required to pass a comprehensive exit exam administered during the graduation semester or, in the case of students selecting the thesis option in the music education concentration, on completion of 24 credits of course work and immediately before beginning work on the thesis. August graduates must take this exam during the preceding spring term. This exam is usually a three-hour written test, with questions based primarily on course work the student has taken toward the degree at Mason.

Degree Requirements
A student must successfully complete the appropriate 30 credits in graduate music courses. With approval of the department, 3 nonmusic graduate credits may be taken.

The student is admitted as concentrating in one of five areas: performance (single or multiple instrument/voice), music education, composition, conducting, or pedagogy/performances. All students are required to complete the 11 credits described below as General Requirements plus 19 credits in one of the six areas identified below as Additional Requirements. There are some limited possibilities for double concentrations. For details, see the director of graduate studies.

General Requirements for the MM (for all six options):
11 credits
MUSI 611 Analytical Techniques.................................3

GRADUATE PROGRAMS

Music, MM

MM-MUSI

The expansion of professional education in the arts is paramount for the growth and development of a rich and vital cultural community and a supporting network of individual artists. The dynamics of contemporary society suggest that the influence of the arts on public life will continue to expand well into the 21st century. Each year, opportunities increase for creative work by performers, composers, sculptors, painters, dancers, actors, historians, theoreticians, and musicologists.

The MM degree is offered as an educational channel to meet the intellectual and career needs of qualified students. It is a comprehensive and advanced program of study with a choice of concentrations in performance (single or multiple instruments), music education, composition, conducting, and pedagogy and performance. The MM with a concentration in music education does not provide licensure to teach music in public or private schools.

Admission Requirements
In addition to fulfilling admission requirements for graduate study, applicants are expected to hold a baccalaureate degree
MUSI 630 Topics in Music History/Literature 3
MUSI 662 Introduction to Research in Music 3
Ensemble 2

Additional Requirements

▲ Concentration in Composition (CPO):
MUSI 728 PMI Composition 9
MUSI 613 Graduate Orchestration 3
MUSI 630 Topics in Music History and Literature 3
MUSI 790 Graduate Recital 1
Electives 3

▲ Concentration in Conducting (CDC):
MUSI 610 Topics in Music Theory 3
MUSI 610 Topics in Music History/Literature 3
or MUSI 630 Topics in Music History and Literature 3
or MUSI 712 Composition for Conductors and Performers 3
MUSI 790 Graduate Recital 1
Electives 3

▲ Concentration in Music Education (MUE):
MUSI 661 Psychology of Music Teaching and Learning 3
MUSI 663 Aesthetics of Music Education 3
Choose one of the three tracks: elementary-level teaching, secondary-level teaching, or thesis
MUSI 563 Orff Schulwerk I 3
MUSI 564 Orff Schulwerk II 3
MUSI 565 Orff Schulwerk III 3
MUSI Electives 4
Or 9 advisor-approved credits from
MUSI 630 Topics in Music History and Literature 3
MUSI 640 Topics in World Musics 3
MUSI 654 Graduate Conducting 3
MUSI 660 Topics in Music Education 3
Electives 4
or
MUSI 799 Thesis 6
MUSI Electives 7

▲ Concentration in Performance (PFM):
MUSI 610 Topics in Music Theory 3
MUSI 630 Topics in Music History 3
MUSI 72X Graduate PMI 9
MUSI 790 Graduate Recital 1
Electives 3

▲ Concentration in Pedagogy and Performance (PPFM):
MUSI 72X Graduate PMI 6
Pedagogy I — Take one of the following: 3
MUSI 551 Keyboard Pedagogy 3
MUSI 552 Vocal Pedagogy 3
MUSI 553 Instrumental Pedagogy 3
MUSI 660 Advanced Topics in Music Education:
Pedagogy II 3
MUSI 695 Teaching Internship 2
MUSI 690 Graduate Lecture-Recital 1
MUSI 790 Graduate Recital 1
MUSI 573 Accompanying/Musicianship III (piano pedagogy only) 3
Electives 0-3
The number of students accepted in the graduate conducting concentration is limited by the extent to which it is possible to provide students with practical experience. In most cases, each student accepted is offered an opportunity to gain conducting experience by serving as an assistant conductor of a university ensemble.

Artist Certificates
The certificate is a specialized, graduate-level program for advanced musicians who desire to further develop and refine their performance art. The certificate program is a two-year course of study requiring at least two consecutive semesters of residence. A total of 32 credits is required. Advisor’s approval is required for each semester’s enrollment.

Admission Requirements

• An artist certificate application and current résumé
• A bachelor’s degree in music or equivalent (as evaluated by the Music Department Admissions Committee)
• Transcripts from previous educational institutions
• One-page written statement of student’s goals and interest in the program
• Two letters of recommendation
• A CD (preferred), audiocassette, or videotape of a live performance of solo works from the standard repertory

Applicants must perform an audition recital and be interviewed on the Mason Campus. Applicants will be notified of the date and time of the audition and interview.

■ Artist Certificate in Piano Performance or
■ Instrumental Performance CERG-ACPP

CERG-ACIP

Credits

Studies in Performance CERG-ACIP

MUSI 72X Graduate PMI (over four semesters) 17
MUSI 592 Topics in Music 2
MUSI 790 Graduate Recital (solo recitals) 2
MUSI 790 Graduate Recital (chamber music) 1

Support Studies in Literature and Pedagogy

MUSI 630 Topics in Music History and Literature 3
MUSI 551 Keyboard Pedagogy 3
MUSI 553 Instrumental Pedagogy 3
MUSI 695 Teaching Internship 2

Support Studies in Accompanying or Ensemble plus Electives

(choose A or B) 7

A
MUSI 571 Techniques of Accompanying I 1
MUSI 572 Techniques of Accompanying II 1
MUSI 685 Graduate Chamber Ensembles 1
Electives 4

B
MUSI 682 Wind Symphony 3
MUSI 683 Symphonic Band 3
MUSI 685 Graduate Chamber Ensembles 3
MUSI 687 Symphony Orchestra 3
MUSI 689 Jazz Ensembles 3
Elective 1

Total 32
The PhD in music education and the doctor of musical arts degree require 60 credits beyond the master’s degree in music.

The PhD in music education, a research-intensive degree, focuses on the gathering, processing, and interpretation of information. Students in the PhD program take seminars and topics courses in music education, as well as research courses through the College of Education and Human Development. PhD graduates are expected to demonstrate the ability to communicate significant concepts of music education.

The doctor of musical arts concentrations are composition, conducting, and performance. While these concentrations share some of the required course work, each is also distinct in course requirements. Professional musicians earn the DMA to enhance and extend their knowledge and practice within their area of specialization. The DMA student focuses on the profession of music performance, as well as the theory and practice of the discipline. DMA graduates are qualified to teach music at the college or university level, as well as K–12.

Admission Requirements
In addition to meeting all admission requirements for graduate study, applicants should submit the following:
- Master’s degree in music from an accredited university
- GPA of 3.00 in master’s-level music course work; 3.50 in courses related to the prospective area of doctoral study (music education, performance, composition, or conducting)
- Three recommendations
- Satisfactory scores on GRE
- A sample of academic writing such as a graduate-level paper from a musicology or music history course taken during MM studies
- Students in performance and conducting must audition. Specific details of those requirements are available from the advisors.

- Composition students must present a portfolio of recent compositions and recordings of performances.
- Music education majors must present a dossier of their teaching experience and activities, and they must schedule an interview with music faculty (including the DGS) prior to admission.
- There is no “provisional” admission. Students must meet appropriate standards prior to commencing doctoral studies.

Placement Examinations
Prior to the beginning of the first semester of doctoral studies, the student must complete placement examinations in music theory, music history, and musicianship (including sight-singing, ear-training, and keyboard skills). Positive scores on the placement exams may reduce or eliminate prerequisites for courses in music history and music theory. Recitals can be scheduled only after completion of any necessary prerequisites in music theory, music history, and musicianship.

Academic Progress
The doctoral student must maintain a minimum of 3.00 GPA in courses presented on the degree plan, which may include no more than 6 credits with a grade of C. The GPA calculation excludes all transfer courses and Mason extended studies or nondegree credits not formally approved for the degree.

Residency
One year (fall and spring) of consecutive full-time study (9 credits per semester) is required (18 total credits). Or, the academic residency requirement may be fulfilled by earning 21 credits within 12 months (fall and spring semesters and summer term). Academic residency should be completed during the first year of study. Any necessary prerequisite courses at the 500 level can be included to meet the residency requirement. Language courses at the undergraduate level may not. Note: The academic residency does not imply meeting the standards of Virginia residency for tuition purposes.

Language Requirements
Reading proficiency is required in a language appropriate to the student’s major area of study. Normally, this will be German, French, or Italian. The DGS and the student’s Faculty Committee will determine the appropriate area of study. Reading proficiency may be accomplished by completing a reading examination provided by the music faculty. The reading examination provided by the faculty will normally consist of translation (with dictionary) of appropriate technical passages relevant to the student’s area of study within a two-hour period. The language reading proficiency should be completed prior to earning 12 credits of courses at the 600 level or above.

Faculty Committee
During the first semester of study, the college’s director of graduate studies will recommend to the dean of the College of Visual and Performing Arts five faculty members to serve as the student’s Faculty Committee; two from the student’s area of specialization (performance, conducting, or composition), one from music theory, one from music history, and one at-large. The student’s major professor will chair the committee. The director of graduate studies of the Department of Music may be part of the committee; if not, he or she will serve ex-
The Faculty Committee will evaluate the progress of the student annually. Continuation in the program is subject to the endorsement of this group. Performance and composition recitals and projects moving toward the dissertation are also subject to approval of the committee.

**Comprehensive Exams**
After the completion of required courses (excluding dissertation credits) or during the semester when completion of those courses is anticipated, the student will take comprehensive examinations. The written exams may also be followed by a one-hour oral exam if needed to clarify issues included in the written exams.

**Advancement to Candidacy**
Before doctoral students may be advanced to candidacy by the dean of the College of Visual and Performing Arts, they must complete all course work required by the program faculty, be certified in all relevant doctoral research skills, pass the comprehensive exams, and be recommended by the Faculty Committee, the director of graduate studies, and the chair of the Department of Music. Students advanced to candidacy after the add period for a given semester must wait until the following semester to register for MUSI 999 Dissertation.

**Dissertation**
The dissertation is the capstone experience of doctoral study. The dissertation will be guided by the Dissertation Committee. This group may be the student’s Faculty Committee as described above, plus a faculty member from beyond the Department of Music. All Dissertation Committee members will be appointed by the dean of the College of Visual and Performing Arts and have graduate faculty status, as approved by the university provost.

**Final Defense and Graduation**
When all degree requirements have been satisfied, including completion of the doctoral dissertation, the doctoral candidate may request a doctoral defense. Approval for the defense must be obtained from the Dissertation Committee, the director of graduate studies and the chair of the Department of Music, and the dean of the College of Visual and Performing Arts. Notice of a defense must be circulated to the university community two weeks before the defense date.

All relevant rules regarding schedule, fees, and other matters as described in the catalog must be followed. All copies of the dissertation materials and fees must be paid before the doctoral degree is awarded.

### Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 860</td>
<td>Doctoral Seminar in Music Education</td>
<td>12</td>
</tr>
<tr>
<td>MUSI 660/670</td>
<td>Topics in Music Ed.</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 880</td>
<td>Doctoral Major Ensemble</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 610/710</td>
<td>Topics in Music Theory</td>
<td>6</td>
</tr>
<tr>
<td>MUSI 630/640/730</td>
<td>Topics in History or World Music</td>
<td>6</td>
</tr>
<tr>
<td>MUSI 810/830</td>
<td>Doctoral Seminar in History or Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives*</td>
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<tr>
<td>MUSI 998 Dissertation Proposal</td>
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<td>MUSI 999 Dissertation in Music Ed.</td>
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### DMA in Musical Arts

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MUSI 828</td>
<td>Doctoral PMI in Composition</td>
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</tr>
<tr>
<td>MUSI 614</td>
<td>Music Theory Pedagogy</td>
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<tr>
<td>MUSI 885</td>
<td>New Music Ensemble</td>
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</tr>
<tr>
<td>MUSI 880</td>
<td>Doctoral Major Ensemble</td>
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<tr>
<td>MUSI 890</td>
<td>Doctoral Recital</td>
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</tr>
<tr>
<td>MUSI 610/710</td>
<td>Topics in Music Theory</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 630/730</td>
<td>Topics in Music History</td>
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<tr>
<td>History or Theory Elective (600 level or above)</td>
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<tr>
<td>MUSI 810</td>
<td>Doctoral Seminar in Analysis</td>
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<tr>
<td>MUSI 830</td>
<td>Doctoral Seminar in Music History</td>
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<td>Doctoral Seminar in Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives*</td>
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<td>MUSI 998 Dissertation Proposal</td>
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</tr>
<tr>
<td>MUSI 999 Dissertation in Conducting</td>
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<td>12</td>
</tr>
</tbody>
</table>

### Theater

Performing Arts Building, Room A407
Phone: 703-993-1120
Web: gmu.edu/departments/theater

**Faculty**

Clayton Austin, Chair

**Professors:** D’Andrea (Robinson professor), Davis

**Associate professors:** Austin, Gero, Johnson-Neshati, Kurtz

Assistant professor: Elston

Term associate professor: Chew, McDonald
Advisors: Lechter, Lee, McManus, Mountain, Murray, Nanni-Messere, Naser, Wallace

Course Work
The Theater Department offers all course work designated THR in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAM
The BA degree stresses the breadth of liberal arts education in the belief that such study, combined with serious practical training and experience, offers the best preparation for a life in the theater. Students electing to major in theater complete the theater core, which is a group of courses providing a broad introduction to the various theater arts and striving to create a shared body of knowledge within the department’s student population.

To organize their advanced work within the major, students elect a course of study that includes courses in at least two of three areas: performance, design and technical theater, and theater studies. The department aims to prepare students for graduate study or entry into the profession through rigorous, concentrated, and individualized training; however, students are encouraged to maintain wide-ranging interests within the department and throughout the university’s extensive offerings.

Students seeking to earn a BA as a second bachelor’s degree, either concurrently or sequentially, must complete all theater degree requirements including foreign language.

Students must earn a minimum 2.00 cumulative GPA in their major.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated writing-intensive in their majors at the 300 level or above. Students seeking a BA in theater fulfill this requirement by successfully completing THR 350 or THR 351.

BA-THR
Degree Requirements

General Education .......................................................... 40

Foundation Requirements
Written communication: ENGL 101 and 302 ................. 6
Nonnative speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, and 302 to fulfill degree requirements. Students are reminded that the English Department offers proficiency exams for credit and exemption from this requirement.
Oral communication .................................................. 3
Quantitative reasoning .................................................. 3
Either appropriate placement score on quantitative skills and one of MATH 108, 110, 111, 113, 115, 125; or IT 250; or STAT 250; or lower placement score requiring MATH 106
Information technology ............................................... 3

Core Requirements
Literature ........................................................................ 3
Arts (outside the major) ............................................... 3
Natural science (including one laboratory science) .......... 7

Western civilization ....................................................... 3
Global understanding .................................................... 3
Social and behavioral sciences ..................................... 3
Synthesis requirement .................................................. 3

Major ................................................................. 56–78
Foreign Language or Minor* .................................. 0–21
*See beginning of CVPA chapter for foreign language requirement.

Students may complete an academic minor in lieu of the foreign language requirement.

Theater Core Requirements ........................................ 32–33
Additional literature .................................................... 3
Additional arts (outside the major) ............................. 3–4
THR 150, 151 Drama, Stage, and Society I and II ......... 6
THR 200 Play Production Practicum ............................. 4
(1 credit each, repeated for a total of 4)
THR 210 Acting I ..................................................... 3
THR 230 Introduction to Technical Theater I ............... 3
THR 329 Directing I ................................................... 3
THR 350 Script Analysis ............................................. 3
One upper-level dramatic literature course
THR 351, 352, 355, 359*, 395, or 424) ......................... 3
One from the following group of 1-credit minicourses: .... 1
THR 201 Stage Management, THR 202 Literary Management, or THR 203 Production/Company Management
*THR 359 may be applied to fulfill either the global understanding or upper-level dramatic literature requirement but not both.

Upper-Level Units: 24 credits of 300- and 400-level courses, chosen from at least two of the following areas: performance, design and technical theater, and theater studies. These credits are in addition to upper-level credits taken to fulfill theater core requirements.

Performance
This emphasis is designed for the serious student of acting with performance aspirations. Solid grounding in the fundamentals of analysis and basic training of the actor’s instrument are complemented by intensive, individualized instruction in the various facets of the actor’s craft.

THR 300 Voice and Speech Fundamentals ..................... 3
THR 301 Voice and Speech for the Performer ............... 3
THR 303 Movement for Actors I ................................ 3
THR 304 Movement for Actors II ................................ 3
THR 305 Stage Combat ............................................. 3
THR 310 Acting II ................................................... 3
THR 320 Beginning Modern Acting .......................... 3
THR 321 Acting Shakespeare ...................................... 3
THR 322 Alexander Technique/Stage Combat ............. 3
THR 323 Lighting Stagecraft ....................................... 3
THR 345 Puppetry: History and Technique .................. 4
THR 365 Characterization ......................................... 3
THR 420 Advanced Modern Acting .......................... 3
THR 421 One-Person Show ....................................... 3
THR 423 Audition Techniques: Stage and Camera ......... 3
THR 425 Verse Speaking .......................................... 3

Design and Technical Theater
This emphasis prepares students for further study and work in the design and technical fields. Courses in this area are also strongly recommended for students interested in directing.

THR 314 Lighting Stagecraft .................................... 3
THR 330 Seminar in Technical Theater ....................... 3+
THR 331 Drafting and Model Making ........................................... 3
THR 332 Seminar in Costume History ........................................... 3
THR 333 Stage Design ................................................................... 3
THR 334 Lighting Design .............................................................. 3
THR 335 Costume Design ............................................................... 3
THR 336 Advanced Theater Technology ....................................... 3
THR 337 Costume Draping and Drafting ....................................... 3
THR 434 Advanced Lighting Design .............................................. 3

Theater Studies

This emphasis is designed to provide the theater generalist with thorough preparation for further study and work in directing, dramaturgy, theater criticism, theater scholarship, playwriting, and teaching. For specific teacher certification requirements, students are directed to the Office of Teacher Education.

THR 340 Directing II ................................................................. 3
THR 351 Dramatic Theory and Criticism .................................... 3
THR 352 Dramatic Literature Seminar ....................................... 3
THR 354 Moral Vision in American Theater ................................ 3
THR 358 World Stages ................................................................ 3
THR 380, 381 Playwriting I, II .................................................... 3, 3
THR 382 Screenplay Workshop .................................................. 3
THR 395 Theater as the Life of the Mind .................................... 3
THR 424 Contemporary Women Playwrights ............................. 3
THR 440 Advanced Studies in Directing/Dramaturgy ............... 3
THR 480 Advanced Playwriting ................................................... 3
THR 482 Advanced Screenplay Workshop ................................. 3
THR 491 Majors Seminar in the Profession ............................... 3
THR 490 Special Topics in Drama, THR 494 Field Experience, and THR 497 Independent Study may be applied to the appropriate area.

Electives .................................................................................. 2–24
Total .......................................................................................... 120

Practicum

Students must earn a total of 4 practicum (THR 200) credits, 1 from each of the three groups below. Students will select their fourth practicum assignment from the group of their choice.

Group 1: Performance/Design (including acting, directing, design, stage management)
Group 2: Production Crew (including run crew, wardrobe, set construction, costume construction, electrics)
Group 3: Production Administration (including positions such as master electrician, company manager, publicity manager, dramaturg)

Minor in Theater

The theater minor consists of 18 credits in theater, selected in consultation with a faculty advisor and approved by the department chair.

Honors in Theater

Students wishing to pursue Honors in Theater should contact the department chair.

Production Opportunities

Participation in Theater Department productions with the GMU Players is expected of all declared majors. Up to 4 practicum credits, 1 credit per assignment can be awarded for satisfactory completion of performance and production assignments in the major, including faculty or guest-directed GMU Players main stage, studio, or Theater of the First Amendment (TFA) productions.

TFA, a professional theater in residence within CVPA, offers students the chance to work closely with professional artists. TFA productions regularly employ student assistants in stage management, directing, design, dramaturgy, technical crews, and production and company management. Students are eligible to audition for age-appropriate roles or understudy assignments in TFA productions and may participate in the Membership Candidate Program through the Actors’ Equity Association.
Course Descriptions

Glossary
This section lists George Mason University’s undergraduate and graduate courses that are available for credit. Courses are listed in alphabetical order. The subject code for courses and the programs offering the courses are as follows:

Accounting ACCT
Administration of Justice ADJ
Adult Education EDAL
African American Studies AFAM
Alternative Education EDAE
Anthropology ANTH
Arabic ARAB
Art History ARTH
Art and Visual Technology AVT
Arts Management MAM
Astronomy ASTR
Bachelor of Arts in Interdisciplinary Studies BAIS
Bachelor of Individualized Study BIS
Biodiversity BIOD
Bioengineering BENG
Bioinformatics BINF
Biology BIOL
Biosciences BIOS
Business Legal Studies BULE
Business, Minor in MSOM
Character Education EDCE
Chemistry CHEM
Chinese CHIN
Civil and Infrastructure Engineering CEIE
Classical Studies CLAS
Climate CLIM
College of Humanities and Social Sciences CHSS
College Teaching CTCH
College of Visual and Performing Arts CVPA
Communication COMM
Comparative Literature CL
Computational and Data Sciences CDS
Computational Sciences and Informatics CSI
Computational Social Science CSS
Computer Science CS
Conflict Analysis and Resolution CONF
Counseling and Development EDCD
Cultural Studies CULT
Dance DANC
Early Childhood Education EDUT
Earth Observing Systems EOS
E-commerce EC
Economics ECON
Education EDUC
Education Leadership EDLE
Education Research EDRS
Educational Psychology EDEP
Electrical and Computer Engineering ECE
Elementary/Secondary Education EDCI
Engineering ENGR
English ENGL
Enterprise Engineering Policy EEP
Environmental Science and Public Policy EVPP
Executive Master of Business Administration EMBA
Exercise, Fitness, and Health Promotion EFHP
Film and Video Studies FAVS
Finance FNAN
Foreign Languages FREN
Forensics FRSC
French FREN
Geography GEOG
Geology GEOL
German GERM
Greek GREE
Global Affairs GLOA
Global and Community Health GCH
Government and International Politics GOVT
Health Administration and Policy HAP
Health and Human Services HHS
Health Education HEAL
Hebrew HEBR
History HIST
Honors Program in General Education HNRS
Information Security and Assurance ISA
Information Systems INFS
Information Technology IT
Initiatives in Educational Transformation IETT
—Teaching
Instructional Technology EDIT
Integrative Studies NCLC
Interdisciplinary Studies MAIS
International Commerce and Policy ITRN
Italian ITAL
Japanese JAPA
Latin LATN
Law LAW
Learning, Social and Organizational LRNG
Linguistics LING
Management MGMT
Management Information Systems MIS
Course Descriptions

Course Numbering

General Information
Course titles are followed by numbers in parentheses (0:0:0), separated by colons. The first number refers to the number of credits; the second number, hours of lecture or seminar per week; and the third number, hours of laboratory or studio per week. For independent study, readings, topics, or similar courses, individual instructors set hours.

Undergraduate
Courses numbered 499 and below are undergraduate courses. Course numbers in the 100 series are customarily taken by freshmen, the 200 series by sophomores, the 300 series by juniors, and the 400 series by seniors. The number designations of the course descriptions in this chapter have the following significance:

- A single number (HIST 301) indicates the course is complete within a single semester, and the semester course may be taken separately with credit toward a degree.
- A double number separated by a comma indicates that the subject matter or content of the course extends through two semesters, but that either semester may be taken by itself. Unless otherwise specified, the first semester is not prerequisite to the second semester.

Graduate
Graduate courses are divided into the following categories:

- 500–699: Open only to graduate students admitted to master’s or doctoral programs; other bachelor’s degree holders; and approved, advanced undergraduate students. Advanced undergraduate students who have secured the permission of the department offering the course may select from these courses to accumulate the hours necessary to complete an undergraduate degree. With the written permission of the dean of their college, they may take these courses for reserve graduate credit.
- 700–799: Open only to students admitted to graduate degree or certificate programs.
- 800–999: Primarily doctoral courses open only to students admitted to graduate degree programs.

Degree programs may extend permission to enroll bachelor’s degree holders.

Courses with the following numbers are reserved for the uses designated:

- 600–609: Limited applicability, graduate-credit courses, normally intended for in-service professional development and not directly leading to a graduate degree. A limited number of credits from these courses may be applied to a graduate degree.
- 798: Master’s research
- 799: Master’s thesis
- 800: Studies for the doctor of philosophy in education program
- 998: Doctoral dissertation proposal
- 999: Doctoral dissertation research
- 790, 890: Supervised practicum
- 794, 894: Internship
- 796, 896: Directed reading and research courses for master’s and doctoral students

Semester Notation
Some course descriptions include one of the following semester notations. Although circumstances may cause a unit to deviate occasionally from these notations, students should use this information to plan their programs of study.

- f: usually available only in the fall semester
- f,sum: available only in fall and summer
- f,s, sum: usually available every semester
- af, as: offered only in alternate fall or spring semesters
- ay: offered only in alternate fall or spring semesters
- ir: offered on an irregular basis at the discretion of the department or school
Courses

Accounting (ACCT)
School of Management (SOM)

If a student takes noncore, upper-level business courses before admission to SOM, those courses will not count on an undergraduate degree application for any major in the school, except as general elective credit. A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Course prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

203 Survey of Accounting (3:3:0) Prerequisite: grade of C or higher in ECON 103. Introduction to accounting from the viewpoint of those who prepare and use financial information. Topics include using accounting information; creating financial statements; an overview of the firm’s operating, financing, and investing activities; and an introduction to product costing, operating budgets, and capital investment decisions. Lecture, recitation format; requires attendance in weekly lecture and weekly recitation.

301 Financial Accounting and Managerial Decision Making (3:3:0) Prerequisite: grade of C or higher in ACCT 203 or equivalent, and sophomore standing. Examines financial accounting from the viewpoint of both users and preparers of financial statements, emphasizing use of financial statement information to make financing, operating, and investing decisions.

311 Managerial and Cost Accounting (3:3:0) Prerequisites: degree status, and grade of B minus or higher in ACCT 301. Develops skills in identifying business processes, transforming data into useful information, and making managerial decisions. Designed for students in all areas of management, especially those whose career aims include cost management. Topics include analyzing and managing costs, developing cost systems that facilitate decision making, identifying opportunities for improving business process, creating financial and operating budgets for planning and control, and developing measures to assess performance.

331 Intermediate Financial Accounting I (3:3:0) Prerequisite: degree status and grade of B minus or higher in ACCT 301. This course deals with the accounting process used to measure and report economic events. The primary goals are to understand the role financial reporting plays in providing decision-useful information; understand the economics underlying business transactions and learn the generally accepted accounting principles (GAAP) that set the reporting and disclosure requirements for those transactions; evaluate the efficacy of GAAP; and understand the motivations that lead managers to select one accounting principle over another. Topics include bonds, owners’ equity, cash flows, accounting changes, and accounting for investments, income taxes, leases, and pensions.

351 Taxation and Managerial Decision Making (3:3:0) Prerequisites: degree status and grade of C or higher in ACCT 331. This course introduces fundamental topics in taxation using a business-entities approach. Specific topics include gross income, deductions, losses, and property transactions. The course emphasizes the identification of planning and compliance issues and the application of tax law to resolve those issues. Both tax and nontax factors affecting decision making are considered.

361 Accounting Information Systems (3:3:0) Prerequisites: degree status and grade of B minus or higher in ACCT 301. Introduction to accounting information systems, focusing on a conceptual basis for transaction processing. Handling and processing of transactions in revenue, expenditure, and payroll cycles serves as platform for developing and manipulating accounting information within a computerized transaction-processing and electronic data environment.

372 Business Analysis and Valuation (3:3:0) Prerequisites: degree status and of C or higher in ACCT 331. Expands on students’ ability to use financial statement information for business valuation and financial analysis transactions including credit analysis, risk assessment, risk management, bankruptcy prediction, and equity valuation. Uses actual case studies to provide in-depth analysis of the use of financial statement information.

382 Financial Analysis and the Business Life Cycle (3:3:0) Prerequisites: degree status; grade of C or higher in ACCT 301. Uses multidisciplinary approach to analyze major events in the financial lifecycle of business firms. Topics include start-up activities such as obtaining venture capital and selecting the appropriate business form; high-growth transactions such as stock-option arrangements and initial public offerings; complex corporate structure issues including mergers and alliances; multi-jurisdictional operations, especially consolidated financial statements, foreign tax credits, currency translations, and currency hedges; downsizing the firm via spin-offs, divestitures, plant closings, and asset sales; and bankruptcy proceedings, including loan workouts.

411 Advanced Managerial Accounting (3:3:0) Prerequisites: degree status, and grade of C or higher in ACCT 301 and ACCT 311. Managerial uses of accounting information in planning, controlling, motivating and decision making. Emphasizes quantitative and behavioral aspects of managerial accounting.

433 Advanced Financial Accounting (3:3:0) Prerequisite: degree status and grade of C or higher in ACCT 332. The course focuses on advanced topics in financial accounting. Students will study accounting business combinations, preparation of consolidated financial statements, accounting for foreign currency transactions, translation and remeasurement of foreign currency financial statements, partnership accounting, interim and segment reporting, and Securities and Exchange Commission reporting issues.

451 Advanced Federal Taxation (3:3:0) Prerequisites: degree status and grade of C or higher in ACCT 351. Federal
taxation of corporations, partnerships, fiduciaries, and gratuitous transfers.

461 Assurance and Audit Services (3:3:0) Prerequisites: degree status and grades of C or higher in ACCT 331 and 361. Introduction to audit and other assurance services' objectives, theory, and practices. Focuses on developing skills for interpreting business strategies and identifying related business risks, describing internal control solutions to those risks, identifying evidential sources, providing assurance about those risks and controls, and designing strategies to provide assurance services about the reliability of business information.

462 Honors Seminar in Accounting (3:3:0) Prerequisites: accounting major, senior standing, and permission of the instructor. The course will provide an in-depth study and analysis of contemporary developments and topics of interest in accounting. The topics and format will vary. Enrollment in this course is limited and competitive.

472 Government and Not-for-Profit Accounting (3:3:0) Prerequisites: degree status; grade of C or higher in ACCT 331. Introduction to accounting for nonbusiness organizations. Focuses on developing understanding of governmental, not-for-profit, charitable organizations, and the federal government.

491 Seminar in Accounting (3:3:0) Prerequisite: degree status and grade of C or higher in ACCT 331. Advanced study of accounting concepts and selected topics.

499 Independent Study (1–3:0:0) Prerequisites: 9 credits in upper-level accounting courses and degree status. Research and analysis of selected problems or topics in accounting. Must be arranged with an instructor, and students must receive written approval from the associate dean for undergraduate programs before registration. Written report required. May be repeated for maximum 6 credits if topics vary.

741 Information Technology Auditing (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Introduces methodologies to assess security and control issues concerning accounting and other information systems. Key feature of course is applying computer-assisted audit tools and techniques to test effectiveness of application controls.

742 Corporate Governance and Ethics (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Focuses on developing understanding of corporate governance issues and ethical decision making. Topics include examination of internal and external international governance issues, and ethical analysis in current business environment.

743 Corporate Financial Reporting (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Addresses contemporary issues in corporate financial reporting. Focuses on role of financial reporting in providing decision-useful information to participants of capital market, and theoretical and empirical assessments of its performance.

744 Fraud Deterrence and Detection (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Introduces strategies and techniques for fraud prevention and detection. Focuses on financial fraud such as bribery, contract rigging and kickbacks, embezzlement, fraudulent financial reporting, payroll fraud, and misappropriation of inventory and other assets.

796 Independent Studies/Directed Readings (1–3:0:0) Prerequisite: permission of instructor. Research and analysis of selected problems or topics in accounting not otherwise available in curriculum. Approval of faculty member and program director required. May be repeated for up to 3 credits.

Administration of Justice (ADJ)

100 Introduction to Criminal Justice (3:3:0) Overview of the American system of criminal justice, covering theories of justice, criminal law, policing, courts and associated pre- and post-trial legal processes, punishment and corrections, and juvenile justice.

300 Research Methods and Analysis (4:3:1) Prerequisite: ADJ 100. Required for all ADJ majors. Students are strongly encouraged to take ADJ 300 before or during the first semester of enrolling in 300-level courses. Emphasizes asking clear, researchable questions and using appropriate evidence to answer them. Students learn to use a broad range of evidence, including quantitative and qualitative information. Covers design and analysis of surveys, government archives, case studies, and interpretations of events in journals. Examines ethical implications of information technologies.

301 Public Law and the Judicial Process (3:3:0) Prerequisite: ADJ 100. Covers American judicial organization and operation, role of the Supreme Court in policy formation, and selected constitutional principles.

302 Sociology of Delinquency (3:3:0) Prerequisite: ADJ 100 and SOCI 101, or permission of instructor. Presents theories of juvenile delinquency and societal reactions to it; gender differences in rates and types; historical overview; development of juvenile justice system; and critical assessment of juvenile justice and its alternative.

303 Experiencing the Criminal Justice System (3:3:0) Prerequisite: ENGL 362; COMM 100, 101, or 104; and 60 credits. Experiential learning course designed to give pre-service ADJ students a firsthand, practical journey through the criminal justice process and system.

304 Computer Crime, Forensics, and Auditing (3:3:0) Prerequisites: IT 103 and 223. Covers computer crime, relevant laws, agencies, standards, auditing, logging, forensics, and related software. Explores legal principles such as chain of evidence, electronic document discovery, eavesdropping, and entrapment. Hands-on experience with forensics tools.

305 Crime and Crime Policy (3:3:0) Prerequisite: ADJ 100. Explores and evaluates how crime is defined and measured, and examines crime patterns and trends. Provides an overview and critical assessment of the major theories of crime at the individual, neighborhood, and structural levels. Considers policies intended to reduce crime.

306 Criminal Justice Ethics (3:3:0) Prerequisite: 60 credits, or permission of instructor. Analyzes ethical principles relevant for those working in criminal justice.
307 Social Inequality, Crime, and Justice (3:3:0) Prerequisite: ADJ 100. Explores the significance of social inequality (especially race and gender inequality) for several crime and criminal justice issues. Examines the effect of gender and race on rates of criminal offending and victimization and explanations for the variation in offending and victimization.

308 Human Rights and Justice (3:3:0) Prerequisite: ADJ 100. Studies the norms, laws, and systems for the promotion and protection of human rights. Provides a foundation for understanding historical, legal, political, economic, and ethical aspects of human rights. Examines ideological and cultural perspectives, sources of violations, the United Nations, regional and national mechanisms, special issues (e.g., women, torture, children, minorities), and the role of nongovernmental organizations.

400 Applied Criminal Psychology (3:3:0) Uses overview of psychological and criminological theories to apply behavioral science theory to practical application in forensic settings. Focuses on analysis of various crime scenes, and characteristics of offenders.

401 Policing in America (3:3:0) Prerequisite: ADJ 100. Fundamental issues relevant to contemporary public policing in America: role and history of police; impact on crime, disorder, and other social problems; discretion and its control; moral hazards; police legitimacy and public support; police culture and the police organization; and community policing.

402 Sociology of Punishment and Corrections (3:3:0) Prerequisite: ADJ 100. Covers theories on forms of punishment systems; punishment and corrections as a product of historical, cultural, and political changes; differences by race and gender in punishment and corrections; problems of social control and violence in prisons; alternative rehabilitation; and community prevention strategies.

403 Community Corrections (3:3:0) Prerequisite: ADJ 100. Studies the purposes and goals of community-based corrections and its various components, including pretrial diversion, probation, parole, and emerging alternatives to traditional incarceration. Addresses issues related to offenders returning to the community and critical issues facing jails, community corrections, and the management of offenders in community settings. Examines the role of community-corrections within the broader correctional system.

404 Crime Victims and Victimization (3:3:0) Prerequisite: ADJ 100. Explores experiences of crime victims, distribution of the risks of victimization, and causes and consequences of victimization. Also considers nature and influence of victim’s rights advocates.

405 Law and Justice around the World (3:3:0) Prerequisite: ADJ 100. Comparative inquiry into the models of legal and justice systems around the world. Considers how social and legal norms are created, and how different societies exercise powers of social control. Evaluates justice models in action, including law and courts, policing, corrections, and juvenile justice.

406 Family Law and the Justice System (3:3:0) Prerequisite: ADJ 100. Introduction to the elements of family law, and exploration of its influence on American social life and contemporary notions of justice. Topics include marriage and parenting, divorce, custody and support, nontraditional families, and domestic violence.

407 Law and Society (3:3:0) Prerequisite: ADJ 100 or GOVT 301. Explores relationship between law and society, including concept of law; origin, development, and role of law in society; and relationship between law and social change. Considers different approaches to the study of law and society, and assesses methodologies.

408 Criminal Courts (3:3:0) Prerequisite: ADJ 100 or GOVT 301. Studies the workings, advantages, and frailties of criminal courts, and explores whether the system works effectively and efficiently.

409 Community Policing (3:3:0) Prerequisite: ADJ 100. Study of community policing, particularly in the United States. Covers history and development of community policing, community relations, problem solving, and issues of organizational change.

422 Controversial Legal Issues (3:3:0) Prerequisite ADJ 100. Focuses on the study of law as an institution that continuously interacts with other social institutions at the individual, community, state, and federal levels. Examines how constitutional and statutory laws are interpreted by the courts to determine and define the law through contemporary, controversial, legal issues. Explores how the courts, using the law, resolve today’s most controversial issues.

423 Constitutional Law: Civil Rights and Liberties (3:3:0) Prerequisite: GOVT 103. Studies 1st Amendment freedoms of speech, press, assembly, association, and religion; the right to privacy; and 14th Amendment right to equal protection.

424 Constitutional Law: Criminal Process and Rights (3:3:0) Prerequisite: GOVT 103. Studies constitutional law pertaining to the rights of the criminally accused from investigation and evidence through attorney, trial, and punishment stages at federal and state levels.

425 Criminal Justice Management (3:3:0) Explains the management function for current and future criminal justice managers. Emphasizes communication, motivation, leadership skills, and organizational development.

460 Surveillance and Privacy in Contemporary Society (3:3:0) Prerequisite: ADJ 100. Philosophical perspectives, historical context, technological developments, and institutional changes that surround controversies about privacy and surveillance in contemporary society. Explores public and private institutions conducting surveillance, how they calculate and manage risk, and legal constraints on surveillance activities.

461 Introduction to Homeland Security (3:3:0) Prerequisite: ADJ 100. Examines governmental actions designed to prevent, detect, respond to, and recover from acts of terrorism and national disasters. Focuses on efforts to align federal, state, local, tribal, private sector, and nongovernmental preparedness, incident management, and emergency response plans into the effective and efficient national structure necessary for the protection of the United States.

462 Law Enforcement and Homeland Security (3:3:0) Prerequisite: ADJ 100. Examines the effect of 9/11 on law enforcement organizations in the United States and explores the evolving relationship between the military, federal, state, and local law enforcement agencies in the post-9/11 era. Emphasis on understanding the entire framework of homeland security in the United States and the unique issues faced by local law enforcement.
471/SCI 471 Prevention and Deterrence of Crime (3:3:0)
Theoretical and practical strategies for crime prevention and
deterrence. Discusses social, environmental, and mechanical
developments, police courts, and correctional elements of
law enforcement in terms of current effectiveness and future
potential for crime prevention.

475 Theory and Politics of Terrorism (3:3:0) Explores
origins of terrorism, tracing development from early states
to a modern mode of conflict. Presents national, regional,
and global perspectives.

479 Preparation for Internship (3:3:0) Prerequisites: ADJ
100, 300, 303; and at least 21 credits of other upper-level
courses required for the ADJ major. Preparation for intern-
ship in a justice organization or justice-related work activity.
Students develop a relationship with a prospective internship
sponsor and develop a plan for the internship and the research
to be reported.

480 Internship in Justice Administration (3–12:0:0)
Prerequisite: ADJ 479. Before enrolling, students must have
a plan approved by the instructor. Application of classroom
learning to an applied justice setting. Students maintain daily
journals, conduct research, and deliver written and oral
reports. Seminars are held three times during the semester
for discussion and oral presentation. Minimum of 50 hours
of on-the-job work time required for each credit. Students
may take the course for 3, 6, or 9 credits. Course may be
taken more than once, but total accumulated credits may not exceed 12. Students using the internship to satisfy skills for
the justice professional must accumulate a total of 9 cred-
its.

490 Special Topics in Administration of Justice
(1–3:1–3:0) Recent developments in the field. Content var-
ies. Recent topics covered workplace violence and interna-
tional terrorism. May be repeated for credit four times.

491 Honors Seminar I (3:3:0) Prerequisites: admission to
the ADJ honors program. First of a two-course sequence;
subject varies. Course includes readings, individual or group
projects, and discussion of seminar papers.

492 Honors Seminar II (3:3:0) Prerequisites: ADJ 491.
Second of a two-course sequence. Subject varies. Course
includes readings and discussion of seminar papers, leading
to a research project under the direction of a faculty member.
Oral exam on the research and report may be required.

499 Independent Study in Administration of Justice
(1–3:0:0) Prerequisite: ADJ 100. Open to majors in ADJ
and public and international affairs, with 90 credits and
permission of instructor and program. Reading and research
on a specific topic under the direction of a faculty member.
Written report is required; an oral exam or report may also
be required. Degree requirements to be fulfilled by a par-
ticular independent study determined by student’s advisor.

500 Special Topics in Administration of Justice
(1–3:1–3:0) Recent developments in the field. Content var-
ies. Recent topics have covered violence in the workplace
and international terrorism. May be repeated for credit.

Adult Education (EDAL)
Graduate School of Education

541 Understanding Adult Learners (6:6:0) Examines a
variety of adult learning issues, including theory, develop-
mental psychology, and motivation and experience. Adult
learners are considered in terms of individual learning needs,
incentives, support systems, and learning style differ-
ences.

542 Arranging Conditions for Adult Learning (6:6:0)
Focuses on linking adult learners to resources, and establish-
ing the environment for learning. Covers program develop-
ment processes, teaching and learning strategies for adults,
technology and adult learning, workplace learning, and
learning organizations.

African American Studies (AFAM)
African American Studies Program

200 Introduction to African American Studies (3:3:0)
Interdisciplinary introduction to the field of African Ameri-
can studies. Includes comparative analysis of approaches,
methodologies, and key concepts related to the study of
people of African descent in the United States, continental
Africa, and throughout the African diaspora. Lectures and
discussion integrate attention to such issues as diversity and
multiculturalism from national and global perspectives.

390 Special Topics in African American Studies (3:3:0)
Study of selected topics related to African American studies.
Topics include foundations of African American literature;
African American literature of the 20th century; the African
American experience in the United States from Reconstruc-
tion to the present; music, film, and civil rights; and black
political thought.

490 Internship (3:3:0) Prerequisites: AFAM 200 and 60
credits. Credit to be determined by the African American
Studies Program.

499 Independent Study (1–3:0:0) Prerequisites: under-
graduate senior status and permission of the director.
Investigation of an area related to African American studies
according to individual interest, with emphasis on research.

Alternative Education (EDAE)
Graduate School of Education

600 Alternative Education for At-Risk Youth (1:1:0)
Overview of the nature of at-risk students, why alternative
education programs exist, and the types of alternative pro-
grams available locally, statewide, and nationally.

601 Curriculum and Methods in Alternative Education
(3:3:0) Identifies and develops expertise in various instruc-
tional strategies, adaptations, and modifications used with
at-risk students in the context of alternative education envi-
ronments. Emphasizes motivation, scheduling, standards of
learning, and technology.

602 Preparing Students for Employment and Living
Independently (2:2:0) Explores postsecondary options and
opportunities for at-risk students in alternative programs.
Covers integration of career development, passing the GED,
in individual transition plans, obtaining employment, using
technology, and locating resources.

603 Communication and Management Strategies for
Alternative Education (3:3:0) Focuses on techniques to
manage crisis management, resolve conflicts, implement
peer mediation, and develop positive peer and adult relation-
ships. Emphasizes strategies for working successfully with families, diverse populations, substance abusers, and dually diagnosed students.

604 Multidisciplinary and Interagency Collaboration (3:3:0) Examines the Comprehensive Services Act of Virginia and other legislation concerning at-risk youth. Emphasizes agency functions, case management, collaboration, identifying resources, and networking.

Anthropology (ANTH)

Sociology and Anthropology

114 Introduction to Cultural Anthropology (3:3:0) For non-Western credit. Overview of major ideas and approaches in the study of cultures around the world. Surveys kinship, social organization, political economy, religious beliefs, and other aspects of non-Western cultures.

120 Introduction to Archaeology (3:3:0) Introduction to survey of anthropological archaeology. Includes development and use of contemporary theory, and field and lab methods.


299 Independent Study (1–3:0:0) Prerequisite: ANTH 114, or permission of instructor. Individual study in anthropology on topic organized in advance by student and instructor.

300 Civilizations (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Cross-cultural and transtemporal examination of complex societies and civilizations. Explores developmental schema for rise, articulation, spread, and decline of historic and contemporary civilizations.

301 Native North Americans (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Exploration of native North American cultures and selected aspects of Indian-white historical relations. Emphasizes cultural persistence as well as change.

302 Peoples and Cultures of Latin America (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Examines Latin American cultures and selected aspects of historical record.

303 Peoples and Cultures of Selected Regions (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines cultures of a specific region such as Middle East, Amazonia.

304 Peoples and Cultures of the Pacific (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Survey of 20th-century Melanesian, Polynesian, and Micronesian cultures. Case studies of interplay between cultural systems and island ecology.

305 Foraging Societies (3:3:0) Prerequisite: 60 credits, 6 credits of anthropology including ANTH 120, or permission of instructor. For non-Western credit. Examines early human societies with emphasis on environmental, technological, and cultural aspects of hunting and gathering as a successful means of adaptation.

306 Peoples and Cultures of Island Asia (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Examines cultures of the Island Asia culture region, focusing on native cultures of Indonesia, Borneo, and the Philippines.

307 Ancient Mesoamerica (3:3:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Examines the peoples and cultures of ancient Mesoamerica, including Olmec, Maya, Teotihuacan, and Aztec societies. Major topics include the rise of civilization, the development of the Mesoamerican cultural tradition, the growth of cities, trade, exchange, writing systems, political organization, religion, conflict, and the archaeological study of this indigenous heritage.

309 Peoples and Cultures of India (3:3:0) Prerequisites: ANTH 114 and 60 credits, or permission of instructor. Examination of South Asia, with emphasis on India. Includes general overview of prehistory and history; impact of colonialism; contemporary Indian culture, including the changing relations of caste and class, family organization, and the roles of women, religion, and ideology; and current trends in economic development and socioeconomic differences in different parts of the country.

310 Social Organization and Kinship (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines social organization, kinship, descent, and kinship terminologies in mainly non-Western cultures, emphasizing the meaning of specific cultural systems and cross-cultural similarities and differences.

311 Peoples and Cultures of Mainland Southeast Asia (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Survey of societies of mainland Southeast Asia, with emphasis on successive waves of outside cultural influences and relations between contrasting ethnic groups in modern states. Focuses on Thailand and Malaysia.

312 Political Anthropology (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines cultural and ecological contexts of political structures and competition for power in selected societies; and cross-cultural and comparative approaches to study of political conflict, leadership, values, and symbolism.

313 Myth, Magic, and Mind (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Examines religion as a cultural system. Topics include mythology, ritual, symbolism, and dogma. Emphasizes cross-cultural and predominantly non-Western material.

315 Socialization Processes: Family, Childhood, Personality in Cross-Cultural Perspective (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines aspects of the cultural transmission process in specific local cultures selected from various world culture regions, with emphasis on transmission of cultures.

322 Historical Archaeology (3:3:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Examines materials, theories, and methods of archaeology derived from and applied to historical sites, as they complement archival records.

324 Warfare, Violence, and Sacrifice in Antiquity (3:3:0) Prerequisites: ANTH 120, 60 credits, or permission of instructor. Examines origin and nature of conflict in human
society with an emphasis on the ancient past. Major topics include the possible role of violence in human evolution, cross-cultural studies of conflict in indigenous society, warfare in early states, and sacrifice as a ritual practice.

325 Field Techniques in Archaeology (3–6:0:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Intensive study of archaeological field techniques by directed group projects in site survey, site testing, recording techniques, and stratigraphy through discussions, demonstrations, and hands-on experience. May be repeated for maximum 6 credits.

330 Peoples and Cultures of Selected Regions: Non-Western (3:3:0) Examines cultures of a specific region such as Africa and the Middle East. Focuses primarily on non-Western cultures.

331 Refugees (3:3:0) Prerequisites: ANTH 114, 60 credits, or permission of instructor. Introduction to causes and consequences of forced dislocation as a global issue. Covers formally recognized refugees, as well as people such as internally displaced persons and asylum seekers who are in refugee-like circumstances. Focuses on understanding the personal experiences of refugees, and examining efforts on their behalf at national and international levels.

332 Cultures in Comparative Perspective (3:3:0) Prerequisite: ANTH 114, or permission of instructor. For non-Western credit and credit toward BA in sociology. Examines the varieties of cultural experience. Several cultures are studied in depth, with attention to local histories, global contexts, and shifting perspectives on the practice of ethnography.

333 Humanitarian Action (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines humanitarian action, drawing on anthropology’s holistic and comparative perspectives developed to ground understanding of humanitarian action within larger cultural contexts. Attention to cultural, biological, environmental, and political sources of humanitarian crises, and actual and potential responses to them. Focuses on large-scale response to social emergencies as culturally informed behavior.

340 Comparative Perspectives on Immigration (3:3:0) Considers the dimensions and meanings of the immigrant experience in the United States, with a focus on the diversity of immigrants and refugees who have arrived during the past 30 years. Emphasis on the social context in which immigration occurs and on the bearing of institutional and cultural influences on patterns of adaptation, assimilation, and exclusion from the host society.

360 Evolution, Sex, and Society (3:3:0) Prerequisite: ANTH 135, 60 credits, or permission of instructor. Inquiry into the biological dimensions of humans as culture-bearing animals. Topics include altruism, aggression, primate social organization, morphology, comparative ethnology, and microevolutionary genetic differentiation.

365 Race and Racism (3:3:0) Prerequisite: ANTH 135, 60 credits, or permission of instructor. Examines biological dimensions of human variation, and the beginnings of race as a concept. Discusses evolution of human biodiversity in culturally distinct human groups related to environment, physiology, genetics, nutrition, and disease. Explores use of scientific analyses of human biodiversity.

370 Environment and Culture (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines relationships among environment, culture, and human behavior with an emphasis on cultural ecological explanations in mainly non-Western contexts.

371 Psychological Anthropology (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Survey of issues in study of relationships between cultural and psychological variables. Major topics viewed cross-culturally include personality, mental illness, projective systems, cognition, and learning.

375 Anthropological Perspectives on History (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Use of ethnographic, archaeological, linguistic, and documentary data, in light of anthropological theory, to interpret the past and processes of change among indigenous peoples throughout the world.

380 Language and Culture (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Anthropological analyses of language behavior, origins, and change, emphasizing interplay of language, culture, anthropology, and linguistics.

381 Health, Healing, and Culture (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Surveys the discipline of medical anthropology, focusing on traditional medical beliefs and the diverse responses to modern scientific medicine in developing countries and among cultural minorities in the United States.

382 Urban Anthropology (3:3:0) Prerequisites: ANTH 114 and 60 credits, or permission of instructor. Uses tools and resources of social and cultural anthropology to study life in cities, including urban poverty, migration, urban planning, and discrimination. Case studies draw from different urban environments around the world, including Washington, D.C., and New York City.

385 Gender, Class, and Ethnicity in Latin America (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines bases for gender differences and similarities across a variety of societies and cultures in Latin America. Examines interrelationships among constructions of gender, class, and ethnicity.

390 Theories, Methods, and Issues I (3:3:0) Prerequisites: ANTH 114 and 60 credits, or permission of instructor. First of a two-course sequence that reviews the major theoretical traditions and schools of thought in anthropology. Required for anthropology majors.

395 Work, Technology, and Society: An IT Perspective (3:3:0) Prerequisites: ANTH 114, 60 credits, or permission of instructor. Introduction to the anthropology of work, technology, and society, with emphasis on information technology. Covers general conceptual issues of information technology and also involves specific practical exercises with computers, their operating systems, the logic of automated production, databases, and web-based communication. Attention also directed to social and ethical issues raised by contemporary information technology.

396 Issues in Anthropology: Social Sciences (3:3:0) Prerequisites: ANTH 114, 60 credits, or permission of instructor. Topic of contemporary interest in anthropology, focusing on social science topics of interest.
399 Issues in Anthropology (3:3:0) Prerequisite: ANTH 114 and 60 credits, or permission of instructor. Topic of contemporary interest in anthropology, changing from semester to semester, and focusing on topics such as sex roles, anthropology and ethics, and primate social organization. May be repeated for credit.

400 Engaging the World: Anthropological Perspectives (3:3:0) Prerequisites: ANTH 114, 60 credits, completion of all general education requirements, or permission of instructor. Examines selected topics with emphasis on the integration of different kinds of knowledge and the balancing of alternative ways of assessing meaning and relevance. Topics usually drawn from issues of global economic processes, civic rights and responsibilities, the environment, and migration. Student papers and oral presentations receive formal review by multiple faculty members, to which the students must then respond. Satisfies general education synthesis requirement.

410 Research Design and Methods in Bioanthropology (3:3:0) Prerequisites: 60 credits and 6 credits of anthropology, including ANTH 120 or 135; or permission of instructor. Research design in bioanthropology and archaeology. Topics include critique of case studies, framing problems, field strategies, measuring variables, sampling, analysis, and interpretation of results.

420 Interpretation in Archaeology (3:3:0) Prerequisite: 6 credits of anthropology including ANTH 120, or permission of instructor. Explores theoretical and methodological issues in archaeology. Considers patterns and contexts of archaeological remains, analytic problems, and interpretation of material culture.

425 Public Archaeology (3:3:0) Prerequisite: 6 credits of anthropology including ANTH 120, or permission of instructor. Considers public significance of archaeology and anthropological contributions to public concerns such as antiquities legislation and cultural resource management.

427 Historic Cemetery Survey (4:4:0) Prerequisite: ANTH 120, or permission of instructor. Explores demographic, stylistic, and religious aspects of historic cemeteries. Students learn to survey, record, and analyze gravestone data through field projects.

428 Patterns in Prehistory (3:3:0) Prerequisite: 60 credits, or permission of instructor. Explores diversity of prehistoric cultures in light of major cultural development: hunting-gathering, agriculture, pastoralism, and complex societies.

430 Research Methods in Archaeology (3:3:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Studies archaeological research process through discussions of current archaeological methodologies and student participation in designing and critiquing research projects.

435, 436 Special Projects: Anthropology (1–3:0:0) Prerequisites: ANTH 120 or 135, 60 credits, and permission of instructor. Lab or field project leading to a written report of the research. Research and paper completed under instructor’s guidance.

440 Public Anthropology: Seeking Solutions in the Public and Private Sectors (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Focuses on anthropologists’ contributions to major policy issues in development agencies in the United States and abroad. Covers techniques that lead to prevention or management of social and cultural conflict.

450 Qualitative Methods: Non-Statistical Approaches in Culture and Social Research (3:3:0) Prerequisites: 60 credits and 6 credits of anthropology including ANTH 114, or permission of instructor. Explores some of the most useful nonquantitative research techniques in social sciences, and offers practice in their application.

488 Gender, Sexuality, and Culture (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines how gender, sexuality, race, and class come together as analytically distinct, yet practically intertwined, systems of meaning and practice. Examples highlight questions of political economy and history while focusing on specific ethnographic or historical readings.

490 Theories, Methods, and Issues II (3:3:0) Prerequisites: 60 credits and 9 credits of anthropology, or permission of instructor. Second of a two-course sequence that reviews major theoretical traditions and schools of thought in anthropology. Required for anthropology majors, and usually taken as a senior seminar.

492 Contemporary Controversies in Anthropology (3:3:0) Prerequisites: 60 credits and 9 credits of anthropology including ANTH 390, or permission of instructor. Examines recent important works, issues, and controversies in anthropology.

495 Internship (3–6:0:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Supervised project in applying anthropology: public archaeology, development anthropology, museums. May be repeated for maximum 6 credits.

496 On Evolution (4:2:2) Prerequisites: 60 credits and 9 credits of anthropology, or permission of instructor. Considers evolution as biological as well as cultural concept. Parallels and contrasts among conceptual approaches allow a critique of the potential of evolution as a unifying biosocial theory.

499 Independent Research (1–3:0:0) Prerequisite: 60 credits, 9 credits of anthropology, or permission of instructor. Individual research on a topic to be organized in advance by student and instructor. May be repeated for credit.

535 Anthropology and the Human Condition: Seminar I (3:3:0) Prerequisite: graduate standing or permission of instructor. Examines some of the major theorists of 19th- and early 20th-century cultural theory. Marx, Freud, Durkheim, and Weber are surveyed as foundational thinkers for reading the works of such 20th-century theorists as Boas, Malinowski, Benedict, and Sapir.

536 Anthropology and the Human Condition: Seminar II (3:3:0) Prerequisite: ANTH 535. Examines contemporary theorists of anthropology, covering ongoing debates over epistemology and the multiple strands that inform anthropological theory and practice.

555 Policy and Culture (3:3:0) Examines the relevance of cultural processes to policymaking and the culture of policymaking organizations. Topics include development, welfare policy, environmental and energy policy, regulation and risk; health care, immigration policy; and the war on drugs.
560 Human Osteology (4:3:3) Prerequisites: course in human evolution or anatomy, and senior or graduate standing, or permission of instructor. Examines structure and function of human skeletal system. Discussions include age criteria, pathology, epigenetic traits, biomechanics, and phylogenetic relationships.

568 Human Origins (3:3:0) Prerequisite: graduate standing, or permission of instructor. Detailed survey of the genetic, morphological, and behavioral origins of hominids. Discusses current interpretations and debates.

576 American Cultures (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines U.S. cultures and explores concept of an American culture. Course readings and discussions explore underpinnings of the American experience, document broad historical shifts, and detail the experience of diverse groups of Americans, thus forming the basis for a critical, analytical, and comparative discussion of American life and life in America.

580 Evolution and Human Ecology (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines complex relationships among human cultures, biocultural adaptation, and the natural world from an evolutionary perspective.

573 Social Organization (3:3:0) Prerequisite: graduate standing, or permission of instructor. Detailed examination and re-evaluation of the basic concepts of kinship and social organization in light of contemporary anthropological concerns. Several classical and contemporary texts develop key issues of social organization. Review of traditional concepts of classical anthropology introduces discussion of the nature of the broad epistemological shift that occurred in the last quarter of the 20th century.

613 Ethnography (3:0:3) Prerequisite: graduate standing, or permission of instructor. Literally, "writing about (a) people," ethnography is the defining practice of social-cultural anthropology. The product of participant-observation fieldwork, ethnography brings together evidence and interpretation, providing a key means for developing and testing theories of culture. Course surveys key classical and contemporary ethnographies, introducing the breadth and scope of ethnographic practice in anthropology. Discussions highlight methodological questions.

614 Ethnopsychology: Self, Subject, and Culture (3:0:3) Prerequisite: graduate standing, or permission of instructor. The emerging field of ethnopsychology, in Catherine Lutz’s words, is “concerned with the way in which people conceptualize, monitor, and discuss their own and other’s mental and/or behavioral processes.” Course examines roots of the ethnopsychological enterprise, reviews several recent approaches to the description and analysis of folk psychological material, and investigates the relationship between folk psychology and other aspects of social life.

615 Ritual and Power in Social Life (3:3:0) Prerequisite: graduate standing, or permission of instructor. Domains of religion and politics are conjoined by questions of power: its deployment, distribution, and forms of resistance it engenders. Drawing on a variety of theoretical orientations in the social sciences, including structuralism, semiotics, psychoanalysis, and performance theory, course investigates connections among religious thought, ritual practice, and political action.

617 Political Economy (3:3:0) Prerequisite: graduate standing, or permission of instructor. Human societies have always engaged in complex political relations and economic exchanges. The cultural meanings people create are shaped by, and in turn shape, systems of power. Political economy is the attempt to understand the relationship between politics and economics, at the juncture of local meanings and global histories. Course reviews major works and models of political economy, especially as they relate to social and cultural analysis.

620 Theory: Archaeology and Biological Anthropology (3:3:0) Prerequisite: course in archaeology, or permission of instructor. Examines theoretical approaches in archaeology, paleoanthropology, and biological anthropology.

625 Research Design and Methods in Archaeology and Biological Anthropology (3:3:0) Prerequisite: course in archaeology, or permission of instructor. Examines research strategies and methods in archaeology, paleoanthropology, and biological anthropology.

630 Anthropology and Humanitarian Action (3:3:0) Prerequisite: graduate standing. Examines humanitarian action from an anthropological perspective, with attention to the cultural, biological, environmental, and political dimensions of humanitarian crises and actual and potential responses.

631 Refugees in the Contemporary World (3:3:0) Prerequisite: graduate standing. Explores major refugee flows since the mid-20th century, emphasizing mechanisms for providing assistance, asylum, and resettlement.

632 International Migration in Comparative Perspective (3:3:0) Prerequisite: graduate standing, or permission of instructor. International migration in the contemporary world, focusing on the full range of economic, political, and social reasons for migration and the effects of different national policies on that process.

635 Regional Ethnography (3:3:0) Prerequisite: graduate standing, or permission of instructor. In-depth study of peoples and cultures of a specific world region (Latin America, East Asia, the Pacific, United States). Content may include cultures defined by diaspora, migration, and other global forces and processes. May be repeated for credit when content differs.

640 Applied Anthropology (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores the application of contemporary anthropological ideas, theories, and methods to find solutions to practical problems as defined by various organizations and institutions including business, government, nongovernmental organizations, and various institutions.

645 Ethnography and Literature (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores relations between ethnography and literature. Most anthropological knowledge is transmitted in written text known as “ethnographies.” Ethnographic techniques can be used in novels, travel literature, biography, and autobiography. Course explores these uses, alongside anthropological ethnographies, to arrive at a better understanding of ethnography: what constitutes it, and how it is defined and practiced.

650 Ethnographic Methods and Research Design (3:3:0) Prerequisite: graduate standing, or permission of instructor. Reviews and examines major research methods commonly
employed in cultural anthropological field study, with emphasis on ethnographic research design and the use of standard ethnographic techniques. Includes practice in designing ethnographic research project, and using ethnographic methods and techniques in a field setting.

655 Nationalism, Transnationalism, and States: Local and Global Perspectives (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores different approaches to understanding the interaction of nationalism, transnationalism, and states given the apparently simultaneous dissolution of demographic, economic and cultural borders, and of modernist social science paradigms.

660 Social Science and Critical Theory (3:3:0) Prerequisite: graduate standing, or permission of instructor. Surveys key ideas of the Frankfurt School and its legacies today, including the critique of ideology; aesthetic theory; instrumental rationality; and analyses of the state, culture, and society. Writing by members of the Frankfurt School draws on many philosophical and methodological strands: radical humanism, Marxist analysis, cultural criticism, psychoanalysis, and political sociology.

670 Regional Studies in Archaeology (3:3:0) Prerequisite: permission of instructor. Regional survey of specific culture area in archaeology to be chosen by student and instructor.

675 Laboratory Techniques (4:3:3) Prerequisite: course in archaeology, and permission of instructor. Covers techniques of data collection, analysis, and management in archaeology and biological anthropology.

677 Anthropology and History (3:3:0) Prerequisite: graduate standing, or permission of instructor. Considers anthropological approaches to the study of history, the ways in which people construct their histories, and social historians’ effort to incorporate anthropological and ethnographic orientations into their accounts. Attention to tensions between culture and power in the constitution of historiography, and to methodological challenges of interpreting qualitative and quantitative data.

680 Readings in Archaeology (3:3:0) Prerequisite: permission of instructor. Directed readings and research on a specific topic in archaeology to be chosen by student and instructor. May be repeated for maximum 6 credits.

682 Readings in Biological Anthropology (3:3:0) Prerequisite: permission of instructor. Directed readings and research on a specific topic in biological anthropology chosen by student and instructor. May be repeated for maximum 6 credits.

684 Independent Study in Sociocultural Anthropology (1–6:3:0) Directed reading and research on a specific topic, agreed on by student and faculty member, resulting in a written project. May be repeated for maximum 6 credits.

685 Language and Culture (3:3:0) Prerequisite: graduate standing, or permission of instructor. Survey of research on the relationship between language and culture, and the many ways the study of language has enhanced understanding of the nature of culture. Course material drawn from anthropology’s four traditional subdisciplines (cultural, linguistic, prehistoric archaeology, and physical), as well as neighboring fields such as sociolinguistics, psycholinguistics, literary theory, and ethnology.

687 Culture and Curing (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores the wide variety of cultural interpretations of health, illness, and curing. Examines a number of different curing systems, both traditional and modern, and compares them with cosmopolitan biomedicine. Several book-length case studies cover a wide variety of cultural groups, health topics, and theoretical orientations.

690 Internship (1–6:0:0) Prerequisite: graduate standing in anthropology with 3 credits of methods and 12 credits in program, or with permission of primary advisor. All internships must be approved by faculty advisor to ensure suitability to the student’s course of study. Introduction to applied anthropology through approved work and study at a museum, institute, agency, or other approved site. May be repeated for maximum 6 credits.

699 Contemporary Issues in Sociocultural Anthropology (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores current issues and debates in sociocultural anthropology. Variable topics.

710 Contemporary Issues in Archaeology and Biological Anthropology (3:3:0) Prerequisites: ANTH 620 and 625, completion of 24 graduate credits, and approval of graduate advisor. Contemporary research developments and the ways in which various scientific disciplines and theoretical approaches are integrated in the study of biocultural evolution, adaptation, and diversity.

721 Culture, Power, and Conflict (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores power and social conflict through the lens of cultural analysis. Special attention to the role of cultural differences in the structuring of conflict, and to the deployment of cultural theory in formulating a practice of conflict resolution.

750 Ethnographic Genres (3:3:0) Prerequisite: graduate standing, or permission of instructor. “Genre” refers to kind, sort, or type. Course surveys the various modes of representation anthropologists use in elaborating participant-observation fieldwork, as well as how these styles refer to and construct ethnographic “others.” Explores a set of central philosophical and methodological issues in social-cultural anthropology such as framing, perspective, authority, reflexivity, and politics of style.

769 Gender, Sexuality, and Culture (3:3:0) Prerequisite: graduate standing, or permission of instructor. Utilizes interdisciplinary material within an overall anthropological perspective on body meanings and practices. Readings highlight questions of political economy and history, focusing on specific ethnographic or historical contexts, to develop an understanding of how gender, sexuality, race, and class become analytically distinct yet intertwined systems of meaning and practice.

797 Anthropology Colloquium (1:1:0) Prerequisite: graduate standing in anthropology, or permission of graduate coordinator. Public forum for the presentation and discussion of contemporary anthropological research.

798 Thesis Proposal (3–6:0:0) Prerequisite: Completion of 18 credits, including all core courses. Work on research proposal that forms basis for master’s thesis.

799 Master’s Thesis (1–5:0:0) Prerequisite: Completion of ANTH 798 and approval of thesis proposal. Master’s thesis research and writing under direction of thesis committee.
Arabic (ARAB)

Modern and Classical Languages

101 Introduction to the Arabic Language (3:3:1) Introduction to Arabic language, dialects, countries, and culture. Beginning modern standard and classical Arabic, with emphasis on the written language, script and phonology. Basic grammar covering gender, numbers, cases, prepositions, nominal sentences, and basic conversation and greetings.

102 Introduction to the Arabic Language (3:3:1) Prerequisite: ARAB 101, or permission of instructor. Introduction to developing reading skills in formal settings. Emphasizes modern standard Arabic in oral communication. Beginning grammar level focuses on verbal sentences, present tenses, questions, and compound nouns.

110 Elementary Arabic (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for ARAB 110 if they have received credit for ARAB 101, 102, or 109. Lab work required.

201 Intermediate Arabic I (3:3:1) Prerequisite: ARAB 102 or equivalent. Further development of listening, speaking, reading, and writing skills. Advanced level of vocabulary. Grammar covers past tenses, subordinated conjunctions, and introduction to passive voice. Also introduces Arabic dictionary.

202 Intermediate Arabic II (3:3:1) Prerequisite: ARAB 201 or equivalent. Emphasis on application of language skills to reading, composition, and discussion. Focuses on language structure, format of developing vocabulary from verbs, covering different derivations, and language patterns. Leads to learning the use of Arabic dictionary in depth. Grammar covers passive voice and verbal nouns.

210 Intermediate Arabic (3:3:1) Prerequisite: ARAB 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Arabic-speaking regions. Lab work required.

250 Gateway to Advanced Arabic (3:3:1) Prerequisites: ARAB 210, appropriate placement score, or permission of department. Integration of advanced intermediate-level Arabic reading, writing, listening, and speaking skills and the development of critical thinking and understanding authentic texts from the Arabic world. Taught in Arabic.

325 Major Arab Writers/Stories (3:3:0) Prerequisite: ENGL 101, or permission of instructor. Studies works of major Arab writers or collections such as The Arabian Nights. Writers and tales to be studied vary. Course work in English; knowledge of Arabic language helpful but not required. May be repeated once for credit with permission of department.

330 Reading and Conversation I (3:3:0) Prerequisites: ARAB 202, appropriate placement score or permission of instructor. Courses I and II must be taken in sequence. Development of conversational fluency and reading skills in modern standard Arabic through class discussion, reports, and presentations. Readings include selections from newspapers, journals, magazines, web sites, literary works, and other sources.

331 Reading and Conversation II (3:3:0) Prerequisites: ARAB 330, appropriate placement score or permission of instructor. Continuation of ARAB 330.

Art History (ARTH)

History and Art History

Students taking ARTH courses should expect to participate in field trips or assignments outside the classroom at area museums.

101 Introduction to the Visual Arts (3:3:0) Introduction to the content and principles of the visual arts. Approach varies with instructor.

102 Symbols and Stories in Art (3:3:0) Themes and imagery in art from early Greece to the modern era.

103 Introduction to Architecture (3:3:0) Introduces study, principle, and understanding of art of architecture. Approach varies with instructor; may be historical, geographical, technical, or thematic. Field trips required.

150 Freshman Seminar (3:3:0) Prerequisite: freshman standing. Focuses on skills and methods of learning as well as subject matter as a way of introducing the discipline of art history. Topics vary.

200, 201 Survey of Western Art (3:3:0) Major periods, monuments, and themes of Western art and architecture. Introduces Washington, D.C., museum collections and a historical framework for further study in art history. Designed as a two-course sequence, but each part may be taken independently without prerequisite. ARTH 200 covers prehistory, the ancient world, and the Middle Ages; ARTH 201 covers the art of the Renaissance, the baroque period, and modern Europe and the Americas.

203 Survey of Asian Art (3:3:0) For non-Western credit. Introduces arts of South, Southeast, and east Asia. Examines aspects of culture and history of Asia. Discusses monuments and artifacts in a variety of media and their relation to social and historical contexts.

204 Survey of Latin American Art (3:3:0) Introduces arts of Latin America from pre-Columbian to modern era. Discusses important examples of painting, sculpture, and architecture in relation to culture and history of region.

Each 300-level course is generally offered once every two years.

303 National Traditions (1–3:1–3:0) Prerequisite: 24 credits. Studies traditions of art and architecture within a single selected country or historical region. Topic varies. May be repeated for credit with different course content.

311 Design of Cities (3:3:0) Prerequisite: 24 credits. Explores problems in urban design in a particular geographical region or historical period. Approach varies with instructor, and may involve archaeological or theoretical approaches appropriate to the specific context. May be repeated when course content is different.

315 Modern Architecture (3:3:0) Prerequisite: 24 credits. Studies in modern architecture from the Beaux Arts movement to the present; an investigation of stylistic, structural, or theoretical innovations.

319 Art and Archaeology of the Ancient Near East (3:3:0) Prerequisite: 24 credits. For non-Western credit. Aspects
of the art, archaeology, and culture of ancient Near East and Bronze Age Mediterranean. Approach varies depending on instructor; emphasis may be on Mesopotamia, Iran, Egypt, Anatolia, the Levant, or the Aegean.

320 Art of the Islamic World (3:3:0) Prerequisite: 24 credits. For non-Western credit. Introduction to Islamic art, from the time of Muhammad to present. Cultural and regional approach, utilizing local museum collections.

321 Greek Art and Archaeology (3:3:0) Prerequisite: 24 credits. History of ancient Greek architecture, sculpture, and painting.

322 Roman Art and Archaeology (3:3:0) Prerequisite: 24 credits. History of Roman architecture, sculpture, and painting.

324 From Alexander the Great to Cleopatra: The Hellenistic World (3:3:0) Prerequisite: 24 credits. Arts of the Hellenistic age within the context of history and culture of the period. Explores the powerful dynasties ruling wealthy empires; achievements in learning and literature housed in the Great Library at Alexandria; baroque sculpture adorning the Altar of Zeus at Pergamon; and Roman collectors of Greek art and antiques.

333 Early Christian and Byzantine Art (3:3:0) Prerequisite: 24 credits. Aspects of medieval art and culture in eastern Mediterranean world. Topics may include late antiquity, early Christianity, and the Byzantine empire and its neighbors. Designed to take advantage of unique local museum resources. Specific focus varies with instructor.

334 Western Medieval Art (3:3:0) Prerequisite: 24 credits. Aspects of art and architecture in medieval Europe, from the fall of the Roman Empire through the Gothic period. Specific focus may vary with instructor. May be repeated when course content is different.

340 Early Renaissance Art in Italy, 1300–1500 (3:3:0) Prerequisite: 24 credits. Studies in architecture, sculpture, and painting in the age of Giotto, Ghiberti, Masaccio, and Botticelli.

341 Northern Renaissance Art (3:3:0) Prerequisite: 24 credits. Studies in the art of France, Germany, and the Netherlands in the age of Van Eyck and Dürer.


344 Baroque Art in Italy, France, and Spain, 1600–1750 (3:3:0) Prerequisite: 24 credits. Studies in architecture, sculpture, and painting in the age of Caravaggio, Bernini, Velazquez, and Poussin.

345 Northern Baroque Art, 1600–1750 (3:3:0) Prerequisite: 24 credits. Studies in architecture, sculpture, and painting in the age of Rubens, Van Dyck, Rembrandt, and Vermeer.

350 History of Photography (3:3:0) Prerequisite: 24 credits. Development of photography from origins in France in the 19th century to the present.

359 Art of the 18th and 19th Centuries (3:3:0) Prerequisite: 24 credits. Introduction to the art and architecture of the 18th and 19th centuries. Topics focus on specific art forms, media, geographic regions, or the thematic categories. May be repeated once for credit when topic differs.

360 Nineteenth-Century European Art (3:3:0) Prerequisite: 24 credits. Movements from neoclassicism to symbolism discussed in relation to social, cultural, political, and technological changes in Europe.

362 Twentieth-Century European Art (3:3:0) Prerequisite: 24 credits. Study of major movements (fauvism, cubism, futurism, constructivism, surrealism, and expressionism) and important artists in 20th-century painting and sculpture. Focus may vary.

371 American Architecture and Material Culture (3:3:0) Prerequisite: 24 credits. Studies in the history of American architecture or decorative arts in cultural context. Topics range from 17th century to 20th century, depending on instructor.

372 Studies in 18th- and 19th-Century Art of the United States (3:3:0) Prerequisite: 24 credits. Developments in visual culture and the changing status of art practitioners throughout these periods. Focus is either chronological (Colonial Period, Gilded Age) or thematic (19th-century genre scenes, the American landscape and national identity). May be repeated once for credit with different topic. Lecture, discussion.

373 Studies in 20th-Century Art of the United States (3:3:0) Prerequisite: 24 credits. Developments in 20th-century American visual culture across all media. Focus may vary (postwar American “realisms,” women artists and feminist art). May be repeated once for credit with different topic. Lecture, discussion.

374 Art Now (3:3:0) Prerequisite: any course in art history or art studio, or permission of instructor. Explores visual art production since 1980, drawing on regional resources. Examines social, institutional, and political issues in recent art and its markets. Requires students to work collaboratively and make several field trips, including one Saturday bus trip to New York. Specific topics and assignments vary with the changing art season and instructor. Lecture, discussion.

376 Twentieth-Century Latin American Art (3:3:0) Prerequisite: 24 credits. Major movements and important artists in 20th-century Latin American art discussed in relation to social, cultural, and political conditions in the region.

380 African Art (3:3:0) Prerequisite: 24 credits. For non-Western credit. Focuses on sub-Saharan African art in terms of styles and aesthetics; materials and techniques; and geographical, social, cultural, and religious contexts. Specific focus may vary with instructor.

382 Arts of India (3:3:0) Prerequisite: 24 credits. For non-Western credit. History, culture, and arts of south Asia from earliest civilizations along the Indus River to onset of Western colonialism. Emphasizes role of material evidence in the creation of the South Asian history and how political, social, and religious developments affected the arts. Discusses monuments and artifacts in a variety of media in relation to historical contexts.

383 Arts of Southeast Asia (3:3:0) Prerequisite: 24 credits. For non-Western credit. Examines various cultural and artistic traditions of ancient Southeast Asia, from the earliest archaeological evidence to onset of colonialism. Lectures
and discussions focus on material culture of the great civilizations that arose within borders of modern Thailand, Cambodia, Indonesia, Burma (Myanmar), Vietnam, Laos, and Malaysia.

384 Arts of China (3:3:0) Prerequisite: 24 credits. For non-Western credit. Explores the complex and dynamic history of China by examining ways in which social, religious, and political shifts have given rise to new and variant forms of material culture.

385 Arts of Japan (3:3:0) Prerequisite: 24 credits. For non-Western credit. Art and architecture of Japan, with particular attention to the ways political changes, religious movements, and social developments influenced and shaped those creations. Discusses monuments and artifacts in a variety of media in relation to social and historical contexts.

386 The Silk Road (3:3:0) Prerequisite: 24 credits. Explores luxury arts and material culture of Eurasian trade routes between Mediterranean and China in historical, religious, and social contexts. Emphasizes cultural interactions in medieval Central Asia.

393 Art History Internships (3–6:0:0) Prerequisite: art history major or minor, and permission of instructor. Internship with a professional arts institution, organization, or individual in the Washington, D.C., area. Project to be arranged by student in consultation with faculty instructor and field supervisor. Strongly recommended for advanced art history students seeking exposure to professional work in visual arts. May be taken for 3 to 6 credits, or repeated for up to 6 credits.

394 The Museum (3:3:0) Prerequisites: 6 credits in art history at the 300-level, and completion or concurrent enrollment in all other required general education courses. Examines history, theory, practice, ethics, and current problems of collecting and displaying art and artifacts to the public. Emphasizes issues central to museums in Washington, D.C., or museums in other locations; focus varies with instructor.

399 Special Topics in the History of Art (3:3:0) Topics vary. At least one 400- or 500-level course is offered each semester; each topic area is generally offered every two years.

400 Historiography and Methods of Research in Art History (3:3:0) Prerequisites: ENGL 302, and 6 credits in art history at the 300 level; or permission of instructor. Historical investigation of theories, methods, and critiques involved in the discipline of art history. Approach or focus may vary with instructor. May be repeated for credit.

420 Advanced Studies in Ancient Art (3:3:0) Prerequisite: ENGL 302, and 300-level course in ancient art; or permission of instructor. Studies a particular area of ancient art of the Mediterranean, Near East, or Middle East. Topics may be art form or medium, geographical area, theme, function, or context. May be repeated for credit.

430 Advanced Studies in Medieval or Islamic Art (3:3:0) Prerequisite: ENGL 302, and a 300-level course in medieval or Islamic art; or permission of instructor. Studies a single topic in medieval or Islamic art. May focus on a particular period, region, or medium, or may explore cultural interconnections within medieval Eurasian world. May be repeated for credit.

440 Advanced Studies in Renaissance and Baroque Art (3:3:0) Prerequisite: ENGL 302, and 300-level course in Renaissance or baroque art; or permission of instructor. Studies a particular aspect of Renaissance or baroque art. Topics may be monographic, thematic, or concentrated on the art of a smaller time period or a particular area. May be repeated for credit.

460 Advanced Studies in 20th-Century European Art (3:3:0) Prerequisite: ENGL 302 and 300-level course in the art of 19th- or 20th-century Europe or the Americas; or permission of instructor. Study of a particular topic in 20th-century European art. Course may focus on a specific period, region, movement, medium, or theoretical issue, or explore cultural connections and transfer between regions.

471 Advanced Studies in Art of the United States (3:3:0) Prerequisite: ENGL 302 and 300-level course in American art. Studies a particular area of American art, focusing on a form, such as landscape or genre painting; theme, such as nationalism, regionalism, or iconography of the family; or movement, American modernism. May be repeated for credit.

472 Advanced Studies in 20th-Century Latin American Art (3:3:0) Prerequisite: ENGL 302 and 300-level course in 19th- or 20th-century art of Europe or the Americas, or permission of the instructor. Study of a particular topic in 20th-century Latin American art. Course may focus on a specific period, region, movement, medium, or theoretical issue, or explore cultural connections and transfer between regions.

482 Advanced Studies in Asian Art (3:3:0) Prerequisite: ENGL 302, and 300-level course in any area of Asian art; or permission of instructor. For non-Western credit. Seminar-style discussions on a specific topic in Asian art. May focus on the art of a particular period, movement, reign, or region, as well as theoretical issues or works in a particular medium. Content varies; course may be repeated for credit.

490, 491 Independent Study in Art History (3:0:0), (3:0:0) Prerequisites: 60 credits, ENGL 302, permission of instructor and chair, plus 9 credits in art history beyond ARTH 200, 201. Intensive study of a particular artist, period, or theoretical problem to be conducted by an individual student in consultation with instructor. Study proposal submitted before registration.

492, 493 Honors Directed Readings, Honors Directed Research (3:3:0), (3:3:0) Prerequisites: admission to art history honors program, ENGL 302, and permission of instructor. Linked individualized courses, usually given by same instructor. ARTH 492 involves directed readings, and ARTH 493 culminates in research paper related to subject of readings. Students must have completed at least one course in the field, or with the professor, chosen for these honors courses. The 3 credits of readings should be taken before the 3 research credits, or they may be taken concurrently.

499 Advanced Studies in Art History (3:3:0) Prerequisite: ENGL 302 and 300-level course, or permission of instructor. For non-Western credit. Seminar-style discussion on specific subjects in art history. Topics may vary. May be repeated for credit.

593 Art History Internships (3–6:0:0) Prerequisite: baccalaureate degree or equivalent, or permission of instructor.
Internship with a professional arts institution, organization, or individual in the Washington, D.C., area. Project to be arranged by student in consultation with faculty instructor and field supervisor. Recommended for advanced art history students seeking exposure to professional work in visual arts. May be taken for 3 to 6 credits, or repeated for up to 6 credits.

594 The Museum (3:3:0) Prerequisite: baccalaureate degree or equivalent, or permission of instructor. Examines history, theory, practice, ethics, and current problems of collecting and displaying art and artifacts to the public. Emphasizes issues central to museums in Washington, D.C., or museums in other locations. Specific focus may vary with instructor.

596 Independent Study (1–3:0:0) Prerequisite: baccalaureate degree or equivalent, or permission of instructor. Independent reading and research on specific project under direction of department member. Written report is required. May be repeated for credit.

599 Special Topics in the History of Art (3:3:0) Prerequisite: baccalaureate degree or equivalent, or permission of instructor. Topics vary.

600 Methods and Research in Art History (3:3:0) Prerequisite: admission to the art history MA program. Investigates theories, methods, and research strategies in discipline of art history. Designed for first-semester students in art history MA program; foundation for further graduate-level work in the program.

696 Independent Directed Readings (3:0:0) Prerequisites: admission to art history MA program, and permission of instructor. Taken in final semester of art history MA. Designed to prepare students for comprehensive exams by integrating past work and filling gaps in expected knowledge before the exam.

699 Topics in Art History (3:3:0) Prerequisite: graduate standing. Research seminar on aspects of art history. Topics vary, but course entails extensive critical readings and discussion, development of bibliographies, and advanced-level research papers.

Art and Visual Technology (AVT)
College of Visual and Performing Arts

101 New Majors Colloquium (1:1:0) Required of all AVT majors. May be taken prior to declaring the major or during the first semester as a declared AVT major. Provides a common core experience of contemporary perspectives on the broad range of professional career options open to studio art majors. Lectures address practical concerns but emphasize social, ethical, and philosophical aspects of visual arts professions.

103 Introduction to the Artist’s Studio (3:1:2) For nonmajors only. Through projects, readings, class critiques, visuals, and field trips, students explore materials, techniques, concepts, and processes essential to understanding the language of visual arts and the artist’s role. Develops imaginative thinking and sensitivity to visual environment.

104 Studio Fundamentals I (4:2:4) Explores elements and principles of two-dimensional design, establishment of visual vocabulary, and critical analysis that supports conceptual development. Studio projects build fundamental knowledge, skills, understanding of precedents, and contemporary practices in visual arts.

105 Studio Fundamentals II (4:2:4) Prerequisite: AVT 104 or permission of instructor. Explores elements and principles of three-dimensional design, establishment of visual vocabulary, critical analysis that supports conceptual development. Studio projects explore form and composition, time-based media, materials, precedents, and contemporary practices in visual arts.

180 Computers in the Creative Arts (3:1:2) Introduces computing from artist’s perspective. Emphasizes computer use for artistic creation and research. Overview of hardware, software, operating systems, peripherals, two-dimensional graphics, and web design.

204 Visual Thinking (3:3:0) Explores the ways contemporary artists use principles of design and perception to challenge how we see our world physiologically, psychologically, or socially. Examples drawn from film, photography, new media art, and other contemporary artistic media.

206 Color (4:2:4) Prerequisite: AVT 104 or permission of instructor. Color theory and principles of color interaction, including additive, subtractive, and partitive color experience, study of harmony, contrast, focus, space, opacity, transparency, temperature and value in both wet and dry media, and related applications of color technology.

215 Typography (4:2:4) Prerequisites: AVT 104 and 180, or permission of instructor. Introduction to history and use of type. Reading and projects develop awareness of type as a linguistic and visual communication tool. Introduces typographic design elements, including color, hierarchy, integration with imagery, structure, and content.

222 Drawing I (4:2:4) Introduction to fundamentals of drawing, with emphasis on observational study and the effective and expressive use of line, mass, value, perspective, and formal composition. AVT majors encouraged to take AVT 222 with AVT 104.

232 Painting I (4:2:4) Introduction to the basic methods and principles of painting with a focus on observation, paint application, formal composition, color mixing, and the articulation of form.

243 Printmaking I (4:2:4) Introduction to basics of hand printing. Emphasis on translation and transferal of images, tools, equipment, and technical skills for making a well-defined print. Presentations and field trips focus on aesthetic concerns of making multiple images.

252 Photography I (4:2:4) Introduces basic principles and aesthetics of photography, 35-mm camera operation, and darkroom practices, including film processing and print development.

253 Introduction to Digital Photography (4:2:4) Introduction to the digital camera as a tool for electronic photographic image making. Students will be introduced to principles and aesthetics of digital photography and also learn basic image-editing skills in a computer environment.

262 Sculpture I (4:2:4) Projects in sculpture with emphasis on contemporary theory and issues, the development of individual concepts, and the exploration of materials, tools, and processes. Faculty demonstrations, lectures, gallery and museum visits, and regular student work critiques.
272 Interdisciplinary Arts (4:4:2) Introduces contemporary interdisciplinary art practice through readings and studio projects in performance and installation. Provides students with opportunities to deepen understanding of conceptual art, nontraditional media practices, and collaborative practice in visual arts.

280 Introduction to Digital Arts (4:2:4) Prerequisite: AVT 104 and 180, or permission of instructor. Investigates ways in which contemporary artists employ tools of digital culture. Students create meaningful works of art that demonstrate conceptual awareness and technical skill.

300 Artsbus Attendance (0:0:0) Students travel to New York or other destinations aboard the AVT Artsbus to attend faculty-selected exhibitions. AVT majors must satisfactorily complete course once for each semester they are enrolled as majors, up to five times. Repeatable up to three times per semester. Graded S/NC (satisfactory/no credit).

301 Visual Voices Colloquium (1:1:0) Students attend AVT Visual Voices lecture series during the semester and complete assignments related to the topics covered. AVT majors must accumulate at least 3 credits in this colloquium to graduate. May be repeated each semester up to a total of 8 credits.

305 Creative Processes (3:3:0) Study of the creative process in general, with emphasis on the inspiration, working methods, and final creations of various artists. Students explore their own creative processes through journal keeping, collaborative exercises, and projects.

307 Aesthetics (3:3:0) Interdisciplinary course examines broad range of contemporary art and culture to engage an expansive conception of aesthetic experience. Students engage with historical and contemporary aesthetic theories, build heightened aesthetic sensibility, and explore their personal aesthetic.

309 Art as Social Action (3:3:0) Interdisciplinary exploration of work by citizen-artists whose art making engages the social world. Students learn about the history of socially engaged art making and experiment with individual and collaborative projects addressing social issues.

311 Graphic Design Methods and Principles (4:2:4) Prerequisite: AVT 215 or permission of instructor. Focuses on developing design solutions requiring demographic, historical, and/or cultural research. Course strengthens design and typography skills, introduces conceptual problem solving, audience considerations, and broad-based tools designers use to develop effective visual communications.

313 Editorial Design (4:2:4) Prerequisite: AVT 311 or permission of instructor. Development and production of long-form design projects (magazines, newspapers, catalogs, and other serial and/or multipage publications). Emphasizes on narrative, consistency, structure, clarity. Addresses information design issues, and reinforces conceptual skills and integration of imagery and text.

318 History of Graphic Design (3:3:0) Survey of design history. Looks at print and web design as both a reaction to and shaper of the broader culture (including other fine and applied arts) through the study of major movements and designers.

323 Drawing II (4:2:4) Prerequisite: AVT 222 or permission of instructor. Students develop observational, sketching, and rendering skills. Introduction to a range of materials, methods, formal concepts, drawing in series, and critique vocabulary.

324 Figure Drawing (4:2:4) Prerequisite: AVT 222 or permission of the instructor. Drawing with an emphasis on the observational study of the human body. Human anatomy and proportion are examined through a series of methodological approaches, including gesture, contour, mass, and modeling.

326 Nontraditional Approaches to Drawing (4:2:4) Prerequisites: AVT 222 or permission of instructor. This course encourages students to challenge some traditional approaches to drawing by creating innovative works that combine familiar drawing techniques with a variety of materials, approaches, and unusual formats.

333 Painting II (4:2:4) Prerequisite: AVT 232 or permission of instructor. Course focuses on the development of formal and technical skills, with an emphasis on paint application, color interaction, and support building and preparation. Concepts, methodologies, and approaches relevant to contemporary painting are introduced.

336 Experimental Painting (4:2:4) Prerequisite: AVT 232 or permission of instructor. Using contemporary painting practices as starting place, students explore a variety of experimental and conceptual approaches to painting.

337 Figurative Painting (4:2:4) Prerequisite: AVT 232 or permission of instructor. Working primarily with live models, students explore the human form as the main subject for a variety of visual and expressive inquiries.

343 Printmaking II (4:2:4) Prerequisite: AVT 243 or permission of instructor. An introduction to relief, screenprint, and intaglio printing, including the study of historical antecedents and their relevancy to contemporary printmaking. Students learn reductive and additive techniques in preparing printing surfaces.

345 Artists’ Books as Visual Language (4:2:4) Prerequisites: AVT 180 or permission of instructor. Introduces the artist’s book as both physical structure and creative association of words and images. Students learn techniques of bookmaking, binding, and traditional and digital printmaking to produce an artist-made book with narrative and sequential elements.

346 Digital Printmaking (4:2:4) Prerequisites: AVT 180 or permission of the instructor. A beginning course in hand printing digitally processed images. Projects focus on electronic means of creating and manipulating imagery. Students achieve skills in multiple steps and incremental development required in making prints.

353 Photography II (4:2:4) Prerequisite: AVT 252 or permission of instructor. Continuation of Photography I, with further investigation into the aesthetics of photography through experimentation with new films, developers, papers, and development of a portfolio of photographic images.

354 Digital Photo (4:2:4) Prerequisites: AVT 252 and 180, or permission of the instructor. A computer-intensive class in which students create digital images from the viewpoint of a photographic artist. Emphasis on digital photo techniques, including making digital negatives, concept development, and visual aesthetics.
356 Studio Lighting I (4:2:4) Prerequisite: AVT 353 or permission of instructor. Introduces theory, concepts, and applications of photographic studio lighting using both artificial and natural light sources with an emphasis on the ability to control and manipulate light.

363 Sculpture II (4:2:4) Prerequisite: AVT 262 or permission of instructor. Expands on the principles and processes introduced in Sculpture I, developing a higher level of technical competence and critical sophistication. Lectures, independent student research, and gallery and museum visits required. Vigorous critiques.

370 Entrepreneurship in the Arts (4:2:4) Combined lecture and studio course in developing entrepreneurial skills in arts. Special focus on developing communication skills and planning strategies, as well as on nurturing skills that enable students to creatively solve problems and think about opportunities.

371 Visual Perception and the Arts (3:3:0) Review of major approaches to the study of visual perception. Topics include analysis of picture perception, visual thinking, the relationship between symbolic and nonsymbolic thinking and representation, and how pathologies of vision affect art production.

372 Hip Hop Culture (3:3:0) Examines hip hop as an art form within a continuum of cultural expression. Explores multilayered social, political, and aesthetic aspects of hip hop, historical causes and precedents, and contemporary derivatives and implications.

373 Performance Studio (4:2:4) Prerequisite: AVT 272 or permission of instructor. Studio course focused on theory and practice of collaborative performance art. Detailed analysis of creation and production processes from interdisciplinary perspective in conjunction with practical training in multimedia technologies, body sculpture, and theater of images.

374 Sound and Vision (4:2:4) Prerequisite: AVT 180 or 280, or permission of instructor. Explores the function and use of sound in conjunction with time-based media and installation. Students learn digital tools for selection, editing, processing, and integration of sound and music (postproduction) into video, animation, and installation projects.

376 Live Movies (4:2:4) Prerequisite: AVT 272 or permission of instructor. Advanced performance studio emphasizing cinematic forms and multimedia technologies. Also covers sound design, scenic design and materials, production planning, and interdisciplinary approaches to narrative and content in performance. Students collaborate on production projects.

377 Cyberpunk (4:6:0) Traces the ways that cinema, music, fiction, cultural theory, visual art, television, theater, and performance have embraced and been shaped by cyberpunk and cyberculture. Includes readings, writings, discussion, screenings, guest speakers, and research projects.

378 The African American Experience in the Performing Arts (3:3:0) Through lectures, slides, audio recordings, videos, and films, students examine African American contributions to cultural fabric of American forms and institutions. Artistic contributions examined in aesthetic, political, historical, and social contexts.

382 Digital Art and Animation (4:2:4) Prerequisite: AVT 280 or permission of instructor. Introduces conceptual, technical, and aesthetic practices of two-dimensional computer animation. Students learn to animate hand-drawn and computer-generated images. Students work to develop and create an imaginative and meaningful short animation with sound.

383 Three-Dimensional Digital Art (4:2:4) Prerequisite: AVT 382 or AVT 390, or permission of instructor. Students create thoughtful and imaginative, three-dimensional scenes with scaled objects, surface textures, lights, and shadows. These scenes serve as environments for short animations. Emphasis on idea generation, contemporary practices, visual aesthetics, and technique.

390 Digital Media and Video Art (4:2:4) Prerequisite: AVT 280 or permission of the instructor. Integrates study of contemporary art theory, montage theory, and artistic practices with application to new media and technology. Special focus on video, visual digital, video art, sound design, and the sociopolitical implications of digital work.

392 Gallery Practices (4:2:4) Prerequisite: 3 credits of AVT or ARTH, junior standing, or permission of instructor. Introduction to practices of the contemporary art gallery, including curatorship, exhibition planning and installation, care and proper handling of artwork, technology in the gallery, collaborating with outside curators, documentation, budget, publicity, and educational and docent activities.

393 Field Experience in the Arts (1–6:0:0) Prerequisite: junior standing and permission of instructor and academic advisor. Introductory working and learning experience with an organization or individual in the arts, or as a teaching assistant. Placement documentation to include 45 hours of work per credit. May be repeated for credit for maximum 6 credits.

394 Honors Seminar (1:1:0) Prerequisite: by invitation to qualified honors students. Offers highly motivated students opportunities to interact with art world professionals through field trips, research, critiques, and creative assignments. Students accrue credits toward graduation with AVT honors. Repeatable for up to 8 credits.

395 Writing for Artists (3:3:0) Prerequisite: ENGL 302 or permission of instructor. Practical writing seminar in which students practice typical writing needs of creative professionals, including artist’s statements, grant proposals, and reviews, while also exploring ways in which artists have used writing, books, and language in art making.

396 Introduction to Art Teaching and Learning (3:3:0) Prerequisites: junior standing, completion of ENGL 302, and completion of at least 20 credits of AVT course work (including AVT 307); or permission of art education advisor. Prior to enrollment, students must complete art education inquiry form. Explores art-teaching profession through readings, discussion, hands-on activities, and visits to diverse area public schools. Students discover a variety of ways that art is taught and evaluated to meet multiple educational needs of today’s PK–12 students.

399 Special Topics in Art and Visual Technology (1–6:1–6:0–6) Explores topical studies in AVT including theoretical and critical aspects of art or studio production. Topics and credit vary with instructor. May be repeated when taken under different topics.
414 Corporate Design and Branding (4:2:4) Prerequisites: AVT 252 or 253, AVT 311, and AVT 395, or permission of instructor. Fundamentals of branding and identity design. Topics include logo development, product packaging, marketing and advertising collateral, web branding, and broadcast advertising development. Special attention is given to the creation of a graphics standards guide.

415 Web Design and Usability (4:2:4) Prerequisites: AVT 252 or 253, AVT 311, and AVT 395 or permission of instructor. Introduces students to web design, usability, and the use of popular applications for static, interactive, and motion-based web development.

419 Topics in Graphic Design (1–6:1–6:0–6) Prerequisites: AVT 311 and AVT 313 or 414. Rotating subjects give students a deep look into and appreciation of a specific topic in design practice. Topics and credit vary with instructor. May be repeated when taken under different topics.

422 Drawing III (4:2:4) Prerequisite: AVT 323 or permission of instructor. Builds on intermediate drawing skills, emphasizing individual exploration and expressive techniques. Along with rigorous observational study, students work from a variety of sources to develop a broad understanding of visual solutions within contemporary art practice.

423 Drawing IV (4:2:4) Prerequisite: AVT 422 or permission of instructor. Students learn and practice advanced drawing skills and techniques in a variety of media and formats. Emphasis on development of content, personal sources, techniques, presentation strategies, and methods of analysis through critique.

432 Painting III (4:2:4) Prerequisite: AVT 333 or permission of instructor. Intermediate course with an emphasis on developing personal content, concepts, painting strategies, and a practical understanding of contemporary ideas in painting.

433 Painting IV (4:2:4) Prerequisite: AVT 432 or permission of instructor. In this capstone course, students engage in a self-directed studio practice through the development of content, personal sources, techniques, presentation strategies, and methods of analysis through critique.

434 Painting V (4:2:4) Prerequisite: AVT 433 or permission of instructor. Students work rigorously and independently, advancing individual studio practice through in-depth dialogue with faculty and formal group critiques. Emphasis on individual decision making, personal initiative, and critical vocabularies.

435 Painting VI (4:2:4) Prerequisite: AVT 434 or permission of instructor. Advanced directed research in painting. Employing rigorous concepts, presentation strategies, and in-depth critique, students develop independent projects into a cohesive body of work.

442 Printmaking III (4:2:4) Prerequisites: AVT 343 or permission of the instructor. An intermediate print media course with an emphasis on a wider variety of tools and concepts that investigate photo-based imagery and advance personal narrative.

443 Printmaking IV (4:2:4) Prerequisites: AVT 442 or permission of the instructor. An advanced print media course that uses hand-drawn, digital, and photo-based imagery. Students explore traditional and new printmaking techniques in a series of related prints and explore their relevancy to contemporary printmaking.

444 Printmaking V (4:2:4) Prerequisites: AVT 443 or permission of the instructor. Advanced print media course incorporating three-dimensional applications of hand printmaking. Students develop concepts in digital printmaking, book making, sculptural prints, and installation works. Explores issues in contemporary printmaking through critical discussions, reading, and writing assignments.

445 Printmaking VI (4:2:4) Prerequisites: AVT 444 or permission of the instructor. Students produce a body of print media work reflecting their interests, including the broader context of social, cultural, and contemporary issues. Students engage in collaborative studio practices and independent projects to integrate multiple visual technologies.

452 Advanced Photographic Printing I (4:2:4) Prerequisite: AVT 353 or permission of instructor. Advanced darkroom course with emphasis on fine art and craft of black-and-white photographic print. Students produce a personal portfolio based on technical instruction, contemporary photographic approaches, and critical discussions.

453 Advanced Photographic Printing II (4:2:4) Prerequisite: AVT 452 or permission of instructor. Intensive continuation of AVT 452. Students produce a photographic portfolio based on technique, content, personal expression, photographic criticism, and knowledge of contemporary trends. Includes critical discussions, and reading and writing assignments.

454 Alternative Photo Processes (4:2:4) Prerequisites: AVT 353 or permission of instructor. Introduction to 19th century and nontraditional photographic processes including cyanotype, van dyke, gum bichromate, liquid emulsion, and image transfer. Exploration and discussion of photography’s influences, application, and use in other mediums.

455 Advanced Digital Photo (4:2:4) Prerequisites: AVT 354 or permission of instructor. Continuation of 354 Digital Photo with further exploration into digital techniques and personal expression. The semester is spent developing and creating a portfolio of photographic images.

456 Large Format Photography (4:2:4) Prerequisites: AVT 353 or permission of instructor. An introduction to basic concepts, controls, and exposure theories of large format photography. Students develop an aesthetic knowledge of the view camera’s potential working with 4” x 5” view cameras in the studio and field.

457 Documentary Photography (4:2:4) Prerequisites: AVT 452 or permission of instructor. Introduces documentary photography: techniques, history, choices, and ideas necessary to create meaningful photo essays that incorporate a personal, committed, in-depth approach to seeing and depicting lives and situations.

458 Advanced Studio Lighting (4:2:4) Prerequisites: AVT 356 or permission of instructor. The advanced study of photographic studio lighting concepts using electronic strobes and power packs with emphasis placed on constructing studio materials, metering techniques, staging complex sets, and on-location photography.

459 About Photography: Practice and Research (4:2:4) Prerequisites: one course from AVT 452–458 or permission of instructor. A combined studio and lecture course investigating photography’s history, critical theory, and practice. Lectures, discussions, readings, and projects focus on a medium that has enormously influenced art and culture.
462 Sculpture III (4:2:4) Prerequisite: AVT 363 or permission of instructor. Advanced studio course for continued individual, conceptual, and critical development in sculpture. Biweekly seminar, independent research, museum and gallery visits, vigorous individual and group critiques, required documentation, and portfolio preparation supporting studio projects.

463 Sculpture IV (4:2:4) Prerequisite: AVT 462 or permission of instructor. Intensive studio course for advanced sculpture students to further individual, conceptual, and critical development. Students produce a body of work based on technical exploration, critical discussion, reading, and writing.

464 Sculpture V (4:2:4) Prerequisite: AVT 463 or permission of instructor. Advanced studio course for rigorous and independent production of sculpture. Weekly topical seminar, vigorous critiques, museum and gallery visits, professional documentation, and research resulting in a body of work to be exhibited.

465 Sculpture VI (4:2:4) Prerequisite: AVT 464 or permission of instructor. Continuation of advanced work in AVT 465. Students work rigorously and independently, gaining insights into personal process and direction through one-on-one critical dialogue with faculty and formal group critiques. Emphasizes individual decision making and personal initiative.

472 Critical Theory in the Visual Arts (3:3:0) Prerequisite: ARTH 374 or permission of instructor. Examination of currents in theory and criticism that inform contemporary practice and critical analysis in the visual arts.


482 Advanced Two-Dimensional Digital Art (4:2:4) Prerequisites: AVT 280 or permission of instructor. In-depth look at advanced digital imaging techniques and contemporary practices. Students are required to create a portfolio of large-format high-resolution digital prints and further develop visual critical analysis skills through active participation in critiques.

483 Internet Art (4:2:4) Prerequisite: AVT 382 or AVT 390, or permission of instructor. Investigates Internet as space for making art while detailing a selection of tools, concepts, issues, and history pertaining to Internet art.

487 Advanced Digital Media (4:2:4) Prerequisite: AVT 382 or AVT 390, or permission of instructor. Integrates media art techniques, including rotoscoping, stop motion, layer compositing, hand drawing, and experimental animation, with digital video editing and DVD authoring. Special focus on intersection of traditional techniques, installation, and contemporary media art theory.

489 Internship in Art and Visual Technology (1–6:0:0) Prerequisite: senior standing, completion of 12 concentration credits, and permission of instructor. Unpaid professional-level work experience in a professional organization or with an individual artist, related to the student’s concentration and career plans. Placement documentation to include 45 hours of work per credit. May be repeated for credit for maximum 12 credits.

491 Independent Study in Art and Visual Technology (1–6:0:0), (1–6:0:0) Prerequisite: senior standing, completion of 12 concentration credits, and permission of instructor. Opportunity for development of advanced skills and concepts in a field of interest. Study proposal must be approved by instructor prior to registration. Project documentation to include 45 hours of work per credit. May be repeated for credit for maximum 24 credits.

493 Teaching Visual Thinking Through Media, PK–12 (3:3:0) Prerequisite: AVT 396 or permission of art education advisor. Investigates range and appropriateness of media and materials that encourage creative expression in the art classroom for PK–12 students, and expands the artist-teacher’s visual repertoire. Incorporates art history, criticism and aesthetics, as well as language arts and other content areas that challenge students’ artistic growth and human development.

494 Teaching Critical Response to Art, PK–12 (3:3:0) Prerequisite: AVT 396 or permission of art education advisor. Develops visual literacy and critical-thinking skills for application to the PK–12 classroom by examining theoretical models and applying strategies to expand knowledge about art and artifacts. Includes intensive writing, readings, discussions, museum work, research and Internet skills, and studio work.

497 Senior Project (4:2:4) Prerequisites: senior art and visual technology major, completion of 12 concentration credits, and completion of or concurrent enrollment in all required general education courses. Capstone course in which students develop and present a cohesive body of work along with written materials and documentation. Students participate in critiques with visiting artists or AVT faculty and in workshops supporting professional goals.

498 Senior Design Project (4:2:4) Prerequisites: senior art and visual technology major, completion of AVT 311, 313, and 414, and completion of or concurrent enrollment in all required general education courses. Capstone course in which students develop and present a design project exploring the possibilities of personal or professional expression. Students participate in critiques with visiting artists or AVT faculty and in workshops supporting professional goals.

522, 523 Drawing V, VI (4:2:4), (4:2:4) Prerequisite: admission to AVT graduate program or permission of instructor for AVT 522; AVT 522; or permission of instructor for 523. Drawing on an advanced level, emphasizing individual decision-making and personal initiative.

526 Independent Study (1–6:1–6:0) Prerequisite: BA or equivalent, or permission of instructor. Independent reading and research on specific project under department faculty member’s direction. Written reports required. May be repeated for credit.

599 Special Topics in Art and Visual Technology (1–6:1–3:0–6) Prerequisite: admission to AVT graduate program, or permission of instructor. Exploration of topical studies in AVT, including theoretical and critical aspects of art or studio production. Topics and credit vary with instructor. May be repeated when taken under different topics.
600 Research Methodologies (3:3:0) Prerequisite: admission to AVT graduate program, or permission of instructor. Graduate seminar focusing on development of independent research project in student’s area of emphasis. Explores principal methods of researching and documenting art and arts practice. Along with traditional methods of library research, emphasizes new processes of examination and investigation through the use of computer-aided research systems.

605 Issues and Research in Art Education (3:3:0) Prerequisite: admission to the MAT program and permission of instructor. Readings and projects explore historical and contemporary ideas, issues, philosophies, pedagogy, and research in art education. Investigates teachers’ use of research-oriented questions and data to explore classroom issues and improve teaching and learning.

610 Graduate Seminar (1–4:0:0) Prerequisite: admission to AVT graduate program, or permission of instructor. Seminar course required of all AVT graduate students four times during course of study. Students present their work or the work of contemporary artists for discussion and peer and faculty critiques. Special focus on developing public communication and presentation skills on contemporary issues in the arts. Repeatable for 4 credits.

615 Technology for Art Teachers (3:3:0) Prerequisite: admission to the MAT program and permission of instructor. Addresses use of technology in PK–12 art classroom. Focuses on research, presentation and instruction, and image creation. Students develop technology-enhanced teaching units for different grade levels and explore related issues, including copyright, plagiarism, and appropriation.

616 Networked Art Practice (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Studio, lecture course investigating art as networked activity. Particular attention focused on Internet as context for creation, distribution, and patronage of art.

620 Theory, Criticism and the Visual Arts (3:3:0) Prerequisite: admission to AVT graduate program, or permission of instructor. Cross-disciplinary graduate seminar focusing on key theories and themes that have informed 20th- and 21st-century arts practice. Explores theory and criticism in a variety of contexts, from popular to scholarly, and considers the role of artists as thinkers and writers.

622 Advanced Drawing (4:2:4) Prerequisite: admission to AVT graduate program, or permission of instructor. Advanced directed research in drawing with continued development of individual aesthetic. Study of historical and philosophical precedents integral.

632 Graduate Painting I (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Entering students are expected to be competent painters, with technical proficiency, a disciplined process, and a directed personal vision. Students work rigorously and independently toward the understanding and mastery of techniques, methods, and concepts relevant to formal expression of personal content. Students expected to participate in critical discourse with supervising faculty. Achievement measured by faculty review board at midsemester and term’s end.

633 Graduate Painting II (5:2:6) Prerequisite: AVT 632, or permission of instructor. Building on research and practices established in Graduate Painting I, students continue to develop strategies for the expression of personal vision and style. Progress tracked and assessed through periodic one-on-one critical discussions with supervising faculty. Achievement measured by faculty review board at midsemester and term’s end.

634 Advanced Graduate Painting (5:2:6) Prerequisite: AVT 633, or permission of instructor. Working independently on a cohesive body of work, students must demonstrate a thorough understanding and mastery of techniques, methods, and concepts relevant to their own practices, and be able to discuss their work within the context of historical and contemporary art practices. Progress tracked and assessed through periodic one-on-one critical discussions with supervising faculty. Achievement measured by faculty review board at midsemester and term’s end.

642, 643 Graduate Printmaking I, II (5:2:6), (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Directed research and practice in printmaking focuses on individualized development of content and technique. Explores intellectual and expressive aspects of printmaking process.

644 Advanced Graduate Printmaking (5:2:6) Prerequisite: AVT 643, or permission of instructor. Intensive course of creative exploration in print media that furthers students’ independence through production of individualized body of work reflecting interests within the broader contexts of contemporary social, technological, and cultural issues. Students also engage in collaborative studio practices to integrate visual technologies in their work. These may include digital imaging, drawing, graphic design, painting, performance, photography, and sculpture.

652 Graduate Photography I (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Critical theory and directed practice in photography focusing on development of a personal voice and working method through intellectual activity and creative work. Emphasizes ability to explore concepts, develop skills, and evolve as a communicator of ideas and photographic artist.

653 Graduate Photography II (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Continuum of Graduate Photography I, an intensive critique class concentrating on the development of creative work with emphasis on articulating responses to others’ work, the cultural climate, and issues involved in one’s own work as it progresses. Weekly classes share equal time with critical theory and hands-on studio work. Includes readings, visiting artists and lecturers, and field trips.

654 Advanced Graduate Photography (5:2:6) Prerequisite: AVT 653, or permission of instructor. Advanced graduate photography course. Intensive critique class concentrating on the development of creative work with emphasis on articulating responses to others’ work, the cultural climate, and issues involved in one’s own work as it progresses. Weekly classes share equal time with critical theory and hands-on studio work. Includes readings, visiting artists and lecturers, and field trips.

662 Graduate Sculpture I (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Intensive studio course that furthers student independence through production of a body of work reflecting interests, including a broader context of social, cultural, and contempo-
porary issues. Emphasizes self-evaluation, critical discussion, reading, and writing.

663 Graduate Sculpture II (5:2:6) Prerequisite: AVT 662 or permission of instructor. Intensive studio course that furthers student independence through production of a body of work reflecting interests, including a broader context of social, cultural, and contemporary issues. Emphasizes self-evaluation, critical discussion, reading, and writing.

664 Advanced Graduate Sculpture (5:2:6) Prerequisite: AVT 663 or permission of instructor. Emphasizes individual creative production and development, with periodic exposure of student’s work and ideas to the critical attention of the AVT teaching faculty and other graduate students. Writing and reading components.

667 Two-Dimensional Art Making: Form, Theme, and Context (4:2:4) Prerequisite: admission to the MAT program and permission of the instructor based on a portfolio review. Through studio work and research on basic and innovative drawing strategies, students explore expressive visual qualities, composition, and color. Students develop professional portfolios that incorporate meaningful themes and contexts for developing visual literacy in PK–12.

668 Three-Dimensional Art Making across Cultures (4:2:4) Prerequisite: admission to the MAT program and permission of the instructor. Explores the diversity of art forms in world cultures and work of traditional and contemporary artists. Students learn basic three-dimensional art-making techniques, including ceramics and fibers, and learn to design three-dimensional art instruction for PK–12 levels.

670 Teaching Practicum (3:3:0 or 6:6:0) Prerequisite: admission to AVT graduate program or permission of instructor. Supervised classroom teaching practicum in Mason’s undergraduate program or community college program. May be repeated for total 6 credits.

672 Performance Studio I (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Introductory studio course looking at performance as a visual art practice and focusing on time, space and the body. Emphasizes artist as performer. Students study the work of performance practitioners, make short performance pieces, document and exhibit their work, and go to galleries and performances locally and in New York. Substantial research project required.

673 Performance Studio II (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. In-depth studio course focusing on collaborative practice of performance art. Analyzes creation and production processes from an interdisciplinary perspective in conjunction with practical training in multimedia performance, complemented by screenings, readings, guest artists, and field trips.

674 Advanced Performance Studio (5:2:6) Prerequisite: AVT 673 or permission of instructor. Advanced laboratory for creating and producing performance art. Emphasizes new technologies and their applications, multimedia scriptwriting and storyboarding, and the creation of audiovisual performance. Students work independently and also contribute to collaborative production.

675 Advanced Performance Topics (5:6:2) Prerequisite: AVT 673 or permission of instructor. Opportunity for advanced study in interdisciplinary arts topics including African American experience in the performing arts, cyber-punk, global motion, interarts figures, live movies, writing and performance. May be repeated for maximum 15 credits when taken under different topics.

676 Sound and Music for Video and Animation (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Combined lecture and studio course focusing on selection, editing, processing, and integration of sound and music (postproduction) into video and animation. Studies time, frequency, and amplitude domain and processing. Students produce sound and music for 15-minute film or animation due at semester end.

678 Interface and CD-ROM Design (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Combined lecture and studio course in multimedia interface and CD-ROM design. Focuses on exporting traditional visual and aural artistic aesthetic to the computer environment within a multimedia context. Assigned class readings augmented and supported by presentations of various digital interfaces and CD-ROM examples. Discusses commercial, entertainment, and educational titles, as well as CD-ROM experimental art works. Studio time divided between AVT labs and area multimedia facilities. Students conceive, design, and develop two CD-ROM or Kiosk Interfaces due at midterm, and complete a dual platform CD-ROM project due at semester end.

681 The Art of 2D Animation (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Designed to broaden range of visually expressive time-based media from cell animation and stop motion animation to rotoscoping and two-dimensional digital animation. Emphasizes idea generation, concept development, and visual aesthetics.

682 The Art of 2D Digital Art (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Overview of two-dimensional computer-imaging applications in the arts, including painting, printmaking, mixed media, illustration, video, and animation. Lectures combine technical and aesthetic material, including image processing for artists and color reproduction. Emphasis on developing advanced studio portfolio.

685 Video Art (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Explores video as medium that is transforming art and is transformed by art. Emphasizes developing an approach to personal narrative, creative skills and construction of meaning, as well as on acquiring technical skills.

686 Three-Dimensional Digital Art (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Teaches how to create realistic, three-dimensional scenes with scaled objects, surface textures, lights, and shadows. Emphasizes idea generation, concept development, visual aesthetics, and technical abilities. Students required to render a portfolio of high-resolution images.

687 Advanced Digital Media (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Advanced course in digital media, including layer compositing, digital video editing, rotoscoping, and cell animation. Emphasizes integrating traditional techniques with software applications, and publishing projects to CD-ROM, DV tape, DVD, and Internet.
688 Digital Animation (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Study of digital two-dimensional and three-dimensional animation practices. Introduces lighting, camera movement, object motion, timing, and texture mapping as students plan and produce a short animation. Emphasizes idea generation, concept development, visual aesthetics, and technical abilities.

691 Elementary Art Education (3:3:1) Prerequisite: admission to the MAT program and permission of instructor. Concepts and methods in early childhood and elementary art education. Students spend three hours per week in class and one hour per week of required field experience in public schools and other educational settings.

692 Secondary Art Education (3:3:1) Prerequisite: AVT 691 or permission of instructor. Concepts and methods in secondary art education. Students spend three hours per week in class, and one hour per week of required field experience in the public schools and other educational settings.

693 Apprenticeship (3:3:0 or 6:6:0) Prerequisite: admission to AVT graduate program or permission of instructor. Apprenticeship at a local business conforming to students’ interests in visual information technologies. May be repeated for total 6 credits.

695 Internship in Art Education (Student Teaching) (6:0:0) Prerequisite: completion of all other MAT program requirements. Corequisite: AVT 696. Full-time internship in which students teach in elementary and secondary schools with guidance from cooperating mentor teachers. College supervisors make periodic site visits to observe, assess, and evaluate progress.

696 Seminar for Student Teachers (1:2:0) Corequisite: AVT 695. Weekly professional seminar focused on needs and concerns of student teachers. Covers issues as they emerge in practice, and concludes with an “Art of Teaching Art” exhibit of work by students of preservice teachers.

796, 798, 799 Directed Project, Directed Reading, Thesis (1–9:0:0), (3:0:0), (1–3:0:0) Prerequisite: admission to AVT graduate program or permission of instructor. Three courses comprising the MFA comprehensive experience for AVT students. Involves a study of historical basis for studio and class, and one hour per week of required field experience in the public schools and other educational settings.

601 Fund Raising/Development in Arts (3:3:0) Prerequisite: admission to graduate program in master of arts in arts management or permission of instructor. Overview for students seeking general knowledge, as well as introductory course for those who will complete the fund-raising concentration. Teaches role of fund raising as management function and part of overall strategic intention of arts organizations, presenting fund raising as a multifaceted, team-based process. Analyzes tools and techniques for effective fund raising.

602 Seminar in Arts Management (3:3:0) Prerequisite: admission to graduate program in CVPA or permission of instructor. Develops tools and techniques necessary for successful pursuit of a management career in visual and performing arts. Introduces wide range of arts organizations, working arts administrators, and institutional models through guest lectures, readings, field trips, and analysis of institutional data. Students gain understanding of organizational structures and functions of arts organizations as well as a theoretical model for general management and practical tools.

603 Arts in Society (3:3:0) Prerequisite: admission to a master’s program in CVPA or permission of instructor. Examines role of visual and performing arts as social and cultural institutions, with emphasis on historic traditions and trends that have most directly influenced contemporary American practice. Consideration is given to the essential functions of art in society in an effort to address questions: Why do we require art at all? What constitutes good or bad art? What is the value of art? What encouragements or impediments does our society offer to the creative artist or arts institution? How do the various forms differ in their traditions, philosophical underpinnings, and current manifestations? How can arts managers participate in the cultural conversation to the benefit of art forms, artists, and the institutions they serve?

604 Public Relations and Marketing Strategies for the Arts (3:3:0) Prerequisite: admission to a graduate program in CVPA or permission of instructor. MAM 602 should be taken prior to or concurrently with MAM 604. Teaches strategic way of thinking about audience, community, and markets. Structured into four modules, beginning with fundamentals of strategic planning. Students learn about external and internal environments and the interplay among them; discuss marketing fundamentals pertaining to arts audiences; and are introduced to fundamentals of applied marketing media and advertising fundamentals. Designed as fundamentals course for elective concentration in marketing and public relations.

605 Arts Audiences (3:3:0) Prerequisite: admission to CVPA graduate program or permission of instructor. Introduces theory and practice of creating commitment of arts audiences for performing and visual arts. Students explore different perspectives such as psychological, anthropological and business-minded.

606 Board of Directors (3:3:0) Prerequisite: admission to master of arts in arts management or permission of instructor. Board development including oversight and management of a board, as well as understanding board functions. Board relationships, including volunteers, are essential through all of the stages of a management career.

607 Fund Raising/Development in Arts II (3:3:0) Prerequisite: admission to arts management program or permission of instructor.
of instructor. Focus on two active arts organizations and create a development plan and various proposals specifically geared to their situations. The course focuses on practical application of development principles, writing and communications skills, and strategic thinking and planning.


609 Facilities Management (3:3:0) Prerequisite: admission to arts management program or permission of instructor. Bridging strategic planning and marketing; audience development; financial management and board and volunteer management, with issues of scheduling, ticketing and sales, mission integration and strategic challenges of new facilities, and growth and operations of existing ones.

704 Finance and Budgeting for Arts Organizations (3:3:0) Prerequisite: admission to CVPA graduate program, or permission of instructor. Introduces budget and finance as fundamentals of the budget process, specifically tailored to needs of arts organizations. Provides overview of accounting as tool to manage and control arts organizations. Involves laboratory component for teaching software application frequently encountered in fiscal operation of arts organizations.

705 Budgeting/Finance for Arts Organizations II (2:2:0) Prerequisites: MAM 704. Introduces budgeting, planning, and finance as fundamentals of the strategic planning process and management control, specifically tailored to the needs of arts organizations.

706 Festivals and Special Events (3:3:0) Prerequisite: admission to arts management program or permission of instructor. Technical aspects of events and festival management. Topics such as cultural understanding, tourism, sponsorship, fund raising and development, logistics of scheduling and contracts, and the relationship to larger venues, marketing and sales, and budgeting.

710 Arts Policy (3:3:0) Reviews current state of nonprofit arts field, then familiarizes students with the most common rationales for public support of the arts and respective roles of federal, state, and local governments and private policy actors. Examines dilemmas that arts organizations face in balancing the need for government support and artistic integrity with push and pull of the market. Compares U.S. policies to those of other developed countries.

711 Directed Readings and Project Course (1–6:1–6:0) Opportunity to engage in a more intensive study or project in arts management. Students partner with faculty member for intensive readings and project in strategy and planning in the arts, fundraising and development, entrepreneurial project work, arts marketing, arts policy and law, or other specialized areas pertinent to arts administration.

712 Grant Writing in the Arts (1:1:0) Prerequisite: admission to master of arts in arts management or permission of instructor. Places components of grant-writing process within broader context of nonprofit management. Introduction to perspectives of grant seeker and maker. The grant-writing process: research, proposal writing, terminology, oral, and written techniques and specific focus. Discover resources and compelling writing skills pertaining to proposal and letters of intent.

740 Internal Internship-Laboratory Rotation (2:0:6) Prerequisite: admission to master of arts in arts management. 12 credits taken within the master in arts management program; or permission of program director. Required for developing practical application. Builds on apprenticeship as a core means of teaching applied concepts of arts management. Augments use of Center of the Arts and active arts environment, both performing and visual, as a learning laboratory. Builds on practical learning, and provides internal training as preparation for external internship. (minimum 84 hours).

750 Arts Entrepreneurship I (3:3:0) Prerequisite: admission to master of arts in arts management or permission of instructor. Lecture course in discovering and developing entrepreneurial skills in the artist and the arts. Special focus will be placed on developing communication skills, planning strategies, and nurturing the skills and attitudes that enable students to creatively solve problems and identify opportunities. This entrepreneurial perspective is in line with the Mason experience and widely applicable outside the business world, in fields such as politics, education, and the arts. Assigned readings will be augmented and supported by presentations, lectures, and meetings with successful art and nonart entrepreneurs in the region. At mid-term, students will conceive, develop, and present a for-profit or nonprofit business plan strategy, which includes a business model(s), market overview, and management structure. The final project will include adding a revenue model, developing revenue streams, constructing a partnership acquisition strategy, and technical and information technology strategy to the business plan strategy. The semester concludes with a 15- to 20-minute public presentation of the business plan summary before a panel of entrepreneurs and business and nonprofit managers.

751 Arts Entrepreneurship II (3:3:0) Prerequisite: Arts Entrepreneurship I or permission of instructor. Advanced lecture course in discovering and developing entrepreneurial skills in the artist and the arts. Special focus will be given to developing business financial planning skills, developing a funding strategy, and the marketing and sales of the arts. Assigned readings in the class will be augmented and supported by presentations, lectures, and meetings with successful art and nonart entrepreneurs in the region. At midterm, students/student teams will conceive, develop, and present three-year projected cash flows, income statements, accompanying financial assumptions, and funding plans for a for-profit or nonprofit business plan. The final project will include determining market verticals, targeting those verticals and building a multimedia event-based marketing campaign, which includes schedule and expenses. The semester concludes with a 15- to 20-minute public presentation of their business financials and marketing campaigns before a panel of entrepreneurs, business, and nonprofit managers.

760 Current Issues in Arts Management (3:3:0) Prerequisite: admission to master of arts in arts management program, 9-credit standing; or permission of program director. Strategic decision making within the complex web of social, political, economic, personal, and ethical dimensions. Analysis of cases, using learned skills in planning, financial
Astronomy (ASTR)

Physics and Astronomy

103 Astronomy (3:3:0) Not for physics majors. Introduction to origin of life, Earth, planets and sun, stars, galaxies, quasars, nature of space radiation, and general theory of relativity.

111 Introductory Astronomy: The Solar System (3:3:0) ASTR 111 and 112 can be used to fulfill a 4-credit lab science requirement; not for physics majors. Topics include history of astronomy, evolution of the solar system, properties of planets, scientific method, critical thinking, nature of light, and principles of telescope design.

112 Introductory Astronomy Lab: The Solar System (1:0:3) Laboratory course associated with ASTR 111. ASTR 111 and 112 can be used to fulfill a 4-credit lab science requirement; not for physics majors.

113 Introductory Astronomy: Stars, Galaxies, and the Universe (3:3:0) ASTR 113 and 114 can be used to fulfill a 4-credit lab science requirement; not for physics majors. Topics include electromagnetic radiation, stellar evolution, interstellar medium, galaxies, cosmology, scientific method, and critical thinking.

114 Introductory Astronomy Lab: Stars, Galaxies, and the Universe (1:0:3) Laboratory course associated with ASTR 113. ASTR 113 and 114 can be used to fulfill a 4-credit lab science requirement; not for physics majors.

301 Astrobiology (3:3:0) Prerequisites: MATH 113 and PHYS 160. Physical science perspective on origin and evolution of life on Earth and how life, in turn, has significantly influenced Earth’s evolution. Topics include origin of Earth, mechanisms and sites for origin of life, coevolution of life and Earth’s atmosphere, habitability of planets, and search for extraterrestrial life.

302 Foundations of Cosmological Thought (3:3:0) Examines scientific, historical, and philosophical foundations and development of cosmological thought from antiquity to the present. Emphasizes qualitative understanding of the development of cosmology concluding with the present concept of origin and evolution of universe. No advanced background in mathematics or natural sciences required.

328/PHYS 328 Introduction to Astrophysics (3:3:0) Prerequisites: PHYS 262 and MATH 214. Topics include physical concepts; magnitudes of stars; Hertzsprung-Russell diagram; stellar radiation; stellar structure and evolution; white dwarfs, red giants, supernovas, neutron stars, and black holes; interstellar matter, dust, and molecules; cosmic rays and magnetic fields; galactic structure, galaxies, quasars, and intergalactic matter; high energy astrophysics, cosmology and general relativity; and models of the universe.

390 Topics in Astronomy (1–4:1–4:0) Selected topics not covered in fixed content courses. May not be included for credit by physics majors in the 45 credits of physics courses required for BS degree, or in 31 credits of physics courses required for BA degree.

401 Computer Simulation in Astronomy (3:3:0) Prerequisites: MATH 213 and ASTR 328. Techniques and methods to simulate astronomical phenomena using a computer. Examples taken from a wide variety of astronomical phenomena, including radiation transfer in astrophysical objects, self-gravitating systems, hydrodynamics, and stellar models. Emphasizes hands-on projects.

402 Methods of Observational Astronomy (3:3:0) Prerequisites: ASTR 111, 112, 113, 114. Collection and analysis of data covering radio, microwave, infrared, visible, ultraviolet, X-ray, and gamma ray astronomy. Topics include electromagnetic spectrum, coordinate systems, motion of celestial objects, telescopes, detectors, statistics, and noise, interferometry, and spectroscopy. This course meets the writing intensive requirement.

403 Planetary Sciences (3:3:0) Prerequisites: MATH 213 and PHYS 160. Introduction to the physics and chemistry of planets and their natural satellites, asteroids, and comets. Topics include history of the solar system; origin and evolution of planets, their internal structure and atmospheres; and analytical techniques used in remote and in situ study.

404 Galactic Astronomy (3:3:0) Prerequisites: ASTR 214, ASTR 328, and PHYS 308. Comprehensive introduction to observational and theoretical aspects of the study of galaxies. Topics include our own galaxy, normal galaxies and their hierarchical structures (groups and clusters), star forming and active galaxies, and colliding galaxies.

408 Senior Research (3:3:0) Prerequisites: 15 credits of ASTR courses. Students may not receive more than 6 credits of ASTR 408 and 409. Independent work under guidance of faculty member on research project in experimental, observational, or theoretical astronomy. Written report on project required. May be taken twice with department permission.

409 Astronomy Internship (3:3:0) Prerequisites: 75 credits, 15 ASTR credits, and permission of department. See department for other requirements and application procedure prior to enrollment. Students may not receive more than 6 credits of ASTR 408 and 409. On-the-job experience for astronomy majors in industry or government laboratories, including summer research programs. Students work in observational, experimental, or theoretical astronomy, and prepare written report at end of internship.

428/PHYS 428 Relativity and Cosmology (3:3:0) Prerequisites: MATH 214; PHYS 303, 305, and 262; or permission
of instructor. Special relativity; four-dimensional space-time; general relativity; non-Euclidean geometries, geodesics, and field equations; tests of general theory of relativity; black holes; cosmology; models of the universe; remnant blackbody radiation; big bang cosmology; thermodynamics; and the universe.

490 Astronomy Capstone (3:3:0) Prerequisites: completion of ASTR core courses or concurrent enrollment in final core courses. Capstone course providing a learning experience, integrating knowledge from previous astronomy courses with selected readings from current scientific papers and an opportunity to effectively present that synthesis. Emphasizes student participation and student-led class discussions. Required of all astronomy majors.

530/CSI 661 Astrophysics (3:3:0) Prerequisites: PHYS 303, 305, 308; MATH 214. Survey of contemporary astrophysics. Topics include physical concepts, stellar spectra, Hertzsprung-Russell diagram, stellar atmospheres, stellar structure, interstellar matter, stellar evolution, high-energy phenomena, hydrodynamical processes in astrophysics, accretion disk formation, and shock formation.

535/CSI 660 Space Instrumentation and Exploration (3:3:0) Prerequisites: PHYS 262 and MATH 213. Survey of instruments, devices, and methods for space and planetary exploration, including remote sensing of Earth and other solar system bodies, and planned manned and unmanned missions by the United States and other countries.

590 Selected Topics in Astronomy and Astrophysics (1–6:0–6:0) Advanced topics from recent theoretical or observational developments and their applications. Satisfies needs of professional community to keep abreast of current developments.

680 Physics of Interstellar Media (3:3:0) Prerequisites: PHYS 402 or permission of instructor. Physical processes in the interstellar media. Topics include the production and transfer of radiation, ionization and recombination, atomic and molecular excitation, dust physics, gas heating and cooling, and star formation.

703 Planetary Sciences (3:3:0) Prerequisites: MATH 213 and PHYS 160. This course will cover the processes and events that have played a central role in the origin and evolution of the solar system, with special emphasis on the terrestrial planets. The unique history of Earth and how it has evolved into a habitable world will be covered in detail.

704 Galactic Astronomy (3:3:0) Prerequisites: MATH 214, ASTR 328, and PHYS 308. Comprehensive introduction to observational and theoretical aspects of the study of galaxies. Topics include our own galaxy, normal galaxies and their hierarchical structures (groups and clusters), star forming and active galaxies, and colliding galaxies.

760/PHYS 760 Space Plasma Physics (3:3:0). Prerequisite: PHYS 622 or 513, or permission of instructor. Covers plasma processes involved in today's space physics research, including different regimes of plasma; basic concepts in kinetic, fluid, and MHD plasmas; and existent waves in these media. Also covers basics of shocks, discontinuities, transport and acceleration of particles such as cosmic rays, reconnection, and MHD instabilities.

761/CSI 761 N-Body Methods and Particle Simulations (3:3:0) Prerequisites: PHYS 613 and CSI 717, or permission of instructor. Study of particle methods as a tool to solve variety of physical systems. Emphasizes study and development of numerical results, and visualization of these results in complex physical systems. Applications and projects include stellar and galaxy dynamics, smoothed particle hydrodynamics, plasma simulations, and semiconductor device theory. Includes algorithms on parallel and vectorized systems.

764/CSI 764 Computational Astrophysics (3:3:0) Prerequisite: ASTR 530 or permission of instructor. Study of statistical mechanics concepts important in astrophysics. Presentation of unified approach to particle acceleration and interaction theory based on analytical and numerical analysis of Boltzmann and Liouville equations. Discussion of computational methods relevant for particle transport problems, with emphasis on Fokker-Planck and Monte-Carlo solution techniques. Applications from space sciences include studies of cosmic ray acceleration, photon comptonization, particle transport in the near-Earth environment, energy transport in stellar atmospheres, and self-gravitating system dynamics.

765/CSI 765 High-Energy and Accretion Astrophysics (3:3:0) Prerequisites: PHYS 502 and 513, and ASTR 530; or permission of instructor. Overview of the field of atomic and nuclear physics, including nuclear reactions of use to high-energy astrophysics. Discusses radiation processes in cosmic plasmas emphasizing quantum mechanical calculations; stellar evolution and nucleosynthesis; computational models of stellar evolution; binary stars and accretion disks; numerical models of the structure of accretion disks; compact stars, white dwarfs, neutron stars, and black holes; acceleration processes and cosmic rays; interstellar medium and propagation of cosmic rays; high-energy processes in the center of galaxies; and ground- and space-based techniques and observations.

766/CSI 766 Relativity and Cosmology (3:3:0) Prerequisites: ASTR 530 and MATH 314, or permission of instructor. Special relativity, four-dimensional space-time, general relativity, non-Euclidean geometries, geodesic and field equations, test of general relativity theory, black holes, cosmic background radiation, thermodynamic considerations in cosmology, and cosmological models.

769/CSI 769 Topics in Space Sciences (3:3:0) Prerequisite: permission of instructor. Selected topics in space sciences not covered in fixed-content space sciences courses. May be repeated for credit as needed.

790 Advanced Topics in Astronomy and Astrophysics (1–6:0–6:0) Prerequisite: graduate standing and permission of instructor. Advanced topics from recent theoretical or observational developments and applications. Satisfies need of professional community to keep abreast of current developments.

796 Directed Reading and Research (1–6:0–6:0) Prerequisite: admission to master's program and permission of instructor. Reading and research on a specific topic in astronomy, astrophysics, or related field under direction of faculty member. May be repeated as needed.

798 Research Project (3:0:0) Prerequisite: 9 credits and permission of instructor. Research project chosen and completed under guidance of graduate faculty member resulting in an acceptable technical report. May not be repeated.
799 Master’s Thesis (1–6:0:0) Prerequisite: 9 credits, and permission of instructor. Research project chosen and completed under guidance of graduate faculty member resulting in an acceptable technical report and oral defense acceptable to three-faculty-member thesis committee. May not be repeated.

998 Doctoral Dissertation Proposal (1–12:0:0) Prerequisites: admission to physics doctoral program and permission of advisor. Covers development of a research proposal under the guidance of a dissertation director and the doctoral committee. The proposal forms the basis for the doctoral dissertation. May be repeated as needed; however, no more than 24 credits in ASTR/PHYS 998 and ASTR/PHYS 999 may be applied toward satisfying doctoral degree requirements in the physics PhD program. Out of the 24, no more than 12 credits of ASTR/PHYS 998 may be applied.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: admission to doctoral candidacy in physics doctoral program and permission of advisor. Doctoral research performed under direction of dissertation director. May be repeated as needed; however, no more than 24 credits in ASTR/PHYS 998 and ASTR/PHYS 999 may be applied toward satisfying doctoral degree requirements in the physics PhD program.

Athletic Training (ATEP)

School of Recreation, Health, and Tourism

228 Introduction to Athletic Training (3:3:0) Includes athletic trainer's role in sports medicine, mechanisms of athletic injuries, tissue response to injury, blood-borne pathogens, introductory techniques of the assessment and evaluation of athletic injuries and emergency procedures, general illness common with athletes, and dermatological conditions.

229 Clinical Experiences in Introductory Athletic Training (3:3:0) Prerequisite: ATEP 228. Introduces clinical skills commonly used in athletic training. Includes athletic training room organization and procedures; protective sports equipment; construction of protective devices; and application of protective taping, braces, wrapping, and protective pads. Assignments include the application of skills with athletic teams.

310 Athletic Injury Recognition of the Lower Extremity and Thorax (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 315; current CPR certification; 2.50 major GPA. An analysis of injury mechanisms of specific injuries to the lower extremity and thorax.

315 Clinical Evaluation Skills for Lower Extremity and Thorax (3:3:0) Corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 310; current CPR certification; 2.50 major GPA. An analysis of injury evaluation and muscle isolation techniques of specific injuries to the lower extremity and thorax. Assignments include the application of skills with athletic teams.

320 Athletic Injury Recognition of the Upper Extremity, Head and Neck (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 325; current CPR certification; 2.50 major GPA. An analysis of injury mechanisms of specific injuries to the upper extremity, head and spine.

325 Clinical Evaluation Skills for the Upper Extremity, Head and Neck (3:3:0) Corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 320; current CPR certification; 2.50 major GPA. An analysis of injury evaluation and muscle isolation techniques of specific injuries to the upper extremity, head and spine. Assignments include the application of skills with athletic teams.

350 Therapeutic Modalities (3:3:0) Prerequisites or corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 310, 315, 320, 325, 354, 357. Study of the physical principals, physiological effects, indications, and contraindications of therapeutic modalities used in athletic training. Also covers indications, contraindications, physiological effects, special programs, and resistance methods used in the prevention and rehabilitation of athletic injuries.

354 Rehabilitation of Athletic Injuries (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 310, 315, 320, 325, 350, 354; current CPR certification; 2.50 major GPA. A study of the indications, contraindications, physiological effects, special programs, and resistance methods used in the prevention and rehabilitation of athletic injuries.

357 Treatment and Rehabilitation Clinical Techniques (3:3:0) Prerequisites or corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 310, 315, 320, 325, 350, 354; current CPR certification; 2.20 major GPA. Practical experience in the therapeutic modalities commonly used in athletic training, and special programs and rehabilitation methods used in the prevention and rehabilitation of athletic injuries. Assignments include the application of skills with athletic teams.

413 Management Skills in Athletic Training (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; PHED 200; ATEP 228, 229, 310, 315, 320, 325, 350, 354, 357; PRLS 405, 410; current CPR certification; 2.50 major GPA. Practical experience in the administration of an athletic training program on collegiate, clinical, professional, and secondary school levels.

441 Practicum in Athletic Training (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; PHED 200; ATEP 228, 229, 310, 315, 320, 325, 350, 357; PRLS 405, 410; current CPR certification; 2.50 major GPA. Techniques and procedures in the care and prevention of athletic injuries in a selected environment under certified athletic trainer supervision. Involves at least 300 hours of participation.

Bachelor of Individualized Study (BIS)

300 Understanding Multidisciplinary Studies (3:3:0) Open only to pre-BIS students and BIS majors. Focuses on literature and issues relevant to interdisciplinary and multidisciplinary studies and the BIS program. Students explore selected topics, develop and gather feedback on individualized concentration proposals, and review BIS issues and program requirements.

390 The Research Process (3:3:0) Prerequisites: BIS 300, 2.00 or above in ENGL 302. Open only to pre-BIS students and BIS majors. Focuses on skills to develop a research topic, find and organize relevant information, examine and critique evidence, establish criteria, and create plan to complete senior project.

399 Special Topics (1–3:1–3:0) Prerequisite: open only to degree students in BIS. Selected topics reflecting interest in specialized areas.
489 Directed Readings and Research (1–3:0:0) Open only to pre-BIS students and BIS majors. Individualized sections by arrangement. Readings and research on a topic directly relevant to student’s core concentration. Guided by instructor with expertise. Topics must be approved by instructor and BIS director prior to enrollment.

490 Senior Project (3:0:0) Prerequisite: BIS 390; corequisite: BIS 491. Open only to BIS majors. Individualized sections by arrangement. Capstone course in BIS core concentration. Project, thesis, or internship on a topic directly relevant to student’s concentration. Guided by student’s faculty advisor. Topics must be approved by faculty advisor committee member and BIS director prior to enrollment. Grade of C or better is required to graduate with a BIS degree.

491 Senior Project Presentation (1:1:0) Prerequisite: BIS 390; corequisite: BIS 490. Open only to BIS majors. Focuses on preparation and delivery of a formal presentation of student’s BIS 490 project. Includes review of basic presentation techniques.

495 Career Practicum (1–6:1–6:0) Prerequisite: permission of instructor and BIS director. Supervised experience in application of specified area.

Biodefense (BIOD)

Public and International Affairs

604 Introduction to Biodefense I: Bacterial and Toxin Agents (3:3:0) Covers pathology, metabolism, and threat of bacterial agents that can be used as biological weapons.

605 Introduction to Biodefense II: Viral Agents (3:3:0) Covers pathology, metabolism, and threat of viral agents that can be used as biological weapons.

607 Introduction to Biodefense/Threat Analysis III: Toxins (3:3:0) Discusses the threat of toxins as biological weapons. Special focus on microbiological toxins, including botulinum toxin, and biochemical action of toxins. Comparison to chemical weapons and debate about classification as such.

609 Biodefense Strategy and Policy (1–4:1–3:0–6) Prerequisite: BIOD 604 and 605 or permission of instructor. Introduces students to the biodefense and biosecurity strategies and policies of the United States, other nations, and international organizations. Evaluates the effectiveness of these policies in strengthening defenses, improving intelligence, increasing oversight, enhancing nonproliferation, and reinforcing norms. Examines the interaction of biodefense and biosecurity with homeland, national, and international security.

610 Advanced Topics in Biodefense (1–4:1–3:0–6) Prerequisite: BIOD 604 and 605 or permission of instructor. Different topics, depending on instructor’s specialty. Topics include legal, ethical, scientific, and political aspects of biodefense, emphasizing current problems and research. May be repeated when topic is different.

620 Health and Security (3:3:0) Prerequisite: BIOD 604 and 605 or permission of instructor. Explores issues emerging from the interaction of health and security that represent novel challenges to policymakers confronting a rapidly changing security landscape. Presents the major lines of discourse in the academic literature examining links between health and security. The impact of the AIDS epidemic on national and regional security, the role of health issues in post-Cold War conflict situations, and the security implications of advances in the life sciences.

621 Ethics and International Security (3:3:0) Challenges students to wrestle with dilemmas raised by the desire to behave ethically in an international system in which consensus about ethical matters is absent. Students will develop, apply, and justify their own perspective on an ethical problem related to international security using ethical theory and social science research. Ethical issues related to nuclear, biological, and chemical weapons that confront researchers, policymakers, and practitioners will be addressed.

622 Negotiating in the International Arena (3:3:0) Provides students with the concepts and tools for analyzing complex negotiation processes and introduces them to the challenges facing international negotiators. Students will read about the frameworks and perspectives that have guided the scholarly research on negotiation, as well as the latest findings from that research; analyze complex cases of actual negotiations in the security, trade, and environmental areas; and negotiate key issues on the agendas of nations and international organizations.

702 Biodefense Colloquium (1:1:0) Forum for presentation and discussion of original and current research in biodefense. May be repeated for credit.

705 Intelligence: Theory and Practice (3:3:0) Prerequisite: BIOD 604 and 605, or permission of instructor. Theory and practice of intelligence, including the intelligence cycle, organization of the intelligence community, and the origins and impact of recent reforms. Examines the capabilities and limitations of the different collection disciplines, analytic methodologies and pathologies, and the relationship between intelligence and policy. Analyzes challenges posed by collecting and analyzing intelligence on weapons of mass destruction programs conducted by states and terrorists.

706 Nuclear, Biological, and Chemical Weapons Policy and Security (3:3:0) Prerequisites: BIOD 604 and 605, or permission of instructor. Explores the causes, conduct, and consequences of the proliferation of nuclear, biological, and chemical weapons. Covers the historical, technological, normative, and strategic factors that have promoted and restrained the spread of these weapons. Addresses the motives for states to develop these weapons and the debate over the security implications of nuclear, biological, and chemical weapon proliferation.

709 Nonproliferation and Arms Control (3:3:0) Prerequisites: BIOD 604 and 605, or permission of instructor. Examines the array of national and international measures used to slow, halt, and reverse the spread of nuclear, biological, chemical, and missile weapons. Explores the theory and practice of proliferation to provide insights into the supply and demand aspects of proliferation.

710 Approaches to Bioweapon Medical Treatment and Response (3:3:0) Prerequisites: BIOD 604 and 605. Examines research, treatment, and preparedness strategies against natural and human-made biological agents. Focuses on various strategies, including immunological, pharmaceutical, and medical treatment methodologies and designs.

722 Examining Terrorist Groups (3:3:0) Prerequisites: BIOD 604 and 605, or permission of instructor. Introduction
to terrorism including the history and evolution of terrorism, case studies of key terrorist groups, the current nature of the terrorist threat and counterterrorism strategies.

723 Legal Dimensions of Homeland Security (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Introduces the impact of legal issues on homeland security and biodefense. Topics include the origins of the Department of Homeland Security, the relationship between public health and law enforcement, the role of the military in homeland security, trade-offs between privacy and security, legal aspects of public–private cooperation in biodefense and homeland security, quarantine authority and enforcement, ensuring compliance with international treaties, and implementing biosecurity regulations.

725 Terrorism and Weapons of Mass Destruction (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Examines the capabilities and intentions of terrorists to acquire and use chemical, biological, radiological, and nuclear (CBRN) weapons. The course provides an in-depth understanding of the history of CBRN terrorism, the current challenges posed by this threat, and the range of national and international policy tools available to address this threat.

726 Agroterrorism and Food Security (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Analyzes the threat of agricultural terrorism, including assessments of the chemical and biological agents used to disrupt agriculture and livestock, and the national and global economic and social impacts of these disruptions. Also examines strategies for enhancing the security of the food production and supply systems.

751 Biosurveillance (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Provides an understanding of the capabilities required to provide reliable early warning of disease outbreaks and identify their etiologic agents. Assesses strengths and limitations of physicians, laboratories, epidemiologists, aerosol sensors, and syndromic surveillance systems. Considers challenges posed by the integration and analysis of the information collected by these sources.

752 The Role of the Military in Homeland Security (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Analyzes the role that the armed forces play in homeland security, including historical and legal developments, the role of the National Guard, capabilities for crisis and consequence management, and case studies of military assistance to civilian authorities in response to riots, terrorist incidents, and natural disasters.

760 National Security Technology and Policy (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Introduces students to the intersection of science, technology, and policy in national security. Will examine the players in the formation of science policy; the roles they play; how the types, uncertainties, and availability of data affect science policy debates; and how science policy decisions are made. Topics to be covered include weapons of mass destruction, nonlethal weapons, nanotechnology, bioengineering, energy security, and pandemic influenza.

761 Dispersal Patterns of Biological Agents (3:3:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Introduction to military and terrorist methods of dispersal patterns. Covers physics of aerosols; engineering and mechanics of building ventilation systems; and mechanical dissemination, including hand-held, automatic, vehicle, and truck-mounted systems. Includes viability of specific agents involved.

762 Into the Hot Zone: Working in a High Threat Environment (2:2:0)  
Prerequisites: BIOD 604 and 605, or permission of instructor.  
Introductory course covers methodology of working in a Biosafety Level 3 or 4 environment. Special attention to responding to biowarfare or bioterrorism-related event.

766 Development of Vaccines and Therapeutics (3:3:0)  
Analyzes the process of developing new medical countermeasures against biological weapons and emerging infectious diseases such as SARS and pandemic influenza. Special attention is paid to the scientific, technical, political, regulatory, and economic obstacles to developing new vaccines and therapeutics. Examines the causes and potential solutions of public and private sector failures.

780 Master’s Supervised Internship (1–6:0:0)  
Prerequisite: permission of program director or advisor.  
Internship under supervision of qualified professional in biodefense at a government agency, consulting firm, industrial firm, or other acceptable agency.

793 Directed Studies in Biodefense (1–3:0:0)  
Prerequisite: permission of the instructor and program director.  
Individualized study of topics not otherwise available in graduate program. May involve reading assignments, tutorials, lectures, papers, presentations, or lab or field study, determined in consultation with instructor.

798 Master’s Research Project in Biodefense (3:0:0)  
Prerequisite: 24 credits in BIOD and permission of project director.  
Research project related to student’s concentration under supervision of faculty advisor. Student produces substantial and original contribution to the field of biodefense on the model of an article in a scholarly journal. Graded S/NC.

799 Master’s Thesis in Biodefense (1–6:0:0)  
Prerequisite: 24 credits in BIOD and permission of thesis committee.  
Master’s thesis research under direction of thesis committee. Graded S/NC.

810 Advanced Seminar in Biodefense (3:3:0)  
Prerequisite: BIOD 604 and 605, or permission of advisor.  
Explores issues of contemporary and emerging concern in biodefense and biosecurity. Topics may include legal, ethical, scientific, economic, and political aspects of biodefense and biosecurity. May be repeated for credit twice when topic is different.

890 Doctoral Supervised Internship (1–6:0:0)  
Prerequisite: permission of program director or advisor.  
Internship under supervision of qualified biodefense professional at government agency, consulting firm, industrial firm, or other acceptable agency.

899 Directed Research in Biodefense (1–12:0:0)  
Prerequisite: approval of program director.  
Research on a pertinent topic in biodefense; scope and subject determined by instructor.

996 Doctoral Reading and Research (1–9:0:0)  
Independent reading and research on specific biodefense topic under faculty member’s direction. Specific arrangements for designing scope and area of study to be determined in consultation with instructor. May involve literature searches and review, workshops, tutorials, or other formats. May be repeated for credits.
998 Doctoral Dissertation Proposal (1–12:0:0) Development of a research proposal, which forms the basis for doctoral dissertation under guidance of dissertation director committee. Only 12 credits may be applied to the degree. Graded S/NC.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: Completion of 998 and advancement to candidacy. Doctoral dissertation research undertaken under direction of dissertation chair. Graded S/NC.

Bioengineering (BENG)

Electrical and Computer Engineering

401 Bioengineering Instrumentation and Design (4:4:0) Prerequisites: BIOL 213; ECE 320 and 333, or permission of instructor. Introduces students to the engineering design process with special focus in medical and biological applications. Tools to be explored range from specialized software (LabView, OrCad, Matlab) to laboratory and machine shop facilities. The semester culminates in the presentation of a group project. Students are expected to leverage their background and apply it to a problem in bioengineering.

402 Bioengineering Instrumentation and Design Laboratory (1:0:3) Prerequisites: BIOL 213, ECE 320 and 333, or permission of instructor. Corequisite: BENG 401. Introduces a project-based laboratory where students are exposed to all available tools from several electrical and computer engineering disciplines. Students will physically implement their own team-based project using a subset of those tools. Projects are then demonstrated during oral presentations toward the end of the semester.

492 Senior Advanced Design Project I (2:2:0) Prerequisites: 90 credit hours applicable to the BSEE degree and COMM 100 and ENGL 302. Conception of senior design project in bioengineering and determination of feasibility of proposed project. Work includes developing preliminary design and implementation plan.

493 Senior Advanced Design Project II (2:2:0) Prerequisites: BENG 492, preferably in the preceding semester. Implementation of project for which preliminary work was done in BENG 492. Project includes designing and constructing hardware, writing required software, conducting experiments or studies, and testing complete system. Requires oral and written reports during project and at completion. Completing this course with a C or better satisfies university’s general education synthesis requirement.

Bioinformatics (BINF)

Bioinformatics and Computational Biology

354 Foundations in Mathematical Biology (3:3:0) Prerequisites: completion or concurrent enrollment in all other required general education courses; chemistry and integral calculus; or permission of instructor. Interdisciplinary introduction to life sciences for physicists, chemists, engineers, and mathematicians. Combines knowledge from natural sciences, social and behavioral sciences, quantitative reasoning, and information technology. Covers selected topics in ecology, physiology, biochemistry, and behavior. May include biochemical reaction kinetics, Hodgkin-Huxley model for cellular electrical activity, continuous and discrete population interactions, and neural network models of learning. Techniques utilized include ordinary differential equations, difference equations, algebraic equations, and computer simulations.

401 Bioinformatics and Computational Biology I (3:3:0) Prerequisites: BIO 231, IT 108, IT 208, or CS 112 (instead of IT 108 and IT 208), STAT 344, or STAT 250. Topics are presented as three-week units: protein sequence, structure prediction, and modeling methods; nucleic acid sequence and structure prediction, and evolutionary models; gene structure prediction in prokaryotes and eukaryotes; image analysis, and biomedical applications.

402 Bioinformatics and Computational Biology II (3:3:0) Prerequisites: BINF 401 and BINF 403. Topics are presented as three-week units: the design and use of parallel genomics platforms, mapping the measurements to biomolecules; approaches for inferring biological pathways; simulation methods for the dynamics of biomolecules; systems approaches to biology.

403 Bioinformatics and Computational Biology Lab I (1:0:3). Corequisite: BINF 401. Laboratories will introduce students to bioinformatics tools designed to answer research problems in the topics covered in lectures, such as sequence alignment, sequence pattern recognition, structural conformation modeling, phylogenetic analysis methods and image comparisons.

404 Bioinformatics and Computational Biology Lab II (1:0:3) Prerequisites: concurrent enrollment in BINF 402 and passing grades in BINF 401 and 403. Laboratories will introduce students to research bioinformatics tools relevant to lecture topics such as: the correspondence of measured fragments to parent biomolecules, inference methods for gene and protein networks, predicting system outputs given specified inputs.

491 Senior Thesis in Bioinformatics (1:1:3) Prerequisites: the bioinformatics minor core classes. A project is chosen and completed under the guidance of a Bioinformatics Department faculty member. An oral progress report with a poster at the fall semester Bioinformatics Student Research Day is required.

492 Senior Thesis in Bioinformatics (1:1:3) Prerequisite: BINF 491. A project is chosen and completed under the guidance of a Bioinformatics Department faculty member. A written thesis in standard format is required.

630 Bioinformatics Methods (3:3:0) Prerequisites: graduate standing, or permission of instructor. Introduction to methods and tools for pairwise sequence comparison, multiple sequence alignment, phylogenetic analysis, protein structure prediction and comparison, database similarity searches, and discovery of conserved patterns in protein sequence and structures.

631 Molecular Cell Biology for Bioinformatics (3:3:0) Prerequisites: undergraduate background in biochemistry or cell biology, or permission of instructor. Intensive review of biochemistry, molecular biology, and cell biology necessary to begin research in bioinformatics. Topics include protein biochemistry, nucleic acids biochemistry, DNA replication, transcription, and translation, recombinant DNA technology, genomics, molecular structure of genes and chromosomes, and gene expression and control.

633 Molecular Biotechnology (3:3:0) Prerequisites: graduate standing or permission of instructor. Introduction
to the theory and practice of molecular biotechnology, with emphasis on the application of tools in today’s society. Includes study of recombinant DNA technology, genomics, and bioinformatics as applied to commercially important products. Lectures reflect more recent advances and applications in the commercial aspects of biology.

634 Bioinformatics Programming (3:3:0) Prerequisite: graduate standing and computer programming experience, or permission of instructor. Introduces programming, control structures, file input/output, subroutines, regular expressions, debugging, introduction to relational databases. Emphasizes bioinformatics applications including DNA sequence analysis, parsing FASTA and GenBank files, processing BLAST output files, SQL, or equivalent query language.

636 Microarray Methodology and Analysis (3:3:0) Prerequisite: BINF 633, or permission of instructor. Theory and practice of analysis including genetics, biochemistry, and tools for analyzing global gene expression, and detection and quantification of genes and gene products.

637 Forensic DNA Sciences (3:3:0) Prerequisite: graduate standing or permission of instructor. Intensive introduction to parameters affecting data QC and analysis, including factors arising from biochemistry, chemistry, genetics, statistics, instrumentation, and software.

639 Introduction to Biometrics (3:3:0) Prerequisites: programming experience such as CSI 603 and 604, or permission of instructor. Introduction to methods for measuring humans. Topics include face, speaker, fingerprint, and shoeprint recognition; and handwriting analysis. Students develop computer programs to perform many of these tasks.

650 Introduction to Bioinformatics Database Design (3:3:0) Prerequisites: BINF 634 or equivalent, or permission of the instructor. Students will acquire skills needed to exploit public biological databases, and establish and maintain personal databases that support their own research; such skills include learning underlying data models and the basics of DBMS and SQL.

690 Numerical Methods for Bioinformatics (3:3:0) Prerequisites: calculus and knowledge of a programming language, such as CS 112 and MATH 113, or permission of instructor. Computational techniques for solving scientific problems focusing on applications in bioinformatics and computational biology. Students develop the ability to convert a quantitative problem into computer programs to solve the problem. Emphasizes efficiency and readability of code.

701/BIOS 701 Biochemical Systematics (Biochemistry) Core for Doctoral Studies in Biosciences and Bioinformatics (3:3:0) Prerequisite: admission to PhD program in biosciences or bioinformatics, CHEM 663, or equivalent. Introduction to biochemical systems to investigate complex, multicomponent, dynamic functions of cellular systems. Such studies employ myriad conceptual and technical approaches in their application. Articles from current literature are basis of course offering. The application of molecular techniques within biosciences is now universal. The cell: What is its structure and how does it function? This is the underlying question of course.

702/BIOS 702 Research Methods (3:3:0) Prerequisite: admission to PhD program in bioinformatics or biosciences.

Trains students in research methodologies for life sciences. Covers the three phases of biological research projects: experimental design, data collection, and data analysis.

703 Bioinformatics Lab Rotation (1:0:1) Prerequisite: permission of instructor. Short-term introductory research on a specific topic in computational sciences and informatics under direction of faculty member. May be repeated.

704 Colloquium in Bioinformatics (1:1:0) Prerequisite: graduate standing. Seminar presentations in a variety of areas of bioinformatics and computational biology by SCS faculty, staff, advanced PhD students, and professional visitors. May be repeated for credit.

705 Research Ethics (1:1:0) Prerequisite: permission of instructor. Examine ethical issues in scientific research, reflecting on purpose and reviewing foundational principles for evaluating ethical issues. Provides skills for survival in scientific research through training in moral reasoning, and teaching of responsible conduct. Students learn to apply critical thinking skills to design, execution, and analysis of experiments and analysis of ethical issues in research, including use of animals and humans, standards in computer community, and research fraud. Guidelines for data ownership, manuscript preparation, and conduct of people in authority may be presented and discussed.

730 Biological Sequence Analysis (3:3:0) Prerequisites: BINF 702 or previous courses in programming, molecular biology, and probability, or permission of instructor. Fundamental methods for analyzing nucleic acid and protein sequences, including pairwise and multiple alignment, database search methods, profile searches, and phylogenetic inference. Development of probabilistic tools, including hidden Markov models and optimization algorithms. Survey of current software tools.

731 Protein Structure Analysis (3:3:0) Prerequisite: permission of instructor, or previous courses in molecular biology, biochemistry, and computer programming. Computational methods for analyzing, classifying, and predicting three-dimensional protein structures. Covers theoretical approaches, techniques, and computational tools for protein structure analysis.

732 Genomics (3:3:0) Prerequisites: BINF 730 or previous courses in biology, numerical methods, and programming; or permission of instructor. Surveys computational tools and techniques to study whole genomes, and explores biological basis of genome analysis algorithms. Topics include genome mapping, comparative genomics, and functional genomics.

733 Gene Expression Analysis (3:3:0) Prerequisites: programming experience and course in molecular biology, or permission of instructor; S-Plus or Matlab experience may be helpful. Analyzes gene expression data. Topics include cluster analysis and visualization of expression data, inference of genetic regulatory networks, and theoretical models of genetic networks.

734 Advanced Bioinformatics Programming (3:3:0) Prerequisites: BINF 634, or permission of instructor. Topics include algorithm design, complex data structures, object oriented programming, relational databases, designing modules, and graphics and web programming. Students complete a bioinformatics programming project.
739 Topics in Bioinformatics (3:3:0) Prerequisite: permission of instructor. Selected topics in bioinformatics not covered in fixed-content bioinformatics courses. May be repeated for credit.

740 Introduction to Biophysics (3:3:0). Prerequisites: undergraduate courses in general physics, calculus, and biology. Introduces biophysics, focusing on physical and chemical concepts and their relation to rapidly expanding interdisciplinary interfaces among biology, chemistry, and physics. Reveals multiscale nature of biophysics, and includes exploration of macroscopic and microscopic applications.

741 Introduction to Computer Simulations of Biomolecules (3:3:0). Prerequisites: BINF 690 and 701, and knowledge of computer programming language; or permission of instructor. Course in differential equations is recommended. Mathematical and computational methods for analysis of cellular and subcellular processes. Topics may include ion channels, whole cell models, intracellular signaling, biochemical oscillations, pathway modeling, parameter estimation, and sensitivity analysis.

796 Directed Reading and Research (3:3:0) Reading and research on specific topic in computational sciences and informatics under direction of faculty member. May be repeated.

798 Research Project (3:0:0) Prerequisites: 12 graduate credits and permission of instructor. Project chosen and completed under guidance of graduate faculty member that results in acceptable technical report.

799 Master’s Thesis (1–6:0:0) Prerequisites: 12 graduate credits and permission of instructor. Course in differential equations is recommended. Mathematical and computational methods for analysis of cellular and subcellular processes. Topics may include ion channels, whole cell models, intracellular signaling, biochemical oscillations, pathway modeling, parameter estimation, and sensitivity analysis.

820 Advanced Topics in Molecular Cell Biology (3:3:0). Prerequisites: BINF 631 or equivalent. Advanced molecular and cellular biology foundation for BINF students. Topics may include cell structure, biomembranes and cell architecture, cell signaling, receptor activation, gene expression and control, protein targeting and trafficking, and cell cycle regulation.

831 Structural Genomics Project (3:3:0). Prerequisite: BINF 731, or permission of instructor. Covers knowledge-based, large-scale protein structure analysis; classification and prediction of protein structure and function; and other current research topics in structural genomics. Projects address entire research enterprise from developing and defending proposal to peer-reviewed publication.

841 Research Topics in Biomolecular Simulations (3:3:0). Prerequisite: BINF 741, or permission of instructor. Research-oriented course combining lectures and work on individual projects in biomolecular simulations. Topics include protein and peptide aggregation, binding, and unfolding and folding.

996 Doctoral Reading and Research (1–12:0:0) Prerequisites: admission to doctoral program and permission of instructor. Reading and research on specific topic in computational sciences and informatics under direction of faculty member. May be repeated.

998 Doctoral Dissertation Proposal (1–12:0:0) Prerequisite: permission of advisor. Covers development of research proposal, which forms basis for doctoral dissertation, under guidance of dissertation director and doctoral committee. May be repeated.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: admission to doctoral candidacy. Doctoral dissertation research under direction of dissertation director. May be repeated, but no more than 24 credits in BINF 998 and 999 may be applied to doctoral degree requirements.

Biology (BIOL)

Molecular and Microbiology

103 Introductory Biology I (4:3:3) Survey course suitable for any major. Topics include chemistry of life, cell structure and function, Mendelian genetics, evolution, and diversity of life. May not be taken after BIOL 200 level or above courses have been taken. f, sum

104 Introductory Biology II (4:3:3) Students are strongly urged to take BIOL 103 prior to BIOL 104. Survey course suitable for any major. Topics include animal (including human) structure, function, homeostatic mechanisms, organ systems, behavior, higher plant systems, and major concepts in ecology. May not be taken after BIOL 200 level or above courses have been taken. sp, sum

105 Introductory Biology I Laboratory (1:0:3) Prerequisite: Permission of BIOL 103/104 coordinator and department chair. Not available to students who have taken BIOL 103 or the equivalent. The chemical basis of life, the structure and function of the cell, Mendelian and human genetics, and the major animal phyla are presented.

106 Introductory Biology II Laboratory (1:0:3) Prerequisite: Permission of BIOL 103/104 coordinator and department chair. Not available to students who have taken BIOL 104 or the equivalent. The structure and function of major organ systems of animals and an examination of the structure and function of plants, emphasizing the higher plants.

124, 125 Human Anatomy and Physiology (4:3:3), (4:3:3) Must be taken in sequence. Does not satisfy natural science requirement for B4 in CAS. Introduction to structure and function of body's major organ systems. f,s,summer

213 Cell Structure and Function (4:3:3) For science majors and preprofessionals in life sciences. Introduction to cell chemistry, metabolism, and genetics. f,s,summer

225 Human Reproduction and Sexuality (3:3:0) Not available for biology major or minor credit. Examines anatomy and physiology of human reproductive systems, physiology of sexual intercourse, normal pregnancy, birth, congenital conditions, sex determination and its expression, diseases of reproductive organs, and technical developments related to reproduction. f

246 Introductory Microbiology (3:3:0) Prerequisite: C or better in BIOL 124 and 125, one year of general biology, or permission of instructor. Corequisite: BIOL 306. Not avail-
available for biology major credit. Not available to students who have taken BIOL 213 or 418. Introduction to microbial cell structure, physiology, and pathogenicity. Emphasizes control of microorganisms, host-parasite interactions including immunology, and viral and bacterial pathogens. f, s

301 Biology and Society (3:3:0) Prerequisites: BIOL 103 and 60 credits, or permission of instructor. Not available for biology major or minor elective credit. Biological problems facing society including pollution, cloning, emerging diseases, global warming, and overpopulation. See Schedule of Classes for current topic; may be repeated if topic is different.

303 Animal Biology (4:3:3) Prerequisite: C or better in BIOL 213, or permission of instructor. Emphasizes structure and function of vertebrates, but surveys all animal groups and protozoa. Also covers evolutionary theory, and evolutionary history of major animal groups. f, s, sum

304 Plant Biology (4:3:3) Prerequisite: C or better in BIOL 213, or permission of instructor. Introduction to study of plants, their structure, development, nutrition, and ecology. Emphasizes flowering plants, but surveys all groups and their phylogenetic relationships. f, s, sum

305 Biology of Microorganisms (3:3:0) Prerequisite: C or better in BIOL 213, or permission of instructor. Corequisite: BIOL 306. Morphology, physiology, and pathogenicity of certain groups of bacteria, fungi, and viruses; stresses host-parasite interactions. f, s, sum

306 Biology of Microorganisms Laboratory (1:0:3) Corequisite: BIOL 246 or 305. Laboratory techniques in culturing, staining, and identifying microorganisms. f, s, sum

307 Ecology (4:3:3) Prerequisites: BIOL 303 and 304, or permission of instructor. Physical environment, energy flow, structure and function of populations, dynamics of communities, and succession. f, s, sum

309/GEOL 309 Introduction to Oceanography (3:3:0) Prerequisites: GEOL 101 and BIOL 103, or 213 or EVPP 110, or permission of instructor. Introduction to chemical, biological, and geological aspects of oceanic environment. May include field trip. f

311 General Genetics (4:3:3) Prerequisites: BIOL 213, 303, 304, 305, 306 all completed with no more than one D: or permission of instructor. Basic principles of heredity and modern developments in this field. f, s, sum

312 Biostatistics (4:3:2) Prerequisites: BIOL 303 and 304, or permission of instructor. Use of probability and descriptive and inferential statistical techniques in interpreting biological data. f

313 Human Genetics for the Social Sciences (3:3:0) Prerequisite: one year of biology, or permission of instructor. Not available for biology credit. Emphasizes topics of interest to students in social sciences, but open to any non-biology major. Topics include human genome and its inheritance; nature versus nurture; genetic disease; genetics of sex determination, intelligence, personality, and mental illness; genetic differences within and between populations; and evolution of human beings. s, odd

318 Conservation Biology (3:3:0) Prerequisites: BIOL 307, 311. Introduction to science used to identify species in need of conservation, and techniques to manage and protect organisms.

320 Comparative Chordate Anatomy (4:2:6) Prerequisite: BIOL 303, or permission of instructor. Compares anatomy and morphology of major chordate groups. Lab emphasizes shark, mudpuppy, cat, and rabbit. af

322 Developmental Biology (4:3:3) Prerequisites: BIOL 303 and 311, or permission of instructor. Principles of embryonic development and differentiation in animal species at cellular, molecular, tissue, and whole organism levels. f

326 Animal Physiology (3:3:0) Prerequisites: BIOL 213, 303, and 60 credits. General consideration of animal function emphasizing common life problems and methods for solving them. Topics include intercellular communication (nervous and endocrine), metabolism, water and solute balance, and cardiovascular and respiratory physiology.

327 Animal Physiology Laboratory (2:1:3) Prerequisites or corequisites: BIOL 326 and permission of instructor. Investigation of invertebrate and vertebrate physiology. Emphasizes responses to environmental changes.

331 Invertebrate Zoology (4:3:3) Prerequisite: BIOL 303, or permission of instructor. Survey of invertebrate phyla, excluding insects, showing morphology, phylogeny, and general biology of these groups.

332 Insect Biology (4:3:3) Prerequisite: BIOL 303, or permission of instructor. Survey of insects including taxonomy, morphology, physiology, behavior, ecology, and economic importance.

333 Vertebrate Zoology (4:2:6) Prerequisite: BIOL 303, or permission of instructor. Phylogeny and systems of major vertebrate groups. Emphasizes ecological adaptation. Lab includes field studies of local fauna.

342 Plant Morphology (4:3:3) Prerequisite: BIOL 304, or permission of instructor. Origin and development of organs, tissue systems, and life cycles of green plants, with phylogenetic comparisons from algae to angiosperms.

344 Taxonomy of Flowering Plants (4:3:3) Prerequisite: BIOL 304, or permission of instructor. Study of terminology and identification of flowering plants with emphasis on local flora.

345 Plant Communities (4:3:3) Prerequisite: BIOL 304, or permission of instructor. Plant associations and formations and their successions in North America. Three Saturday or Sunday field trips required.

350 Freshwater Ecosystems (4:3:3) Prerequisites: CHEM 211/212, and either EVPP 110/111 or BIOL 307. Studies physical, chemical, and biological processes in lakes, streams, and wetlands. Lectures, field trips, and lab exercises teach physical and chemical aspects of aquatic systems and life cycles, and adaptations of aquatic organisms.

371 Animal Distributions (3:3:0) Prerequisites: BIOL 303 and 304, or permission of instructor. Relations of North and South American faunas with other regions in light of continental drift. Emphasizes vertebrates.

377 Applied Ecology (3:3:0) Prerequisite: 8 credits of biology, geology, or chemistry; 60 credits; or permission of instructor. Introduction to ecosystem concepts and their applications to natural and managed ecosystems.

385 Biotechnology and Genetic Engineering (3:3:0) Prerequisites: BIOL 311; CHEM 211, 212; MATH 110 or 113. Emphasizes theory and applications, including signifi-
cance and societal implications of biotechnology applied to medicine, agriculture, and environment.

402 Applied and Industrial Microbiology (3:3:0) Prerequisites: BIOL 213, 305, 306; CHEM 211, 212; or permission of instructor. Biology of microorganisms of ecological and industrial significance. Includes food production, spoilage and preservation, fermentation technology, waste disposal, water purification, biodeterioration, and decomposition.

403 Techniques in Applied and Industrial Microbiology (1:0:3) Prerequisites: BIOL 213, 305, 306; CHEM 211, 212. Corequisite: BIOL 402, or permission of instructor. Lab exercises illustrate basic and applied methodologies, including isolation of commercially useful strains. Discusses production and purification of industrial products.

404 Medical Microbiology (3:3:0) Prerequisites: BIOL 305 and 306. Basic principles of infectious diseases caused by bacteria and viruses. Discusses genetics and molecular mechanisms of pathogenicity.

405 Microbial Genetics (4:3:3) Prerequisites: BIOL 305 and 306. Study of structure and function of bacterial DNA, emphasizing mechanisms of gene transfer, expression and regulation. Introduces DNA repair, mutation, and life cycles of bacteriophage.

406 Microbial Physiology and Metabolism (4:3:3) Prerequisites: BIOL 305 and 306. Study of complexity and diversity of microbial physiology and metabolism with emphasis on bacteria. Nutrition, growth, transport, and anaerobic and catabolic processes are emphasized. Laboratory includes quantification of cellular macromolecules, enzyme purification and kinetics, column chromatography, and bacterial responses to environmental stimuli.

407 Microbial Diversity (4:3:3) Prerequisites: BIOL 305 and 306. Studies effect of microorganisms on ecological and medical phenomena. Stresses evolution of microbial species, biochemical cycling, and species interactions. Laboratory stresses use of cultural, biochemical, and phylogenetic methods to study microbial isolation, metabolism, and identification.

411 Advanced General Genetics (3:3:0) Prerequisites: 2.00 or better in BIOL 311, or permission of instructor. Topics include quantitative genetics, extrachromosomal inheritance, and special techniques such as mutation screening, development genetics, cancer genetics, behavior genetics, evolutionary genetics, and ethics of genetic technology.

417 Selected Topics in Molecular and Cellular Biology (1–4:0–3:0–6) Prerequisites: BIOL 311 or 482, or permission of instructor. Study of current topics in molecular and cellular biology. Lecture, laboratory. Topics vary. May be repeated for credit.


421 Genetics of Human Diseases (3:3:0) Prerequisite: BIOL 311. Emphasizes strategies used for identification of genes involved in human genetic diseases. Both monogenic and complex human genetic diseases, as well as principles of genetic screening and counseling, will be presented.

422 Stem Cell Biology and Regenerative Medicine (3:3:0) Prerequisite: BIOL 311. A broad overview of the biological principles governing stem cell populations. The functional roles stem cells play in regulating normal development and contributing to disease-state pathologies. An examination of the therapeutic potential of stem cells through “regenerative medicine.”

425 Human Physiology (3:3:0) Prerequisite: BIOL 213, 303, or permission of instructor. Organ system approach to study of homeostasis, including cardiovascular, respiratory, renal, digestive, endocrine, and nervous system functions.

433 Selected Topics in Plant Biology (1–4:1–4:0–6) Prerequisite: BIOL 304, or permission of instructor. Lecture or field course in botany. Topic varies with instructor’s specialty.

440 Field Biology (1–4:0–2:3–9) Prerequisites: BIOL 303, 304, and 60 credits, or permission of instructor. Directed field studies emphasizing ecology and behavior. Topics vary but include design of field manipulations, data collection and analysis, and introduction to organisms of study site. Students bear cost of required field trips. May be repeated once with permission of department chair. Total limit for 440, 495, and 497 is 6 credits toward 44 credits required for BS, and only 4 credits toward 32 credits for BA, not to exceed 4 credits in any one semester.

446 Environmental Physiology (3:3:0) Prerequisite: BIOL 326, or permission of instructor. Physiological responses of animals to environmental factors and changes in natural environment. Topics include biorythms and adaptation to temperature, high pressure, and altitude. Emphasis on vertebrates.

449 Marine Ecology (3:3:0) Prerequisite: BIOL 307 and BIOL/GEOL 309, or permission of instructor. Plants and animals of marine environments and physical and chemical conditions that affect their existence.

452 Immunology (3:3:0) Prerequisites: BIOL 213, 305, 306, and 311; or permission of instructor. Topics include structure and function of immunoglobulins, role of cell-mediated immunity, protective role of immune system, and disease and injury related to malfunctions of immune system.

453 Immunology Laboratory (1:0:3) Prerequisite or corequisite: BIOL 452. Techniques relevant to BIOL 452, including enzyme-linked immunobassorbant assay, immunoassay, protein electrophoresis, and immune fixation.

459 Fungi and Ecosystems (3:3:0) Prerequisite: BIOL 304, course in microbiology, or permission of instructor. Considerers impact of fungi on ecosystems in terms of biogeochemical cycling, primary and secondary production, and regulating community structure and populations of individual species through their activities as symbionts and parasites. Discusses role of fungi in ameliorating pollutants produced by anthropogenic activities.

465 Histology (4:3:3) Prerequisites: BIOL 303 and 60 credits, or permission of instructor. Microscopic structure of animal tissues and organs, with emphasis on vertebrates.

471 Evolution (3:3:0) Prerequisite: BIOL 311, or permission of instructor. Process of evolution emphasizing role of
472 Introductory Animal Behavior (3:3:0) Prerequisites: BIOL 213, 303, or permission of instructor and 60 credits. Corequisite: BIOL 473. Study of mechanisms, functions, and evolution of behavior.

473 Introductory Laboratory in Animal Behavior (1:0:3) Corequisite: BIOL 472. Field or laboratory study in animal behavior with emphasis on mechanisms, functions, and evolution of behavior. Stresses experimental design and analysis of data. Writing-intensive laboratory.

482 Introduction to Molecular Genetics (3:3:0) Prerequisites: BIOL 213, 305, and 306, or permission of instructor. Basic concepts of structure and function of genetic material at molecular level.

483 General Biochemistry (4:4:0) Prerequisites: BIOL 213; CHEM 313, 314; or permission of instructor. Structure and function of proteins, carbohydrates, and lipids. Enzymology, and metabolism and its control.

484 Eukaryotic Cell Biology (3:3:0) Prerequisites: BIOL 311, 483; MATH 110 or 113; or permission of instructor. Structure and function of cell membranes and organelles with regard to cellular transport, sorting, compartmentalization, signaling, motility, and cell division.

485 Eukaryotic Cell Biology Laboratory (1:0:3) Corequisite: BIOL 484 or permission of instructor. Laboratory experiments using cell biology techniques, including microscopy, spectrophotometry, centrifugation, chromatography, and electrophoresis.

486 Molecular Biology and Biotechnology Laboratory (2:0:6) Prerequisites: BIOL 385 or 482. Introduction to theory, techniques and practices used in modern molecular biotechnology laboratories.

492 Senior Seminar (1:1:0) Prerequisites: BIOL 307 and 311, and 90 credits. Capstone course. fs

493 Honors Research in Biology (1:0:0) Prerequisite: admission to the Biology Honors Program. Laboratory or field investigation under supervisor’s guidance.

494 Honors Seminar in Biology (1:1:0) Prerequisites: admission to department honors program, and permission of instructor. Weekly seminar course dealing with recent advances in biology. Topics selected from recent publications in field. May be repeated for credit six times. fs

495 Directed Studies in Biology (1–2:0:0) Prerequisite: permission of instructor and department chair. Study of a topic not otherwise available to student. May involve reading assignments, tutorials, lectures, papers, presentations, or field or laboratory study, determined in consultation with instructor. May be taken for 1 to 2 credits and repeated once for a total of 2 credits. Total limit for 440, 495, and 497 is 6 credits toward 44 credits required for BS, and only 4 credits toward 32 credits for BA, not to exceed 4 credits in any one semester.

497 Special Problems in Biology (1–4:0:0) Prerequisites: 60 credits, and permission of instructor and department chair. Lab or field project leading to written report of research. Research and paper completed under instructor’s guidance. Total limit for 440, 495, and 497 is 6 credits toward 44 credits.

501 Microbial Diversity: An Organismal Approach (3:3:0) Prerequisite: undergraduate course in microbiology, or permission of instructor. In-depth study of nonpathogenic microbial world, emphasizing detection, enumeration, and classification of microorganisms; their physiological and evolutionary relationships; and biotechnological applications.

506 Selected Topics in Microbiology (1–4:1–3:0–6) Prerequisites: BIOL 305, 306, or permission of instructor. Topic depends on instructor’s specialty. May be repeated only with permission of department chair.

507 Selected Topics in Ecology (1–4:1–3:0–6) Prerequisite: course in ecology and permission of instructor. Topic depends on instructor’s specialty. May be repeated only with permission of department chair.

508 Selected Topics in Animal Biology (1–4:1–3:0–6) Prerequisite: BIOL 303, or permission of instructor. Topic depends on instructor’s specialty. May be repeated only with permission of department chair.

515 Introduction to Neurobiology (2:2:0) Prerequisite: completion of 60 credits, including PSYC 372; or BIOL 213 and 303. Introduction to neurobiology with an overview of embryological development of nervous system in evolutionary context. Regional and systems neuroanatomy is introduced by study of mammalian visual system with a comparative perspective.

516 Mammalian Neurobiology (3:2:3) Prerequisite: BIOL 515. Functional anatomy of mammal brains emphasizing regional and systems neuroanatomy of humans. Correlates with material from clinical neurology, where possible. Laboratory component includes brain dissections and clinical correlations.

518 Conservation Biology (3:3:0) Prerequisite: BIOL 307, 311, or equivalent. Introduction to science used to identify species in need of conservation, and techniques to manage and protect organisms.

520 Systematics in Complex Angiosperm Families (3:1:6) Prerequisite: BIOL 344 or 534, or permission of instructor. Morphology and speciation of more complex families such as Poaceae, Cyperaceae, and Asteraceae. Laboratory emphasizes identification of specimens, and acquaintance with taxonomic literature.

532 Animal Behavior (3:3:0) Prerequisite: permission of instructor. Ecological aspects of animal behavior.

533 Selected Topics in Plant Biology (1–4:1–3:0–6) Prerequisite: BIOL 304, or permission of instructor. Topic depends on instructor’s specialty. May be repeated only with permission of department chair.

534 Advanced Plant Taxonomy (3:1:6) Prerequisite: course in plant taxonomy, or permission of instructor. Laboratories consist of field trips, and collection and identification of specimens.

535 Ancient Plants and their Environment (3:3:0) Prerequisite: BIOL 304, course in paleontology, or permission of instructor. Study of factors involved in origin, history, and extinction of fossil plants, including adaptations, paleoecology, and major geological events.
536 Ichthyology (4:3:3) Prerequisite: course in ecology or permission of instructor. Studies systematics, evolution, physiology, ecology, and behavior of fishes. Lab time used for field trips, practice in identifying species, and hands-on experience with lecture subjects.

537 Ornithology (4:2:6) Prerequisite: course in ecology, or permission of instructor. Study of evolution, systematics, physiology, ecology, and behavior of birds, emphasizing field work.

538 Mammalogy (4:2:6) Prerequisite: course in ecology, or permission of instructor. Study of evolution, systematics, physiology, ecology, and behavior of mammals, emphasizing field work.

539 Herpetology (4:2:6) Prerequisite: course in ecology, or permission of instructor. Study of evolution, systematics, physiology, ecology, and behavior of amphibians and reptiles, emphasizing field work.

540 Tropical Ecosystems (4:3:3) Prerequisite: course in ecology, or permission of instructor. Terrestrial, aquatic, and marine ecosystems in tropics, emphasizing plant communities, plant-animal interactions, and role of humans in the tropics. Field trip to tropics required as part of laboratory.

546 Estuarine and Coastal Ecology (4:3:3) Prerequisite: course in ecology, and permission of instructor. Emphasizes marine biology of estuarine and coastal habitats of Chesapeake Bay region, and factors affecting distribution and abundance of organisms. Laboratory provides training in field measurement of physical and chemical parameters, and collection and identification of local organisms. Extended field trips made to mid-Atlantic sites.

547 Terrestrial Plant Ecology (4:3:3) Prerequisite: course in ecology. Considers community organization, development, productivity, and mineral cycling; interactions between plants and competitors; herbivores; and environmental factors, especially light, water, and soil. Field work and laboratory emphasize data collection and statistical analysis.

553 Advanced Topics in Immunology (3:3:0) Prerequisite: BIOL 452, or permission of instructor. Comprehensive study of immunologic mechanisms as they pertain to immunologic diseases and transplantation.

556 Advanced Topics in Microbial Physiology and Metabolism (3:3:0) Prerequisite: BIOL 305, 306, or permission of instructor. Comprehensive study of microorganisms including growth, nutrition, transport, autotrophic and heterotrophic metabolism, regulation, and differentiation.

559 Fungi and Ecosystems (3:3:0) Prerequisite: BIOL 304 or a course in microbiology, or permission of instructor. Considers impact of fungi on ecosystems in terms of their effects on biogeochemical cycling, primary and secondary production, and regulating community structure and populations of individual species through their activities as symbionts and parasites. Discusses role of fungi in ameliorating pollutants produced by anthropogenic activities.

561 Comparative Animal Physiology (3:3:0) Prerequisite: BIOL 326, or permission of instructor. Detailed study of selected physiological systems of invertebrates and vertebrates, emphasizing current research.

563 Virology (3:3:0) Prerequisite: BIOL 482, or permission of instructor. Fundamental concepts of nature of viruses, virus classification, cultivation, and biochemistry. Emphasizes bacteriophage and animal viruses.

564 Techniques in Virology (1:0:3). Prerequisites: BIOL 563, virology, and entrance into the PhD/biosciences or MS/biology program; or permission of instructor. Basic techniques of animal virus propagation, isolation, and quantitation.

566 Cancer Genomics (3:3:0) Prerequisite: course in genetics or biochemistry. Review of modern concepts in cancer biology including taxonomy of human tumors, common cancer syndromes, and genome instability. Genetic and molecular studies of tumor cell proliferation, migration, invasion, and death.

568 Advanced Topics in Molecular Genetics (3:3:0) Prerequisite: BIOL 482, or permission of instructor. Comprehensive study of regulatory mechanisms controlling gene expression in viruses, prokaryotes, and eukaryotes, emphasizing current research.

572 Human Genetics (3:3:0) Prerequisite: BIOL 311, or permission of instructor. Inheritance of humans emphasizing current problems, including genetic control of metabolic diseases, effects of radiation and chemical agents in environment, and directed genetic change.

573 Developmental Genetics (3:3:0) Prerequisite: BIOL 311, or permission of instructor. Genetic approaches to problem of eukaryotic development, emphasizing current research on regulation of gene enzyme systems.

574 Population Genetics (3:3:0) Prerequisites: BIOL 307 and 311, or permission of instructor. Genetic structure and dynamics of populations, both real and ideal.

575 Selected Topics in Genetics (1--4:1--3:0--6) Prerequisite: BIOL 311, or permission of instructor. Different topics in different years, including molecular, developmental, physiological, and classical genetics, emphasizing current problems and research. May be repeated once with permission of department chair.

576 Microbial Ecology of Soils (3:3:0) Prerequisites: BIOL 305, 306, or permission of instructor. Detection, identification, and physiological role of microorganisms in soils from root zone to deep subsurface. Emphasizes interactions of microorganisms, viruses through protests, and their functions in soil.

577 Biogeochemistry: A Global Perspective (3:3:0) Prerequisites: introductory courses on ecology and chemistry, or permission of instructor. Structure and function of ecosystems, their interactions as components of landscapes, and contributions to global environment. Emphasizes biogeochemical cycles of natural, disturbed, and managed ecosystems, and their integration at landscape and global level as related to current ecological problems such as transfer of nonpoint source pollutants, atmospheric deposition, stratospheric ozone depletion, and global change.

578 Mutation, DNA Repair, and Environmental Contamination (3:3:0) Prerequisites: BIOL 307 and 311. Overview of relationship between environmental contamination and genetic damage. Covers types of contamination that result in mutations, and molecular mechanisms of DNA damage and repair.
579 Molecular Evolution and Conservation Genetics (3:3:0) Prerequisite: BIOL 311. Corequisite: BIOL 471, or permission of instructor. Evolution of genes and gene families at molecular level, including gene duplication and divergence, positive and negative selection, genetic drift, and molecular clocks. Also includes selected applications in conservation genetics, such as molecular phylogenetics and estimates of population size.

580 Computer Applications for the Life Sciences (3:3:0) Prerequisites: 12 credits of biology and one year of college mathematics, or permission of instructor. Studies computer use in biological sciences. Combines lectures, supervised exercises on mainframe and microcomputers. Students present seminar on advanced application, and complete project using computer to fulfill major assignment associated with another course or employment.

583 General Biochemistry (4:4:0) Prerequisites: BIOL 213; CHEM 313, 314; or permission of instructor. Structure and function of proteins, carbohydrates and lipids, enzymology, and metabolism and its controls. Emphasizes chemistry of nitrogen compounds.

584 Eukaryotic Cell Biology Laboratory (1–2:0:1–3–6) Prerequisites: BIOL 484 or BIOL 682, or permission of instructor. Selected topics of laboratory procedures used in the study of eukaryotic cells. May be repeated one time with permission of program director.

587 Soil Ecology (3:3:0) Prerequisite: introductory course in general ecology or environmental science, or permission of instructor. Introduction to physical, chemical, and biological processes that govern development of soils and their ecological functions. Emphasizes central role that plants, microbes, and animals play in soil processes. Provides some training in system of soil classification and current methods to study soils.

588 Global Changes in Climate and Ecology (3:3:0) Prerequisites: introductory courses in general ecology or environmental science, or permission of instructor. Focuses on global-level changes that influence ecology. Introduces climate system—past, present, and future—emphasizing links between ecological systems and changes in climate, land use, and element cycling. Topics include responses of forests, oceans to climate change; effects of elevated carbon dioxide on plants; effects of ultraviolet radiation on aquatic systems; salt marsh responses to sea level rise; global eutrophication; desertification; carbon sequestration; and public policy implications of global change science.

589 Teaching Practicum (1:0:3) Prerequisites: permission of instructor, chair, and course coordinator (if any). Experience teaching biology in laboratory or in field under supervision of faculty member. Undergraduate assists instructor. May be repeated once.

607/EVPP 607 Fundamentals of Ecology (3:3:0) Overview of concepts in physiological, population, community, and ecosystem ecology. Restricted to graduate students with little or no background in ecology.

608 Topics in Biology (1–4:1–4:0–9) Prerequisite: employment or anticipated employment as science teacher. Not available for credit toward MS in biology, or PhD in environmental science and public policy. Inservice course to strengthen and update teacher’s knowledge of biology. Topics include organismal biology, cell biology, ecology, microbiology, or genetics. May be repeated for credit with permission of department chair.

610 Bioremediation: Theory and Applications (3:3:0) Prerequisites: course in microbiology and organic chemistry, or permission of instructor. Provides basis for understanding proper application of bioremedial technologies to treatment for hazardous wastes. Includes evaluation of data to determine successful treatment.

611 Techniques in Environmental Microbiology (2:0:4) Prerequisite: laboratory course in microbiology, or permission of instructor. Open first to those enrolled in BIOL 610. Laboratory exercises illustrate techniques to demonstrate microbial degradation, detection of microbes, isolation, and evaluation of physiological and genetic characteristics.

622 Methods and Principles of Animal Taxonomy (3:1:6) Prerequisite: course in evolution, or permission of instructor. Theoretical basis of techniques in animal classification, emphasizing practical application to laboratory problem dealing with a particular animal group.

640 Environmental Biology (3:3:0) Prerequisite: course in ecology, or permission of instructor. Patterns of climate and weather, tectons, soil formation, and surface water and groundwater movements.

643 Microbial Ecology (4:3:3) Prerequisite: course in microbiology, or permission of instructor. Study of relationships between microorganisms and their natural environment, and methodology for observing their natural environment and biochemical activities in that environment.

648 Population Ecology (3:3:0) Prerequisite: course in ecology or permission of instructor. Survey of ecological models and theory. Topics include population growth and regulation; competition; predator-prey, herbivore-plant, and parasite-host interactions; mutualism; and metapopulation ecology.

649 Biological Resource Management (3:3:0) Prerequisite: course in ecology, or permission of instructor. Applies modern ecological theories and methods to biological resource management in developing and developed countries. Explores problems in achieving optimum productivity of specific resources and application of systems analysis.

665 Environmental Hazards to Human Health (3:3:0) Prerequisites: courses in animal physiology and organic chemistry, or permission of instructor. Health effects of chemical contaminants of air, water, and food resulting from industrialized society. Includes identifying, evaluating, and controlling hazards.

666 Human Genetics Concepts for Health Care (4:4:0) Prerequisites: BS degree or enrollment in accelerated MS program. Course in cell or molecular biology. Not available to students who have taken BIOL 572. Principles of genetically determined diseases with emphasis on clinical aspects of these diseases, genetic counseling, and laboratory methods used in human genetics. Extended studies students preparing to enter medical or dental school are welcome.

668 Advanced Techniques in Molecular Biology (4:2:6) Prerequisite: BIOL 568, or permission of instructor. Experimental studies using current methods for purification and characterization of biologically important compounds. Provides training for research in molecular biology.
669 Pathogenic Microbiology (3:3:0) Prerequisites: courses in microbiology and biochemistry. Molecular mechanisms of bacterial pathogenicity, and immune response in infectious diseases.

670 Environmental Law for Biologists (3:3:0) Prerequisite: course in ecology, environmental biology, or permission of instructor. Study of laws and regulatory issues such as National Environmental Policy Act and Clean Water and Clean Air Acts. Emphasizes critical evaluation of alternatives to unresolved issues in environmental policies.

680 Experimental Design and Analysis for the Life Sciences (4:3:3) Prerequisite: course in biostatistics, or permission of instructor. Advanced course in applying probability and statistics to research in life sciences. Examples drawn from environmental, medical, physiological, genetic, and chemical biology.

682 Advanced Eukaryotic Cell Biology (3:3:0). Prerequisites: BIOL 483, CHEM 313, 314; or permission of instructor. Structure and function of biomembranes, cytoskeleton, and transport systems. Also discusses protein trafficking, cell cycle, and cell adhesion molecules.

690 Introduction to Graduate Studies in Biology (2:2:0) Required of all new MS students in biology. May be repeated for credit.

691 Current Topics in Biology (1–4:1–3:0–6) May be repeated for credit.

692 Seminar in Biology (1:1:0) Topics vary. May be repeated for credit.

693 Directed Studies in Biology (1–8:0:0) Prerequisites: permission of instructor, chair, and graduate committee. May not be used to fulfill explicit undergraduate prerequisites for graduate work. Study of topic not otherwise available in graduate program. May involve any combination of reading assignments, tutorials, lectures, papers, presentations, or laboratory or field study, determined in consultation with instructor.

695 Seminar in Molecular, Microbial, and Cellular Biology (1:1:0) Review and discussion of recent literature in specialized area. Includes student presentations. May be repeated for credit.

715 Microbial Physiology (3:3:0). Prerequisites: undergraduate lecture/lab course in microbiology, and course in biochemistry. Comprehensive study of functioning of microbial cells, with emphasis on pathogens. Stresses growth, cell cycle, and cell adhesion molecules.

718 Techniques in Microbial Pathogenesis (3:0:3). Prerequisites: admission to biosciences PhD or biology MS program, and permission of instructor. Laboratory based class in which students perform current techniques in microbial pathogenesis.

720 Microbial Metabolism (3:3:0). Prerequisites: undergraduate lecture/lab course in microbiology, and course in biochemistry. Discussions of catabolic and anabolic pathways of bacterial pathogens, and regulation and integration of these pathways.

745 Environmental Toxicology (3:3:0) Prerequisites: courses in ecology and physiology, or permission of instructor. Study of nature, distribution, and interaction of toxic chemicals released into the environment. Emphasizes effects on nonhuman biota, detection and fate of chemicals, and implications for government regulation.

793 Research in Biology (1–3:0:0) Prerequisites: 8 graduate credits in BIOL, and permission of instructor and chair. Library, laboratory, or field investigation under supervisor’s guidance. May be repeated for total 3 credits.

798 Master’s Research Project (1–3:0:0) Prerequisites: permission of instructor and department chair. Students who take BIOL 793 may not receive more than 6 credits total for both BIOL 793 and 798. Experimental or theoretical research project chosen and completed under guidance of graduate faculty member. Comprehensive report acceptable to student’s advisory committee is required. Graded S/NC.

799 Thesis (1–6:0:0) Prerequisites: 8 graduate credits in BIOL, and permission of instructor and department chair. Students who take BIOL 793 may not receive more than 6 credits total for both BIOL 793 and 799. Thesis research under direction of supervisor. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study in biology. Program of study designed by student’s discipline director and approved by student’s doctoral committee. Students participate in research of discipline director, and produce paper reporting original contributions. Paper presented in subsequent PhD summer seminar. Enrollment may be repeated.

See EVPP, Environmental Science and Public Policy, for additional related course work.

Bioscience Management (MSBM)

School of Management

603 Managerial Economics and Decisions of the Firm (3:3:0) Prerequisite: admission to MSBM program. Provides fundamental understanding of how microeconomics concepts are usefuly applied to managerial decision-making. Fully explores principles of microeconomic theory, including market supply and demand, production and cost functions, industry structure, and product and resource pricing.

613 Financial Reporting and Decision Making (3:3:0) Prerequisite: admission to MSBM program. Foundation course focusing on economics and analysis of business transactions and related financial reporting issues. Topics include introduction to accounting framework in financial reporting; and analysis of financial statements, economic events’ impact on financial reports, and impact of accounting method choices on financial reports.

623 Marketing Management (3:3:0) Prerequisite: admission to MSBM program. Develops abilities to make marketing decisions in a wide variety of bioscience organizational and competitive situations. Emphasizes technology to aid in analysis, decision making, and communication of decisions to relevant stakeholders. Case studies, team work, and projects.

643 Managerial Finance in Bioscience Management (3:3:0) Prerequisite: admission to MSBM program. Introduces theory and practice of finance within corporations as applied to life sciences organization and industry. Topics include intertemporal choice, valuation, capital budgeting, capital structure, working capital management, and risk/return analysis.
Legal and Ethical Aspects of Bioscience Management (3:3:0) Prerequisite: admission to MSBM program, or permission of instructor. Introduces contemporary legal and ethical doctrines as applied to the life sciences organization and industry, and examines how they can be applied to guide and enhance the decision-making processes of managers in a global economy. Discusses intellectual property issues. Lecture, class discussion, cases, and projects.

Organizational Behavior and Human Resource Management (3:3:0) Prerequisite: admission to MSBM program. Emphasizes development of conceptual tools for understanding and analyzing individual and group behavior in bioscience organizations and organizational processes. Considerable focus on developing relevant skills for working in groups and teams. Lectures, discussions, case analyses, and in-class exercises.

Best Practices in R&D Management (3:3:0) Prerequisite: admission to MSBM program, or permission of instructor. Deals with management of R&D in corporations and outside funding agencies. Management of R&D project portfolio; third and fourth generation R&D management practices; and climate for R&D funding, including government policy from perspective of firms and institutions receiving funding, and the agencies funding projects. Studies corporate, institutional, and governmental perspectives.

Project and Cost Management (3:3:0) Prerequisite: completion of bioscience management core requirements, or permission of instructor. Focuses on project scheduling, time-cost trade-offs, budgeting, cost control, and project monitoring. Emphasizes cost-management aspects of projects in bioscience industries. Uses software, case studies.

Analysis of the Bioscience Industries (3:3:0) Prerequisite: admission to MSBM program, or permission of instructor. Develops knowledge of status of bioscience and bioinformatics industry and its companies and segments. Students analyze bioscience companies using Porter’s Five Forces Model, examine industry segments, and create electronic database with their findings and analysis.

Bioscience Management Capstone Project (3:3:0) Prerequisite: admission to MSBM program, or permission of instructor. Teams undertake strategic evaluation and plan for bioscience-driven business initiatives. Teams present their results, including analysis of competitive forces and the value chain; recommendations including changes in goals and organizational design; plan of action integrating marketing, human resource development, organizational theory, finance, and bioscience product research and development; and implementation plan using theories of communication and change management, to include business case and business plan.

Bioscience Product Development and Risk Management (3:3:0) Prerequisite: admission to MSBM program, or permission of instructor. Explores best practices in product development in the life sciences (bioinformatics, bioscience, genomics, biotechnology, and pharmaceutical) Students analyze practices in terms of gaining competitive advantage in an industry where new technologies and economic models for products are constantly being developed. Life science projects and product development efforts categorized and analyzed to develop and maintain the most favorable project or product asset portfolio to successfully carry out business goals and strategies. Analyzes effect of bioscience project investments on organization’s financial worth and performance, and bioscience industry segments and companies from perspective of choosing appropriate partnerships.

Global Aspects of Bioscience Management (3:3:0) Prerequisite: admission to MSBM program, or permission of instructor. Students spend a week in an international residency under faculty leadership. Primary focus is dealing with globalization of the life science industries, international markets for life science products and global developments in R&D, virtual global organization, and project management across cultures. Features corporate site visits, and presentations by professors from international universities and practitioners.

Biosciences (BIOS)

Molecular and Microbiology

Biochemical Systematics (3:3:0) Prerequisites: general biochemistry. Introduces biochemical systems to investigate complex, multicomponent, dynamic functions of cellular systems. Readings include articles from current literature in molecular biosciences. Application of molecular techniques within biosciences is now universal, and underlying questions is, “What is the structure of a cell, and how does it function?”

Research Methods (3:0:0) Prerequisite: admission to PhD program in biosciences. Trains students in research methodologies, techniques, and data analysis in life sciences. Divided into three modules that introduce separate but equally significant components of any research project: parameters required to outline and synthesize a problem, techniques of measurement and analysis used by life scientists, and approaches for data analysis and interpretations.

Laboratory Rotation (1:0:4) Prerequisite: admission to PhD program in biosciences. Intensive introduction to research laboratory in biosciences. Students read background material pertinent to problem under study, learn and practice research methods of laboratory, and formulate short final project that may be proposal or actual project, demonstrating some mastery of techniques and approaches employed. Should be repeated three times (except by permission of concentration director).

Topics in Biosciences (1:1:0) Prerequisite: admission to PhD program in biosciences. Required of all students during each semester prior to advancement to candidacy. Combines invited seminars from internal and external faculty with graduate student seminars. Seminar presentation required for advancement to candidacy, generally given in last semester before candidacy. Includes discussion section led by course coordinator. Should be repeated three times (except by permission of concentration director).

Current Topics in Biosciences (1–3:1–3:0) Prerequisite: admission to biosciences PhD or biology MS program. Studies current topic in biosciences. Topics vary. May be repeated for credit with permission of concentration director.

Laboratory Methods in Functional Genomics and Biotechnology (3:2:3) Prerequisite: admission to PhD program in biosciences, or permission of instructor. Current laboratory techniques in molecular biology and genomics, including nucleic acid isolation, gene cloning and sequencing, gel blot analysis, PCR, in vitro mutagenesis, and theory
and practice of DNA microarray analysis of gene expression. Topics may vary from year to year depending on advances in field.

741 Genomics (3:3:0) Prerequisites: at least one undergraduate course in genetics and molecular biology, or permission of instructor. Genetic structure and function at whole genome level. Includes some sequence analysis, comparative genomics, classical genetics, and development genetics, as well as analysis of synteny groups, isochores, gene families, genetic complexity. C value paradox, directed discovery of gene functions, and animal models of human disease. Readings from recent texts and primary research literature. Students expected to give one or two oral presentations of primary research papers, as well as complete midterm and final exams.

742 Biotechnology (3:3:0) Prerequisites: undergraduate course work in genetics and molecular biology. Theory and applications of biotechnology. Includes promoter design, gene fusions, protein targeting, techniques of protein purification, construction of transgenic organisms, cloning of animals and plants, ethical and legal issues. This is a relatively new area of study that is rapidly changing; course strives to keep students abreast of current literature.

743 Genomics, Proteomics, and Bioinformatics (3:3:0). Prerequisite: admission to biosciences PhD or biology MS program. Fundamental methods for analyzing genomic and proteomic data, including nucleic acid and protein sequences, pair-wise and multiple alignment, database search methods, clustering and presentation of data, prediction modeling, and survey of available software and freeware tools.

744 Molecular Genetics (3:3:0) Prerequisites: undergraduate course work including BIOL 311, CHEM 313, 314, 315, and 318; equivalents; or permission of instructor. Develops understanding of principles of modern molecular genetics and methods of investigation of genomes of pro- and eukaryotes, including types of genetic manipulations conducted in research laboratories today.

760 Seminar in Molecular Systematics (1-3:1-3:0) Presentations and discussion by students and faculty of research papers and projects.

761 Dispersal Patterns of Biological Agents (3:3:0). Prerequisites: admission to biosciences PhD or biology MS program, and permission of instructor. Introduces military and terrorist methods of dispersal patterns. Covers physics of aerosols, engineering and mechanics of building ventilation systems, and mechanical dissemination including handheld, automatic, vehicle, and truck-mounted systems. Also covers viability of specific agents involved.

762 Phylogenetic Analysis (4:3:3) A consideration of molecular systematics techniques in biology, especially cladistics and phenetics methods. Species concepts, biological nomenclature, and classifications will also be discussed. Laboratory will emphasize phylogenetic methods using online sources of comparative data.

765 Molecular Systematics (3:3:0) Comparative evolutionary techniques applied to molecular data. Use of molecular techniques, molecular, databases, and analytical techniques will be covered.

767 Molecular Evolution (3:3:0) A review of the diversity and organization of genomes and evolutionary processes that operate at the molecular level. Emphasis will be placed on processes of molecular evolution and techniques used to analyze these processes.

899 Directed Studies in Biosciences (1–12:0:0) Prerequisite: permission of research advisor. Studies of specialized topics in biosciences. Specific arrangements for designing scope and area of study to be determined in consultation with instructor. May involve literature searches and review, workshops, or tutorials.

899 Directed Research in Biosciences (1–12:0:0) Prerequisite: permission of research advisor. Research on a pertinent topic in biosciences. Scope and subject of research to be determined by instructor.

998 Doctoral Dissertation Proposal (1–6:0:0) Prerequisite: permission of research advisor. Research and writing of research proposal for doctoral dissertation. Graded S/NC.

999 Doctoral Dissertation Research (1–24:0:0) Prerequisite: approved dissertation proposal. Research in concentration pertinent to students’ program of study. Maximum of 24 credits can be applied toward degree. Graded S/NC.

Business Legal Studies (BULE)

School of Management

If a student takes noncore, upper-level business courses before acceptance to the School of Management, those courses will not count on an undergraduate degree application for any major in the school, except as general elective credit. A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Course prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

302 Legal Environment of Business (3:3:0) Prerequisite: sophomore standing. This course surveys the legal environment of business, emphasizing legal concepts and legal reasoning to prepare students to recognize legal problems and formulate appropriate responses. Topics include business ethics, torts, crimes, contracts, and other topics. Lecture, discussion, cases.

402 Commercial Law (3:3:0) Prerequisites: BULE 302; degree status. Survey of commercial law emphasizing the Uniform Commercial Code. Lecture, discussion, cases.

Minor in Business (MSOM)

School of Management

Prerequisite for all MSOM courses is completion of 29 credits (sophomore standing).

300 Managing Financial Resources (3:3:0) May not be taken for credit by SOM majors. Students who have received credit for both ACCT 203 and FNAN 301 cannot also receive credit for MSOM 300. Focuses on using basic concepts of accounting and financial management to make investment, credit, and operating decisions for an organization. Emphasizes financial reports to aid planning and control of organizational activities.

301 Managing People and Organizations (3:3:0) May not be taken for credit by SOM majors. Students cannot receive credit for both MGMT 301 and MSOM 301. Introduces key issues in management, organizational behavior, and human
302 Managing Information in a Global Environment (3:3:0) May not be taken for credit by SOM majors. Students cannot receive credit for both MIS 301 and MSOM 302. Provides overview of strategic role of information, need for information systems, organizing information, integration of information systems in management processes and decision making, and related discussions in electronic commerce.

303 Marketing in a Global Economy (3:3:0) May not be taken for credit by SOM majors. Students cannot receive credit for both MKTG 301 and MSOM 303. Presents marketing principles, concepts, strategies, and analytical tools used by profit and nonprofit organizations to market ideas, products, and services to selected target groups. Emphasizes how to develop, promote, distribute, and price firm’s offerings in dynamic economic, social, political, and global environment.

304 Entrepreneurship: Starting and Managing a New Enterprise (3:3:0) May not be taken for credit by SOM majors. Explores behaviors required to successfully launch a new business, tools to identify and evaluate opportunities, and the issues critical to a new firm. Issues include organizational structure, effective marketing strategy, operational logistics, legal issues, financial projections, financing options, and available support structures.

305 Managing in a Global Economy (3:3:0) May be taken for credit by SOM majors only if taken to satisfy the global understanding requirement for general education. Multidisciplinary approach to global economy from viewpoint of managing international business. Introduces unique aspects of managing in global economy including theory and political economy of international trade and foreign direct investment, global monetary system, and strategy of international business.

306 Managing Projects and Operations (3:3:0) May not be taken for credit by SOM majors. Students cannot receive credit for both OM 301 and MSOM 306. Introduces project management and operations management concepts and tools including project planning, scheduling, monitoring, and control; process design, selection and improvement; supply chain management; inventory management; and quality assurance.

Character Education (EDCE)

Graduate School of Education

600 Philosophical and Theoretical Perspectives on Character Education (3:3:0) Prerequisite: admission to Character Education Program. Analyzes and evaluates theories and models of character education that fit with different philosophical perspectives. Analyzes character education in the United States and other countries.

601 How Students Learn Values and Ethics (3:3:0) Prerequisite: admission to Character Education Program. Applies theories to practice to increase learning through the study of moral and ethical development theories and how students learn personal, prosocial, and civic values.

602 Comprehensive Character Education Frameworks (3:3:0) Prerequisite: admission to Character Education Program. Analyzes comprehensive character education frameworks that have emerged from research and practice, examining framework components and their applications to character education initiatives.

603 Global and Ethical Perspectives on Teaching Diverse Learners (3:3:0) Prerequisite: admission to Character Education Program. Analyzes ethical and moral dimensions of classroom interactions using developmental framework and foundation of democratic principles. Evaluates school politics and policies, and provides overview of prevailing ethical points of view.

604 Character Education Curriculum and Programs (3:3:0) Prerequisite: admission to Character Education Program. Analyzes and evaluates quality of programs and curriculum materials for character education using program, implementation, and curriculum standards.

605 Character Education Assessment and Evaluation (3:3:0) Prerequisites: EDCE 602, 603, and 604. Applies assessment standards and audit tools to analyze and evaluate formative and summative assessments of programs for character education. Utilizes backward design model.

606 Leadership in Character Education: An Internship in Program Development, Curriculum, Instruction, or Assessment (3:3:0) Prerequisites: EDCE 602, 603, 604, and 605. A 150-hour, on-site internship focusing on one of the following: instructional strategies, curriculum or program development, using resources, or assessment.

607 Educational Research for Character Educators (3:3:0) Prerequisites: EDCE 600, 601, 602, 603, and 604. Prerequisite or corequisite: EDCE 605. Studies and applies fundamental concepts and methods of educational action research. Emphasis on researching how students learn personal, prosocial, and civic values, and teacher and school effectiveness in this area.

Chemistry (CHEM)

Chemistry and Biochemistry

CHEM 211, 212 are prerequisites to all other undergraduate CHEM courses numbered 301 or above.

101 Introduction to Modern Chemistry (3:3:0) Not open to students majoring in chemistry. Credit will not be given for this course and CHEM 103. Fundamental principles of chemistry. Physical and chemical discoveries and properties of matter presented along with their application and impact on way of life. Topics include atomic and molecular structure, nuclear chemistry, and chemistry in Earth and atmosphere. No previous knowledge of chemistry assumed or required.

102 Introduction to Organic and Biological Chemistry (3:3:0) Prerequisite: CHEM 101, 103, or 211. Not open to students majoring in chemistry. Course cannot be used in place of CHEM 313 or 314. Credit will not be given for this course and CHEM 104. Structure and properties of major classes of organic compounds with particular reference to organic molecules and their relationship to manmade polymers and biopolymers including carbohydrates, lipids, proteins, and nucleic acids. Primarily intended for those interested in applying principles of organic chemistry and biochemistry to related areas such as genetics, microbiology, physiology, and nutrition.

103, 104 Chemical Science in a Modern Society (4:3:3) CHEM 103 is a prerequisite for CHEM 104. Not open to...
students majoring in chemistry. Credit will not be given for both this course and CHEM 211, 212. Terminal course in chemistry for nonscience and nursing majors. Principles and application of chemistry. Topics are those described for CHEM 101 and 102 but with lab to enhance scientific experience.

155, 156 Introduction to Environmental Chemistry I and II (4:3:3) Prerequisite for 156: CHEM 155. Credit will not be given for this course and CHEM 103, 104. Basic chemical principles of Earth’s water, air, and soil systems, presented in the context of understanding environmental issues. Includes Saturday morning field trips to sites of past and present environmental contamination, alternating with Saturday morning laboratory activities.

201 Introductory Chemistry I (3:3:0) Does not fulfill degree requirements for laboratory science course. Credit will not be given for this course and CHEM 211 or 103. General chemistry course for students interested in science, engineering, mathematics, or computer science who do not require a lab. Fundamental principles of atomic and molecular structure; chemical bonding; basic concepts of chemical reactions and thermochemistry; and properties of gases, liquids, and solids.

202 Introductory Chemistry II (3:3:0) Prerequisite: CHEM 201 or 211. Does not fulfill degree requirements for laboratory science course. Credit will not be given for this course and CHEM 212 or 104. Second-semester general chemistry course for those interested in science, engineering, mathematics, or computer science who do not require a lab. Fundamentals of reaction rates and equilibrium. Topics include kinetics, properties of solutions, ionic equilibrium, chemical thermodynamics, electrochemistry, and nuclear chemistry.

211, 212 General Chemistry (4:3:3), (4:3:3) CHEM 211 is prerequisite to 212. Credit will not be given for this course and CHEM 103, 104. Basic facts and principles of chemistry, including atomic and molecular structure, gas laws, kinetics, equilibrium, electrochemistry, nuclear chemistry, and properties and uses of the more important elements and their compounds. Students majoring in science, engineering, or mathematics should choose this course sequence.

251 General Chemistry for Engineers (4:3:3) Enrollment restricted to students intending to major in engineering. Students who need two semesters of chemistry should enroll in CHEM 211. Credit will not be given for this course and CHEM 211. Fundamental principles of chemical structure and reactivity including atomic and molecular structure; chemical bonding; structures of ionic, covalent, and metallic lattices; oxidation reduction; electrochemistry and chemistry of metals; and introduction to organic chemistry and polymers.

300 Chemistry of Semiconductor Processing (3:3:0) Prerequisite: completion of 30 credits, or permission of instructor. Does not satisfy chemistry course requirements for BS in biology. Cannot be used as a chemistry elective toward BA, BS, or minor in chemistry, and does not fulfill premedical requirements. Chemical aspects of the manufacture of semiconductor devices. Topics include oxidation of silicon, photoresists, plasma etching, removal of metal contaminants by acid etching, and analysis of semiconductor thin films.

313, 314 Organic Chemistry (3:3:0) Corequisite for CHEM 313: CHEM 315; corequisite for CHEM 314: CHEM 318. CHEM 313 is a prerequisite for CHEM 314. Theoretical, synthetic, industrial, and biological aspects of the chemistry of carbon compounds.


321 Elementary Quantitative Analysis (4:2:0) Principles of chemical analysis emphasizing ionic equilibria. Lab consists of gravimetric, volumetric, and instrumental methods illustrating principal types of quantitative determinations.

322 General and Biochemical Equilibrium (2:2:0) Prerequisite: CS 103, 112, or 161. Study of general and biochemical equilibria in gas phase, ionic, and heterogeneous systems. Topics include gas reactions, polyfunctional acids and bases, complexation formation, solubility and free energy relationships, and the use of computer algorithms to solve equilibrium problems.

331, 332 Physical Chemistry I, II (3:3:0) Prerequisite: MATH 113, 114. Prerequisite or corequisite: PHYS 243 or 160. CHEM 331 is prerequisite to 332. Yearlong survey covering topics including thermodynamics, equilibria, kinetics, solution properties, elementary quantum theory, electrochemistry, atomic and molecular structure, and nuclear chemistry.

333, 334 Physical Chemistry for the Life Sciences I, II (3:3:0) Prerequisites: CHEM 211, 212; MATH 113. CHEM 333 is prerequisite to CHEM 334. Corequisite or prerequisite: MATH 114. Credit will not be given for both this course sequence and CHEM 331, 332. Yearlong survey of principles of physical chemistry emphasizing application in biological sciences. Topics include first and second laws of thermodynamics, free energy and chemical equilibria, kinetics, transport properties, molecular interactions, molecular structure, spectroscopy, statistical thermodynamics, and x-ray diffraction.

336 Physical Chemistry Lab I (2:1:3) Prerequisite or corequisite: CHEM 331 or 333. Quantitative experimental study of physicochemical principles. CHEM 336 and 337 constitute an introduction to the practice and theory of experimental physical chemistry. One-hour recitation.

337 Physical Chemistry Lab II (2:1:3) Prerequisite or corequisite: CHEM 332 or 334. Continuation of CHEM 336. One-hour recitation.

341 Fundamental Inorganic Chemistry (3:3:0) Descriptive chemistry including chemical properties, reactions, and reaction mechanisms of inorganic elements and compounds. Topics include main group and transition elements, organometallic compounds, and bioinorganic chemistry.

350 Computer Techniques for Chemistry (3:3:0) Prerequisite: CHEM 313. Introduction to computer software, both commercial and online, emphasizing applicability to chemistry topics. Techniques include spreadsheet programming, graphing and statistics, molecular modeling, and chemical information search and retrieval.

401 The Research Experience (3:1:6) Prerequisites: completion or concurrent enrollment in all other required
general education courses. Introduction to research on current problem in chemical sciences, under supervision of faculty advisor. Includes literature search, writing research proposal, attendance at scheduled seminars, written report including impact statement, and oral presentation.

422 Instrumental Analysis (3:3:0) Prerequisites: CHEM 314, 321, and 331. Introduces theories of analysis by instrumental methods. Basic electronics applied to chemical measurements. Topics include introduction to theory of spectroscopy including ultraviolet, visible, and infrared, and electrochemical methods of analysis; theory of Fourier transform techniques such as FT-IR and FT-NMR; and theory of advanced pulse techniques.

423 Instrumental Analysis Laboratory (2:0:6) Prerequisite: CHEM 422. Laboratory-based introduction to quantitative analysis of organic and inorganic substances by using modern analytical instrumentation. Laboratory highlights practice of atomic and molecular spectroscopy, spectrophotometry, chromatography, voltammetry, and potentiometry in relation to chemical experimentation.

441 Properties and Bonding of Inorganic Compounds (3:3:0) Prerequisites: CHEM 314 and 332. Interpretation of physical and chemical properties of inorganic compounds in terms of currently used bonding concepts. Topics include molecular symmetry and applications of symmetry, structure and bonding in ionic solids; and stereochemical, electronic, and magnetic properties of transition metal complexes and metal atom cluster compounds.

445 Inorganic Preparations and Techniques (2:0:6) Prerequisites: CHEM 321 and 441. Application of techniques of inorganic chemistry to preparation, purification, and spectroscopic characterization of selected substances.

446 Bioinorganic Chemistry (3:3:0) Prerequisite: CHEM 314. Application of inorganic coordination chemistry and physical methods in study of structure and function of metal ion sites in biomolecules. Properties of transition metal ions, ligand field theory. Topics include iron cytochromes, zinc and copper enzymes, cobalamin, iron sulfur proteins, oxygen transport, iron storage, electron transfer, inorganic model compounds, metals in medicine, and toxicity of inorganic species.

451, 452 Special Projects in Chemistry (2:0:6) Prerequisites: Chemistry major or minor, 90 credits, and permission of department research committee. Introduction to chemical research or development. Includes literature search, conferences, and lab. Written and oral technical reports required.

455, 456 Honors Research in Chemistry (3:1:6) Prerequisites: CHEM 313, 314, 321, 331–332 or 333–334; admission to Chemistry Department Honors Program; and permission of department research committee. Credit will not be given for both these courses and CHEM 451, 452. Introduction to research on current problem in chemical sciences under supervision of faculty advisor. Includes literature search, laboratory or theoretical work, conferences with faculty advisor, attendance at regularly scheduled seminars, and oral and written presentations.

463 General Biochemistry I (4:4:0) Prerequisites: CHEM 313, BIOL 213. Brief introduction to biochemistry, followed by in-depth look at amino acids and proteins, 3-D structure, folding and dynamics, their specialized function, and primary metabolism. Emphasizes enzymes and their chemical mechanisms, and metabolism.

464 General Biochemistry II (3:3:0) Prerequisite: CHEM 463/BIOL 483. Continuation of general biochemistry, focusing on secondary metabolism, cell signaling, and processes of replication, transcription, and translation. Emphasizes important biochemistry research topics; much material drawn from current biochemical literature.

465 Biochemistry Lab (2:0:6) Corequisite: CHEM 463. Introduction to modern biochemical experimental methods of studying chemical and physical properties of biological molecules. Includes separation, identification, and characterization of biomolecules.

467 The Chemistry of Enzyme-Catalyzed Reactions (3:3:0) Prerequisites: CHEM 313 and 463. Examples of enzyme mechanisms demonstrate how chemical principles are employed by living organisms. Specific enzyme mechanisms used to illustrate principles from organic, inorganic, and physical chemistry. Discusses techniques to monitor enzyme reactions.

468 Bioorganic Chemistry (3:3:0) Prerequisites: CHEM 314 and 463. Basic understanding of chemical nature of biomolecules and biomacromolecules. Includes synthesis of biomolecules such as amino acids, proteins, carbohydrates, and lipids. Lectures focus on biophysical properties and synthesis, using practical examples and visual aids.

470 Laboratory Instructional Methods for Chemistry (3:1:6). Prerequisite: CHEM 314. Lecture and laboratory experience teaching chemistry in laboratory. Students work closely with faculty member and are responsible for all aspects of teaching undergraduate laboratory techniques. Students also learn techniques for acquisition and storage of chemicals and laboratory apparatus, safety, disposal of chemical waste, and literature of chemical education.

500 Selected Topics in Modern Chemistry (3:3:0) Topics of interest in analytical, biological, environmental, geological, geochemical, inorganic, organic, and physical chemistry. May be repeated for credit with different topics. Credit not allowed toward major in chemistry.

505 Hazardous Materials Waste Management (1–3: 0). Prerequisite: CHEM 313 or permission of instructor. Comprehensive review of subjects most frequently encountered in hazardous chemicals management.

513 Synthetic and Mechanistic Organic Chemistry (3:3:0) Prerequisites: CHEM 313 and 314. General review of synthetic pathways and applications to new topics, emphasizing fused ring aromatics, heterocyclics, natural products, and biologically active compounds. Includes relationship of applied organic chemistry to consumer products, including drugs and agricultural chemicals. Organic core course.

521 Theory of Analytical Processes (3:3:0) Prerequisite: CHEM 422 or permission of instructor. Theory of signal and noise, mass transport phenomena, thermodynamics, and ionics in analytical chemistry. Applications made to Fourier transform techniques such as FT-IR and FT-NMR, convolution and correlation spectroscopy, chemical sensors, chromatography, flow injection analysis, ion transport in membrane, and interpretation of analytical signals. Analytical core course.

529 Instrumental Techniques of Analysis (2:0:6) Prerequisites: CHEM 321 and 422 or 521, or permission of department. Principles and operation of modern instrumentation, emphasizing applications to analysis of chemical, biological,
and environmental samples. Methods include combined capillary column gas chromatography and mass spectrometry, high-performance liquid chromatography, optical methods, surface analysis methods, magnetic resonance spectroscopy, atomic emission and absorption spectrometry, and electroanalytical methods. With approval of research committee, students choose methods studied.

531 Elements of Physical Chemistry (3:3:0) Prerequisite: CHEM 314; PHYS 243, 245; and MATH 113; or permission of instructor. Intensive overview of concepts, techniques, and models of physical chemistry as they apply in many branches of chemistry and allied sciences. Topics include properties of gases, first and second laws of thermodynamics, phase and chemical equilibrium, chemical kinetics, atomic and molecular structure, and spectroscopy. Emphasizes developing practical skill in using tools of physical chemistry. Extensive use of spreadsheet models to investigate chemical and physical systems.

554 Geochemistry of Environmental Hazards (3:2:3) Prerequisite: CHEM 314 or permission of instructor. Introduction to origins and reactions of hazardous substances in air, water, and soil environments. Covers movement of trace organic and inorganic substances in geochemical cycle, with particular reference to transport processes that influence air and water quality.

563, 564 Biochemistry (3:3:0) Prerequisites: CHEM 313 and 314. CHEM 563 is prerequisite to CHEM 564. Previous course in biology recommended but not required. Important biological compounds, including proteins, carbohydrates, lipids, and nucleic acids, and their interrelations.

579 Special Topics (1–6:1–6:0) Prerequisites: CHEM 314 or permission of instructor. Current topics in chemistry, depending on instructor’s specialty. May be repeated with different topics, with department approval.

613 Modern Polymer Chemistry (3:3:0) Prerequisite: CHEM 513 or permission of instructor. Synthetic and analytical chemistry of synthetic macromolecules. Topics include polymer solutions, molecular weight determination, spectroscopy, thermal analysis, x-ray crystallinity, polymerization types, and commercial and electroactive polymers. Organic core course.

614 Physical Organic Chemistry (3:3:0) Prerequisite: CHEM 314 or permission of instructor. Principles underlying molecular structure, reactivity, and reaction mechanisms. Topics include valence-bond and molecular-orbital theory, electronic interpretation of organic reactions, stereochemistry, conformational analysis, kinetics and thermodynamics of organic reactions, and photochemistry. Organic core course.

617 Organic Structural Spectroscopy (3:3:0) Prerequisite: CHEM 314 or equivalent. Spectroscopic determination of organic molecular structure using 1H, 13H, 19F, and 31P nuclear magnetic resonance spectroscopy and infrared, mass, ultraviolet and visible, and Raman spectroscopy. Organic core course.

620/PHYS 533 Modern Instrumentation (3:2:2) Prerequisite: CHEM 422 or permission of instructor. Methods of sensing and measurement of radiation, particles, pressure, concentrations of specific elements and compounds. Topics include basic operational amplifier circuits for analog signals, digitizing devices and computerized data collection, noise and noise-reduction methods, and specialized instrumentation systems for various areas of chemistry and physics.

624 Principles of Chemical Separation (3:3:0) Prerequisite: CHEM 422 or 521, or permission of instructor. Theories and models of separation with applications to analyses of a wide range of chemical, biological, and environmental samples. Topics include high-resolution gas and high-performance liquid chromatography. Emphasizes theory of reverse phase, normal phase, ion exchange, size exclusion, and affinity based separations. Also presents instrumentation such as detectors, pumps, and columns, and data acquisition. Analytical core course.

625 Electroanalytical Chemistry (3:3:0) Prerequisites: CHEM 321 and 331. Review of basic electrochemistry. Emphasizes analysis and research for applications of modern electrochemical techniques such as chronoamperometry; cyclic, stripping, and AC voltammetry; pulse polarography; coulometry; electrochemical sensors; and instrumentation.

633/CSI 711 Chemical Thermodynamics and Kinetics (3:3:0) Prerequisites: CHEM 331 and 332. Advanced study covering application of kinetics to the elucidation of reaction mechanisms, and application of statistical thermodynamics to theory of elementary reaction rates. Physical core course.

646 Bioinorganic Chemistry (3:3:0) Prerequisite: CHEM 441 or permission of instructor. Applies inorganic coordination chemistry and physical methods to understand structure and function of metal ion sites in biomolecules. Biochemical roles of metal centers in oxygen transport, metalloenzymes, and electron transfer. Topics include iron cytochromes, zinc and copper enzymes, cobalamins, iron sulfur proteins, inorganic model compounds, and metals in medicine. Inorganic core course.

651 Environmental Chemistry of Organic Chemicals (3:3:0) Prerequisite: one semester of physical chemistry, or permission of instructor. Study of principles governing multimedia distribution and fate of organic chemicals in environment. Overview of origin and occurrence of major classes of natural and anthropogenic organic chemicals in environment. Environmental core course.

670 Teaching Practicum (1–2:0:0) Prerequisites: enrollment in graduate program and demonstrated proficiency in English language. Preparatory lecture and laboratory teaching in chemistry. Students work closely with faculty and are responsible for all aspects of teaching undergraduate laboratory techniques.

690 Graduate Seminar (1:1:0) Prerequisite: attendance at minimum 70 percent of departmental seminars in semester preceding each enrollment. Selected topics from recent chemical theory and applications, designed to inform about current developments in chemical sciences. Requires, in last semester, seminar presentation on student’s research or another topic acceptable to department. Three credits of CHEM 690 required for MS degree; an additional 3 credits required after admission to PhD program.

728/CSI 712 Introduction to Solid Surfaces (3:3:0) Prerequisite: CHEM 422 or equivalent. Introduces properties of solid surfaces. Topics include gas adsorption isotherms, surface area measurement techniques, real and clean surfaces, physisorption and chemisorption, methods of gas adsorption and desorption, measurement of heats of adsorption, desorp-
tion kinetics, electron spectroscopies and surface sensitivities, instrumentation; and principles of vacuum technology.

730/CSI 782/PHYS 711 Statistical Mechanics (3:3:0) Prerequisite: permission of instructor. Statistical methods, systems of particles, thermodynamics, macroscopic parameters, the ideal gas, kinetic theory, quantum statics, and transport processes.

732/CSI 713 Quantum Chemistry (3:3:0) Prerequisite: CHEM 332. Illustration of fundamental concepts of quantum mechanics with applications to chemical systems, including atomic and molecular electronic structure and properties, molecular symmetry, and intermolecular forces. Physical core course.

733 Polymer Physical Chemistry (3:3:0) Prerequisite: CHEM 332 or permission of instructor. Physical chemistry of macromolecules including molecular weight, conformation, configuration, characteristics of the glassy state, methods for studying polymer morphology (XRD, SEM, TEM, optical microscopy), electronic structure and behavior, band theory, conduction mechanisms, intrinsically conductive polymers, polarization, dielectric behavior, triboelectric behavior, piezoelectric behavior, and nonlinear optical properties.

736/CSI 783/PHYS 736 Computational Quantum Mechanics (3:3:0) Prerequisite: PHYS 502, 510, or permission of instructor. Study of fundamental concepts of quantum mechanics from computational point of view, review of systems with spherically symmetric potentials, electron atom solutions to Schrodinger's equation, electron spin in many electron systems, atomic structure calculations, algebra of many electron calculations, Hartree-Fock, self-consistent field method, molecular structure calculations, scattering theory computations, and solid-state computations.

798 Research Project (3–6:0:0) Prerequisites: permission of department; 6 credits of CHEM 798 or 799, but credit will not be given for both. Experimental or theoretical research project chosen and completed under guidance of graduate faculty member. Requires comprehensive report acceptable to advisory committee, and final oral exam on report. Graded S/NC.

799 Master's Thesis (1–6:0:0) Prerequisite: permission of department. Laboratory thesis research and writing under direction of supervisor. Minimum of 3 credits for first two enrollment periods. Graded S/NC.

Chinese (CHIN) Modern and Classical Languages

101 Elementary Chinese (3:3:1) Introduction to Mandarin, including basic grammar, oral expression, listening comprehension, reading, and writing. Language lab integral.

102 Elementary Chinese (3:3:1) Prerequisite: CHIN 101. Continuation of CHIN 101. Lab work required.

109 Intensive Elementary Chinese (6:6:2) Equivalent to CHIN 101 and 102 taught in single semester. Recommended for students who desire training in Chinese language to an intermediate level of competence in a relatively short period of time. Students may not receive credit for CHIN 109 if they have received credit for CHIN 101 or 102. Lab work required.

110 Elementary Chinese (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for CHIN 110 if they have received credit for CHIN 101, 102, or 109. Lab work required.

201 Intermediate Chinese I (3:3:1) Prerequisite: CHIN 102 or equivalent. Further development of skills acquired in CHIN 101 and 102, including grammar, oral expression, listening comprehension, reading, and writing. CHIN 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate Chinese II (3:3:1) Prerequisite: CHIN 201 or equivalent. Continuation of CHIN 201. Lab work required.

209 Intensive Intermediate Chinese (6:6:2) Prerequisite: CHIN 102, 109, appropriate placement score, or permission of instructor. Equivalent to CHIN 201 and 202 taught in single semester. Recommended for students who desire training in Chinese to an intermediate level of competence in a relatively short period of time. Students may not receive credit for CHIN 109 if they have received credit for CHIN 101 or 102. Lab work required.

210 Intermediate Chinese III (3:3:1) Prerequisite: CHIN 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Chinese-speaking regions. Lab work required.

250 Gateway to Advanced Chinese (3:3:0) Prerequisites: CHIN 210, appropriate placement score, or permission of department. Integration of advanced intermediate-level Chinese reading, writing, listening, and speaking skills, and the development of critical thinking about authentic texts from around the globe. Taught in Chinese.

300 Reading Skills Development (3:3:0) Prerequisite: CHIN 202, appropriate placement score, or permission of instructor. Develops reading proficiency, emphasizing vocabulary and grammar of standard written Chinese. Introduction to discourse structure, sociolinguistic and cultural knowledge, and strategies for reading Chinese at advanced level.

301 Advanced Grammar and Syntax (3:3:0) Prerequisite: CHIN 300, appropriate placement score, or permission of instructor. In-depth review of Chinese grammar and syntax. Provides extensive practice in controlled and free writing, emphasizing fundamental difficulties and points of interference between English and Chinese.

305 Chinese for the Business World (3:3:0) Prerequisite: CHIN 300, or permission of instructor. Introduces terminology and structure of business Chinese. Emphasizes acquiring vocabulary and developing facility in Chinese business articles and correspondence. May be repeated for credit with permission of department when content is different.

310 Survey of Chinese Literature (3:3:0) Prerequisites: ENGL 101, or permission of instructor. Introduces outlines of Chinese literature to the 19th century, presented through literary sources arranged in roughly chronological order. Readings include poetry; fiction; personal essays; documents of philosophy, history, and religion; and transcribed oral records. Knowledge of Chinese language helpful but not required. Course work in English. May be repeated for credit
once when course content is different, with permission of department.

311 Modern Chinese Literature in Translation (3:3:0)
Prerequisite: ENGL 101, or permission of instructor. Introduction of outlines of modern Chinese literature from early 20th century to post-Mao era, presented through literary sources arranged in roughly chronological order. Readings include poetry, fiction, personal essays. Knowledge of Chinese language helpful but not required. Course work in English. May be repeated for credit once when course content is different, with approval from department.

318 Introduction to Classical Chinese (3:3:0)
Prerequisites: CHIN 202, appropriate placement score, or permission of instructor. Introduces basic structures and vocabulary of Classical Chinese, which still has a large influence on the formal written prose of modern newspapers and documents.

320 Contemporary Chinese Film (3:3:0)
Explores China from 1949 to present through cinematic and literary representations. Discussions focus on representations of cultural, social, and political changes in the movies. Also introduces critical readings that address issues of gender and youth, family, ethnicity, modernity and the nation, as well as visuality and memory. Knowledge of Chinese language helpful but not required. Course work in English.

324 Major Chinese Writers (3:3:0)
Prerequisite: ENGL 101, or permission of instructor. Studies works of major Chinese writers. Writers vary. Course work in English. May be repeated for credit up to two times with permission of department. Knowledge of Chinese helpful but not required.

328 Asian American Women Writers (3:3:0)
Introduction to selected works by female writers of Chinese, Filipino, Indian, Japanese, and Korean descent. Analyzes themes, form, style, language, and structure of a variety of works, mainly novels and short stories. Assesses role and significance of writings as part of ethnic American and women’s literature by exploring questions of identity formation and disintegration, and how they are rooted in gender, social status, ethnicity, community, geography, and generational conflict. Knowledge of Asian languages not required. Course work in English.

355 Readings in Chinese Poetry and Poetics (3:3:0)
Prerequisite: CHIN 300, or permission of instructor. Close readings and discussions of primary texts covering major periods in Chinese poetry to 1949. Analyzes variety of themes, forms, and styles. Knowledge of Chinese required. May be repeated once for credit.

365 Readings in Chinese Fiction after Mao (3:3:0)
Prerequisite: CHIN 300, or permission of instructor. Close readings and discussions of primary texts after Cultural Revolution. Analyzes themes, subjects, language, and styles. Knowledge of Chinese required. May be repeated once for credit.

480 Fourth-Year Chinese I (3:3:0)
Prerequisites: CHIN 300 and 301; appropriate placement score or permission of instructor. Advanced work in major grammatical and lexical topics of Chinese. Applies theoretical principles to guided written and oral exercises.

481 Fourth-Year Chinese II (3:3:0)
Prerequisites: CHIN 300, 301, 480; and appropriate placement score or permission of instructor. Advanced work in major grammatical and lexical topics of Chinese. Applies theoretical principles to guided written and oral exercises.

Civil and Infrastructure Engineering (CEIE)

100 Environmental Engineering around the World (3:3:0)
Introduces environmental engineering as practiced in different societies around the world. Environmental engineering is broadly defined as organizational and physical infrastructure to manage natural resources. Focuses on how different societies respond to environmental challenges related to engineering opportunities. Issues include construction of large dams to manage rivers; use of forecast climate and weather data to improve agriculture, emergency response, or water supply; collection and treatment of wastewater; public health and pollution control; disposal of waste nuclear materials; and management of significantly polluted sites.

197, 297, 397 Industrial Internship I-A, II-A, III-A (0:0:0)
Civil and infrastructure engineering majors only. Prepares for summer work experience in civil and infrastructure engineering positions with land development, architecture/engineering, and construction firms, or government.

198, 298, 398 Industrial Internship I-B, II-B, III-B (0:0:0)
Prerequisites: CEIE 197, 297, 397; and ENGR 183. Civil and infrastructure engineering majors only. Supervised 10-week summer work experience in civil and infrastructure engineering positions with land development, architecture/engineering and construction firms, or government.

199, 299, 399 Industrial Internship I-C, II-C, III-C (1:1:0)
Prerequisites: CEIE 198, 298, 398. Evaluation of summer work experience in civil and infrastructure engineering positions with land development, architecture/engineering and construction firms, or government. Requires written report and presentation.

230 Hydraulics (3:3:0)
Prerequisite: PHYS 160. Principles of fluids in equilibrium and motion. Topics include hydrostatic pressure; continuity, Bernoulli, and momentum equations; viscosity flow problems; measuring instruments; and applications to closed conduits and open channels.

300 Engineering Computation and Design (3:2:3)
Prerequisite: ENGR 183. Introduces civil engineering design process. Includes methods, technologies for spatial data acquisition, emphasizing land measurements, mapping, and surveying. Covers processing field data to incorporate into computer-aided design systems; conversion of raw data into finished design documents, including schematic layouts, digital terrain models, preliminary plans, topographic maps, detailed design plans, cut sheets, cross-sections and profiles; 2D and 3D computer-aided design techniques; and application of digital computation. Includes design projects.

301 Engineering and Economic Models in Civil Engineering (3:3:0)
Prerequisite: STAT 344 and basic spreadsheet knowledge, or permission of instructor. Applies planning, analysis, control, and engineering economic models to life cycle of physical infrastructure. Introduces infrastructure design process and application of quantitative and probabilistic models. Presents applications of model building for engineering economics; decision making; forecasting; resource scheduling and allocation; estimating; work measurement and
materials; and quality and process control in water, transportation, environmental, energy, and telecommunications infrastructure systems and the built environment. f

305 Soil Mechanics (3:3:0) Prerequisite: ENGR 210. Covers formulation and engineering characteristics of soils. Includes strength and deformation characteristics, consolidation and bearing capacities, and corrective measures. Introduces foundation design fundamentals. s

311 Structural Analysis (3:2:3) Prerequisites: PHYS 160, MATH 114, ENGR 210, ENGR 310. Basic concepts and assumptions of structural analysis, including statical and geometric redundancy and related degrees of redundancy. Analyzes, by integration of deformation, simple structural members. Includes virtual work method to analyze deformations of simple structural systems such as articulate beams, trusses, frames, and arches. Analyzes statically determinate trusses. Covers method of forces to analyze statically indeterminate systems, method of displacements to analyze geometrically indeterminate systems, and symmetry and antisymmetry in structural analysis. Uses computer programs for structural analysis. f, s

340 Water Resource Engineering (3:2:3) Prerequisite: CEIE 230. Introduces principles and practice of water resources engineering. Covers analytic methods and computer models to design and evaluate water resource projects such as flood control and river basin development. Topics include hydrology; governing principles, common models, and typical applications for water resource systems; and design of storm water management systems and sanitary sewers. Laboratory and field work required on selected topics. f, s

360 Introduction to Transportation Engineering (3:2:3) Prerequisites: ENGR 210, ENGL 302, and CEIE 290. Introduces transportation systems and the factors that influence their planning, design, and operation. Topics include fundamentals of urban travel, travel demand forecasting, and traffic flow; principles of highway design; highway capacity and level of services; introduction to traffic control; traffic signal control systems; intersection design; speed zoning and control; and introduction to Intelligent Transportation Systems and travel demand management. Requires laboratory, field work on selected topics. Fulfills writing-intensive requirement for civil and infrastructure engineering major. f, s

367 Behavior of Concrete and Steel Structures (3:3:0) Prerequisite: CEIE 311. Covers structural design process. Analysis and design of simple steel structural and simple reinforced concrete members, including tension members, beams, and columns; and bolted and welded connections in steel structures. Uses computer programs to analyze, design, and optimize complex structural systems. f, s

400 Civil Engineering Planning and Management (3:3:0) Prerequisites: CEIE 360 and 340; corequisites: CEIE 440 and 455. Quantitative and qualitative analysis in planning, design, construction, and management of engineering systems and facilities. Introduces policies, programs, and regulations that influence land development, history-enabling legislation, governing and regulating bodies, control of site plan development, and approval process. Examines structure, function, and purpose of urban design systems and how they can be achieved. Discusses physical relationships among development, land use, transportation, energy, communications, and water systems. Studies public- and private-sector urban development industry. Other topics include innovation, competition, new technology, and environmental issues. Requires design projects. f

410 Geographic Information Systems in Engineering (3:3:0) Prerequisites: CS 112 or ENGR 117, CEIE 360 and CEIE 455. Credit is not given for both CEIE 410 and 510. Introduces geographic information systems (GIS) and their application in environmental, transportation, land-use planning, and other situations. Explores methods, technologies for spatial data acquisition, specification, storage, manipulation, query, thematic analysis, presentation, and application in the design process. Introduces relationships, integration of GIS with computer-aided design and global positioning system. Hands-on projects. f

411 Introduction to Design and Inventive Engineering (3:3:0) Outlines major stages of design process. Covers conceptual versus detailed design; design theories, including axiomatic and inferential; basic assumptions and industrial applications of proactive design; design evaluation, including multiatribute utility models; and network computing in design. Covers inventive problem-solving methods, including brainstorming, Synectics, TRIZ, and morphological analysis. Includes computer tools to support design creativity. Features collaborative design: fundamentals and group projects dealing with civil engineering problems provided by industry.

440 Water Supply and Distribution (3:2:3) Prerequisite: CEIE 230. Focuses on analysis and design of public water supplies. Topics include supply evaluation; water quality and quantity requirements; treatment requirements and methods; hydraulic analysis of water distribution systems including line sizing, fire protection, pumps, valves, and storage; environmental impact assessments; and federal, state, and local government laws and regulations related to public water systems. Requires laboratory, field work on selected topics. f

450 Environmental Engineering Systems (3:3:0) Prerequisite: CEIE 455. Credit is not given for both CEIE 450 and 550. Introduces systems analysis in environmental engineering. Applies linear and dynamic programming, computer modeling, and other systems analysis methodologies to solve environmental engineering problems related to air, soil, and water pollution. Reviews experimental design approaches to characterize environmental sites. s, odd years

452 Wastewater Management (3:3:0) Prerequisite: CEIE 455. Credit is not given for both CEIE 452 and 552. Explores design fundamentals to treat wastewater. Topics include environmental regulations; wastewater characterization; pretreatment systems; biological, physical, and chemical treatment; treatment and disposal of wastewater sludge; and financing and management. Also covers consequences of environmental policies; environmental impact assessments; and federal, state, and local government laws and regulations related to wastewater collection, treatment, and disposal. s, even years

455 Introduction to Environmental Engineering (3:3:0) Prerequisite: 3 credits of chemistry. Credit is not given for both CEIE 455 and 555. Introduces principles of environmental engineering management and design pertaining to water supply and treatment, wastewater treatment, solid waste management, air pollution control, noise pollution measurement and control, and environmental impact assessment. f

456 Environmental Law (3:3:0) Credit is not given for both CEIE 456 and 556. Introductory course in the study of environmental laws as they pertain to urban systems infrastructure
management. Reviews the National Environmental Policy Act, Clean Air Act, Clean Water Act, Safe Drinking Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, and other environmentally related legislation. Also reviews laws for allocation of surface and groundwater supplies, and reviews environmental law databases.

460 Public Transportation Systems (3:3:0) Prerequisite: CEIE 360. Credit is not given for both CEIE 460 and 560. Analyzes public transportation systems in terms of their role in urban transportation. Topics include history of public transportation in the United States, quantitative performance attributes of different modes, analytical techniques for planning and operation, and management and administrative concepts.

461 Traffic Engineering (3:3:0) Prerequisite: CEIE 360 or 365. Credit is not given for both CEIE 461 and 561. Elements of traffic engineering analysis; system components of traffic operations: driver, vehicle, and roadway; traffic flow design elements including volume, density, and speed; intersection design elements including traffic control device warrants, signal timing, delay, capacity, and accident countermeasures; and terminal design elements including inflow, outflow, and circulation.

462 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 360 or 365. Credit is not given for both CEIE 462 and 562. Technical and qualitative aspects of urban transportation planning process. Topics include urban travel characteristics and data collection methods; urban transportation modeling system, including land use, trip generation, trip distribution, mode choice, and trip assignment models; site traffic impact studies; environmental impacts; project and plan evaluation; and technology options for urban transport.

463 Construction Systems (3:3:0) Prerequisite: CEIE 301. Overview of the modern construction industry and principles and practices of construction management. Topics include project planning, construction administration, the contract environment, equipment operations, cost estimation and scheduling, and legal theories. Current industry trends are emphasized as are the uses of modern scheduling and cost-estimating software and online databases.

490 Senior Design Project (3:3:0) Prerequisite: CEIE 367, 400. Capstone design experience. Integrates all design fundamentals employed by a typical civil engineering design team. Major team efforts include land use, transportation, water and sewerage, stormwater, site analyses, economic and regulatory considerations, sectioning, grading, and siting. Students focus on teamwork, interdisciplinary interaction, and tradeoff decision making. Design team analyzes all aspects of a major urban project, develops solutions to design problems, and produces project report and oral presentation. Design effort completed and report is prepared, presented, and evaluated. Primary course goal is to produce design for contemporary civil infrastructure project.

498 Independent Study in Civil Engineering (1–3:0:0) Prerequisite: 60 credits; must be arranged with an instructor and approved by department chair before registering. Directed self-study of special topics of current interest. May be repeated for maximum 6 credits if topics are substantially different.

499 Special Topics in Civil Engineering (3:3:0) Vary with nature of topic. Topics of special interest to undergraduates.
financing and management. Includes consequences of environmental policies; environmental impact assessments; and federal, state, and local government laws and regulations related to wastewater collection, treatment, and disposal. s, even years

555 Introduction to Environmental Engineering (3:3:0) Credit is not given for both CEIE 455 and 555. Introduces principles of environmental engineering management and design pertaining to water supply and treatment, wastewater treatment, solid waste management, air pollution control, noise pollution measurement and control, and environmental impact assessment. f

556 Environmental Law (3:3:0) Credit is not given for both CEIE 456 and 556. Introductory course in the study of environmental laws as they pertain to urban systems infrastructure management. Reviews the National Environmental Policy Act, Clean Air Act, Clean Water Act, Safe Drinking Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, and other environmentally related legislation. Also reviews laws for allocation of surface and groundwater supplies, and reviews environmental law databases. s

560 Public Transportation Systems (3:3:0) Prerequisite: CEIE 360. Credit is not given for both CEIE 460 and 560. Analyzes public transportation systems in terms of their role in urban transportation. Topics include history of public transportation in the United States, quantitative performance attributes of different modes, analytical techniques for planning and operation, and management and administrative concepts. f, odd years

561 Traffic Engineering (3:3:0) Prerequisite: CEIE 360 or 365 or equivalent. Credit is not given for both CEIE 461 and 561. Covers elements of traffic engineering analysis; system components of traffic operations: driver, vehicle, and roadway; traffic flow design elements including volume, density, and speed; intersection design elements including traffic control device warrants, signal timing, delay, capacity, and accident countermeasures; and terminal design elements including inflow, outflow, and circulation. f

562 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 360 or 365 or equivalent. Credit is not given for both CEIE 462 and 562. Covers technical and qualitative aspects of urban transportation planning process. Topics include urban travel characteristics and data collection methods; urban transportation modeling system, including land use, trip generation and distribution, mode choice, and trip assignment models; site traffic impact studies; environmental impacts; project and plan evaluation; and technology options for urban transport. s

565 Design of Transport Systems (3:3:0) Prerequisite: CEIE 360. Covers street and highway facilities design emphasizing interaction among driver, vehicle, and geometric design elements. Design of interchanges and intersections; highway roadside safety and tort liability; pavement design, maintenance and safety; edge dropoff; clear zone concept; roadside barriers; guardrail treatments; traffic calming; pedestrian and bicycle and transit design challenges; and work-zone traffic control. Provides skills to understand interaction among driver, vehicle, and environment, and how to incorporate better design practices. Also introduces concepts of forgiving highway design and highway tort liability.

600 Civil Engineering Infrastructure Planning and Management (3:3:0) Study of planning and management practices applicable to the life cycle of the physical urban infrastructure including roads, sewers, water distribution and other pipelines, telecommunications, and energy distribution systems. Includes study of relationship of urban growth and infrastructure reinvestment; mechanisms of deterioration; direct and indirect methods of assessment and degradation models; capital finance, budgeting, and programming; planning integration and coordination; quantitative applications in planning; uncertainty and reliability; public-private partnerships; operation and maintenance strategies; and future issues.

601 Infrastructure Modeling (3:3:0) Prerequisite: CEIE 605. Concepts of modeling for infrastructure engineering. Covers modeling, simulation, optimization, deterministic and stochastic models, and limitations of modeling approaches. Also includes multiple objective, multiple decision maker problems, and case studies in areas such as transportation, water resources, the environment, energy, telecommunications, and construction. s

605 Infrastructure Systems Analysis (3:3:0) Prerequisite: STAT 344. Probability and statistics topics for analysis of infrastructure systems. Includes Bayesian decision theory, decision trees, Monte Carlo analysis, stochastic models, and economic analysis of infrastructure projects and systems. f

610 Construction Systems and Management (3:3:0) Prerequisite: permission of instructor. Studies applications of construction management concepts and techniques to the production of constructed system. Explores construction industry and environment through project cycle design and construction phases, emphasizing estimating, planning, scheduling, labor, money, materials, machines, time, and information. Uses popular scheduling software with class projects and case study.

632 Groundwater Systems Modeling (3:3:0) Prerequisite: CEIE 601. Introduces groundwater hydrology and modeling, including quantity and quality aspects. Topics include characterization of subsurface regime; well hydraulics; consideration of two-dimensional steady and unsteady state flows; exploration of modeling approaches; simulation and optimization modeling; contaminant transport; parameter estimation; and design of systems to control groundwater quantity and quality.

660 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 601. Quantitative and qualitative techniques in urban transportation planning. Topics include different levels of urban transportation planning; technical transportation planning process, including travel demand estimation, establishment of transportation strategies, and utility analysis; and activity center planning including onsite vehicle and pedestrian circulation, transportation interface, environmental planning, and planning administration.

663 Intelligent Transportation Systems (3:3:0) Prerequisite: CEIE 561 or 562. Advanced transportation system operations and safety through the use of wireless and wireline communications; integrated transportation systems; in-vehicle technologies; industry standards; and systems architecture. Provides skills to apply advanced technologies to transportation systems to improve operational and safety performance. Provides nontraditional tools to address issues of congestion and improved safety performance.
670 Civil Engineering Decision Methods and Tools (3:3:0)
Prerequisite: CEIE 605. Principles of decision making and knowledge acquisition to build knowledge-based decision support tools for civil, environmental, and infrastructure engineering. Includes solving complex problems from several areas of urban systems engineering; and using various decision-support tools based on Bayesian decision theory and principles of artificial intelligence, including knowledge-based systems and learning systems.

671 Best Engineering Management Practices (3:3:0)
Prerequisite: graduate standing. Covers strategies to identify and implement best engineering management practices. Addresses development of performance standards. Introduces quality-improvement methods and standards, including Quality Functional Development, ISO 9000, Baldrige Excellence Award, and the Six Sigma method. Presents relevant national and engineered standards, statistical norms, rules of thumb, selected statistics from comparative projects, excerpts from performance records, and performance targets. Covers case studies relating to management of infrastructure projects. Includes introduction to benchmarking methods, addressing criteria to select benchmarking program or process.

680 Introduction to Infrastructure and Security Engineering (3:3:0)
Prerequisite: BS in civil engineering, or permission of instructor. In-depth review of present and proposed practices and issues to manage civil infrastructure, focusing on performance and security through the full life cycle, including planning, design, and construction of new, rehabilitated, modified, and recycled or decommissioned components. Covers asset-management methods and their effectiveness in managing all types of risk. Profiles policies leading civil infrastructure industry toward adoption of such methods, and examines industry case studies. Special attention to vulnerability assessment and risk management in context of broad sampling of potential threats.

681 Security of Structural Systems (3:3:0)
Prerequisite: BS in civil engineering, or CEIE 367. Basic concepts of security of structural systems; analytical models of behavior of structural systems under various security threats; computer simulation of security threats, including blasts and fire; generation of terrorist scenarios and of preventive structural measures; design for security; out-of-the-box approaches to development of preventive structural measures; lessons learned; and intelligent structural security systems.

683 Water and Wastewater Systems Security (3:3:0)
Prerequisite: BS in civil engineering, or CEIE 440 and 455. Examines overall security of water and wastewater systems. Covers theory and methods to define water and wastewater infrastructure as physical and organizational systems. Explores concepts of infrastructure systems security; identifies actors, interactions in organizational infrastructure, and threats to water and wastewater infrastructure; describes behavior of physical and organizational infrastructures under stress; examines history of threats or attacks against water and wastewater systems; and explores evolution of design, operations, and maintenance paradigms in response to changes in threats. Covers proactive responses to security threats through vulnerability assessments, and models of organizational and physical infrastructure system.

685 Civil Engineering Information Management (3:3:0)
Advanced course covering all phases of information management life cycle from conceptual design and data collection through systems development, archiving, and disposal. Covers software engineering such as structured analysis, rapid prototyping, and object-oriented analysis as applied to urban systems infrastructure problem solving. Reviews database technology, spreadsheets, communications software, customized applications software, groupware, and graphics software including computer-aided design and geographic information systems. Covers selection and use of appropriate software to match specific engineering problems related to the design, construction, and management of civil engineering infrastructure. Includes design and development of system for engineering application.

686 Transportation System Security and Safety (3:3:0)
Prerequisite: BS in engineering or permission of instructor. Focuses on critical transportation systems infrastructure and operations, and technologies for predicting and managing damage and disruptions caused by potential threats, including natural and technological disasters and terrorist threats. Includes asset management, methodologies for assessing vulnerabilities, potential impact of damage and disruption, applying state-of-the-art technologies and R&D processes for harnessing best analysis methods, and technologies for hardening transportation infrastructure systems. Includes sensing and surveillance using satellite and aerial remote sensing imagery, application of GIS and spatial information technologies, information and communication, intelligent transportation systems, hardening systems, and making intelligent choices for implementing technology advances to transportation security and safety.

690 Topics in Civil Engineering (3:3:0)
Prerequisite: determined by topic. Topics not covered in the regular civil engineering offerings. Course content may vary each semester. Course may be repeated with change in topic.

762 Transportation System Planning Models (3:3:0)
Prerequisite: CEIE 562 or 660; CEIE 601. Covers transportation systems analysis; theory, mathematical structure, and applications of transportation planning models; network analysis and equilibrium; dynamic and stochastic equilibrium models; modal choice analysis; discrete choice models of transportation demand; and model estimation and aggregation.

767 Traffic Engineering Modeling and Analysis (3:3:0)
Prerequisites: CEIE 561, 601. Covers basic principles of simulation; queuing theory and traffic signal operations at individual intersections, arterials and networks; applying models related to traffic signalization; optimization and traffic simulation; and developing skills to select most appropriate model for given scenario.

795 Civil and Infrastructure Engineering Seminar (0:1:0)
Prerequisite: graduate standing. Invited speakers, faculty, and CEIE graduate students lecture on current topics and research. Partially fulfills MS in civil and infrastructure engineering seminar requirement; required for master’s candidates during semester they complete research project or thesis.

796 Directed Reading (1–3:0:0)
Prerequisites: graduate standing and permission of instructor. Reading on specific topic under direction of faculty member. May be repeated with change in topic.

798 Research Project in Civil Engineering (3:3:0)
Prerequisite: permission of instructor; corequisite: CEIE 795. Analyzes and investigates contemporary problem in civil, environmental, and infrastructure engineering. Requires prior approval by faculty member who supervises student’s work. Written report also required.
799 Master’s Thesis (1–6:0:0) Prerequisites: 18 credits of graduate-level course work and permission of instructor. Research project chosen and completed under guidance of graduate faculty member that results in technical report acceptable to three-faculty-member committee, and an oral defense.

Classical Studies (CLAS)

Modern and Classical Languages

240 Greek and Latin Elements in English (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Studies formation of English vocabulary derived from Greek and Latin prefixes, stems, and suffixes to increase word power in English (vocabulary, style). Special emphasis on bioscientific, medical, and legal terminology. Intended for native and non-native speakers of English. Literary texts illustrate word analyses, vocabulary uses.

250 Classical Mythology (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Illustrates role of classical myths in classical and modern literature and art. Course work in English.

260 The Legacy of Greece and Rome (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Introduces history, culture, and literature of Greece and Rome through close readings of central passages from classical literature dealing with some of the most important aspects of human existence. Illustrates importance of classical antiquity for the Western tradition. Course work in English.

340 Greek and Roman Epic (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Examines development of classical epic as genre, from beginnings with Homer to transformations in the works of later Greek and Roman authors. Course work in English.

350 Greek and Roman Tragedy (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Follows development of tragedy from its origins to the works of Aeschylus, Sophocles, and Euripides, and its reappearance in the Roman world in the tragedies of Seneca. Considers influence of Greek tragedy on later cultures. Course work in English.

360 Greek and Roman Comedy (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Studies forms, contexts, and developments of comedy as a dramatic form in Greco-Roman world. Traces development of New Comedy in Hellenistic age, and translation and adaptation of New Comedy by Roman dramatists Plautus and Terence. Course work in English.

370 Greek and Roman Historians (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Examines writings of major Greek and Roman historians, including Herodotus, Thucydides, Sallust, Livy, and Tacitus; their interpretations of the past; and their influence. Course work in English.

380 Greek and Roman Novels (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Examines novels written in antiquity, and influences on postclassical and modern literature. Emphasizes works of Longus, Heliodorus, Petronius, and Apuleius. Course work in English.

290 Topics in Classical Literature and Culture (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Certain topics may have other CLAS courses as prerequisites. Studies forms, contexts, and developments of distinctive literary genre or cultural phenomenon in Greco-Roman world. Course work in English. May be repeated once for credit.

499 Senior Seminar in Classical Studies (3:3:0) Prerequisites: modern and classical languages majors concentrating in classical studies, 90 credits, and permission of instructor. Individual research on specialized topic culminating in seminar paper. Fulfills writing-intensive requirement. Subject of seminar determined by instructor in consultation with student. Permission must be obtained in advance. Students may present no more than 3 credits for graduation.

Climate (CLIM)

Climate Dynamics

101 Weather, Climate, and Society (3:3:0) Prerequisites: none. This course provides a survey of the scientific and societal issues associated with weather and climate variability and change. The course will examine physical phenomena observed in the Earth’s weather and climate, providing sufficient scientific and technical background to enable students to critically examine arguments being discussed by policymakers and the public at large. The course will also review the current debate on climate change from a scientific point of view, with a focus on those aspects that have the largest potential impact on global society.

710 Introduction to Physical Climate System (3:3:0) Prerequisites: BS or MS in mathematics or a physical science, or permission of instructor. Provides modern understanding of ocean, atmosphere, and land based on fundamental physical laws. Describes current climate and physical processes by which climate is maintained. Covers theoretical models of general circulation of atmosphere, including time mean and transient behavior. Describes basics of ocean circulation, and interactions between ocean and atmosphere. Reviews past climate change; stratosphere and its interactions with troposphere; and role of land processes in modulating climate.

711 PHYS 676 Introduction to Atmospheric Dynamics (3:3:0) Prerequisites: BS or MS in mathematics or a physical science, or permission of instructor. Covers basic conservation laws of mass, momentum, and energy; and scaling analysis of equation of motion and thermodynamic equation. Discusses balanced flows in atmosphere, such as geotropic wind and its vertical shear, and thermal wind relationship. Also explores circulation and vorticity; role of atmospheric boundary layer in mass, momentum, and energy transfer; synoptic scale motions; and role of gravity and Rossby waves in controlling general circulation of atmosphere.

712 Physical and Dynamical Oceanography (3:3:0) Prerequisites: BS or MS in mathematics or a physical science, or permission of instructor. Introduces climatology and dynamics of oceans. Covers nature of seawater, heat, and salt budgets; general circulation of the ocean, including the Gulf Stream and thermohaline circulation; dynamics of wind-driven ocean circulation; and processes influencing biological and chemical behavior.

713 Atmospheric-Ocean Interactions (3:3:0) Prerequisites: CLIM 712 or 711 or equivalent, or permission of instructor. Provides comprehensive observational and mechanistic understanding of El Niño and Southern Oscillation (ENSO).
phenomena. Topics include observations and theories of seasonal and interannual changes in ocean circulation and temperature and interactions with atmosphere; equations of motion and theories of wind-driven circulation; mixed layer observations and theories; midlatitude and equatorial ocean waves; interannual variability and atmosphere-ocean coupling; and tropical oceanography and meteorology.

714 Land-Climate Interactions (3:3:0) Prerequisites: BS or MS in mathematics or physical science, or permission of instructor. Interdisciplinary course providing detailed description of surface energy and water balance over land, and radiative and turbulent transfer. Introduces numerical techniques for modeling land surface and applications in weather, climate, and hydrologic forecasting and simulation. Includes hands-on experience with land surface models in computer laboratory, including sensitivity experiments to reinforce theoretical concepts. Exposure to contemporary research through reading and reviewing seminal journal papers.

715 Numerical Methods for Climate Modeling (3:3:0) Prerequisites: CLIM 712 or 711 or equivalent, or permission of instructor. Foundation and theory of computational methods for atmosphere and ocean modeling, with special emphasis on finite-difference and spectral methods. Topics include accuracy, consistency, convergence and stability; time stepping schemes; nonlinear computational stability; energy and enstrophy conserving schemes for momentum equations; staggered and curvilinear grids; alternate vertical coordinate systems; implicit and split-explicit barotropic mode solution; pressure gradient errors and vorticity constraints; spectral methods for atmospheric models; and treatment of model physics.

750 Geophysical Fluid Dynamics (3:3:0) Prerequisite: CLIM 711, or permission of instructor. Introduces geophysical fluid dynamics, the study of rotating stratified flows. Covers hydrostatics; equations of motion, gravity wave dynamics, and stratified flow; effects of rotation, midlatitude dynamics, Rossby number and quasigeostrophic expansion; beta plane approximation; and equatorial Kelvin and Rossby waves.

751 Predictability of Weather and Climate (3:3:0) Prerequisites: CLIM 711 or equivalent, or permission of instructor. Covers fundamental aspects of weather and climate predictability. Using simple dynamical models, illustrates basic theorems on divergence of trajectories in phase space and fundamental periodicity properties of flow. Explores paradigms of turbulence, barotropic and baroclinic instability, and optimal linear growth to describe fundamental error growth mechanisms. Examines examples from real weather forecasting systems. Studies predictability of time averages with simple dynamical models and experiments using complex general circulation models and historical data analysis. Emphasizes roles of boundary conditions of sea surface temperature and soil moisture.

752 Ocean Circulation Theory (3:3:0) Prerequisites: CLIM 712 or 711 or equivalent, or permission of instructor. Description and theory of large-scale ocean circulation and how it affects climate. Focus is on ubiquitous flow structures such as gyres, equatorial currents, and meridional overturning cells. The class examines how the circulation follows from wind and thermohaline forcing and from physical principles. The influence of the circulation on heat transport and climate variability is also discussed. Conceptual guideposts include barotropic gyres, Ekman cells, potential vorticity, western intensification, the interplay of gravity and the Earth’s rotation, advective-diffusive balance, multiple flow states, and Rossby waves.

753 General Circulation of the Atmosphere (3:3:0), Prerequisites: CLIM 710 and 711. Overview and several theoretical perspectives of atmospheric transport of energy, moisture, and angular momentum, and how these processes fundamentally affect the climate on various time scales.

759 Topics in Climate Dynamics (3:3:0) Prerequisites: permission of instructor. Covers selected topics in climate dynamics not covered in fixed-content courses. May be repeated for credit when offered with different content.

796 Directed Reading and Research (1–6:0:0) Prerequisites: admission into climate dynamics doctoral program and permission of instructor. Reading and research on a specific topic in climate dynamics under the direction of a faculty member. May be repeated as necessary.

991 Climate Dynamics Seminar (1:1:0) Prerequisites: graduate standing. Presentations in climate dynamics field by Mason faculty and invited speakers. May be repeated for credit; however, a maximum of 3 credits may be applied toward the climate dynamics PhD.

996 Doctoral Reading and Research (1–6:0:0) Prerequisites: admission into climate dynamics doctoral program and permission of instructor. Reading and research on a specific topic in climate dynamics under the direction of a faculty member. May be repeated as necessary.

998 Doctoral Dissertation Proposal (1–12:0:0) Prerequisites: doctoral standing and permission of instructor. Covers development of research proposal under guidance of dissertation director and doctoral committee. Proposal forms basis for climate dynamics doctoral dissertation. Course may be repeated, but no more than 12 credits of CLIM 998 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1–12:0:0) Prerequisites: admission to doctoral candidacy and permission of instructor. Doctoral dissertation research under direction of dissertation director. May be repeated, but no more than 24 credits total in CLIM 998 and 999 may be applied to doctoral degree requirements.

College of Humanities and Social Sciences (CHSS)

101 Presenting and Processing Information Using Technology (1–3:0–3:0–3) Prerequisite: varies with topic. Presents practical experience in computer applications. Topics vary; most require laboratory work. May be repeated for credit when course content differs.

200 Introduction to Science and Society (2:2:0) Provides students in the interdisciplinary minor in science and society with general background information and a common frame of reference for developing an individualized core of course work. Students design a plan for their course work in the minor, envision the specific topic they will address, and begin preliminary preparation for CHSS 400.

313 Mystery, Madness, and Murder (3:3:0) Prerequisite: completion or concurrent enrollment in all other required general education courses. Multidisciplinary approach to
taboo topics that fascinate and frighten us. Instructors from disciplines across the arts and sciences bring expertise and diverse perspectives to provocative issues such as cannibalism and serial murder. Students learn to think critically and objectively while examining use in myth, literature, and popular culture.

390 Peer Tutoring in Writing across the Disciplines (1:0:0) Prerequisites: grade of A in ENGL 302, 60 credits, and overall GPA of 3.00 or higher with a GPA in major of 3.50 or higher. Student must submit two faculty recommendations and a sample of recent academic writing, and complete an interview with the director of the Writing Center. Experiential learning course in teaching of writing across disciplines. Students receive Writing Center training in theory and techniques of tutoring writing, and work a minimum of 3 hours per week in Writing Center. Focus is on practical application of writing theory and pedagogy from course readings, development of tutoring skills, and self-reflection through journals and final paper. May be repeated up to three times.

395 Technology Apprenticeship (3:1:0) Prerequisites: 30 credits; GPA of 2.50 or higher; ability to use Internet browser; and skills in keyboarding, data entry, and word processing. Experiential learning course in using technology in instruction. Students receive up to 45 hours of instruction and work 90 hours with faculty members, assisting with technology project. Students submit faculty recommendation and application to technology apprenticeship coordinator. May be repeated once for credit.

400 Perspectives on Science and Society (1:1:0) Prerequisite: CHSS 200 and completion of 17 credits toward the minor in science and society. Capstone course for the interdisciplinary minor in science and society. Helps students integrate material from their individualized core of courses and make explicit connections among the various disciplines. Provides opportunity for students to share their experiences, expanding their breadth of knowledge in this important and timely area of study.

485 International Internship (3–9:0:0) Prerequisites: 60 credits, 2.50 GPA, and successful completion of application and selection process. Students should contact faculty director one semester prior to semester of enrollment. Work at overseas locations under faculty director and site supervisor. Predeparture orientation; minimum 45 hours of work for each credit (in 3-, 6-, and 9-credit increments); and written assignments as specified in learning contract approved by faculty director, including journals, work products and reports, reflective essays, and research papers.

490 Faculty-Student Research Apprenticeship (3:0:0) Prerequisites: 60 credits, and permission of instructor. Open only to recipients of the provost’s Faculty-Student Apprenticeship Award. Introduces scholarship in action in major field of study. Complements and enriches required course material, and provides undergraduates the unique opportunity to work collaboratively with faculty on research projects.

College Teaching (CTCH) Higher Education

601 The Community College (3:3:0) Studies institutional character of the community college, including history, purpose, clientele, organization, finance, and social function. Studies issues currently faced by community colleges.

602 College Teaching (3:3:0) Describes issues that affect teaching and learning, and provides basic tools to use in college classroom. Teaches how to plan course, develop syllabus, promote learning among diversity of students, and implement classroom assessment techniques.

603 Technology in Higher Education (3:3:0) Prerequisites: basic familiarity with computer operations. Overview of technology issues in higher education and hands-on experience with select technology tools to enhance productivity and classroom and online learning. Examines issues related to using technology in administration, teaching and learning, and guides in developing policies and effective technology-enhanced learning activities for students.

604 The Scholarship of Teaching and Learning (3:3:0) Overview of the movement in higher education in scholarship of teaching and learning. Focuses on ways students learn, how learning can be improved, and different methods of conducting research into teaching and learning.

605 Curriculum and Program Design and Assessment (3:3:0) Prerequisites: CTCH 601 or 602, and 603. Prepares for designing, implementing, and assessing new courses, curricula, and programs. Examines relationships of courses and curricula to larger programs and institutional goals. Explores program planning and implementation such as documenting need, generating cost estimates, and assembling strong case for new programs.

606 Diversity in Higher Education (3:3:0) Explores instructional interactions and communication strategies for diverse learner populations. Includes discussion of sociological, behavioral, and cognitive theory on culture.

621 Higher Education in the United States (3:3:0) History of higher education from colonial period to the present. Examines philosophic, political, social, and economic forces that have influenced development. Reviews today’s issues and challenges.

622 Organization and Administration in Higher Education (3:3:0) Provides concepts of organization and administration in contemporary institutions from macro to micro perspectives. Studies theory and practices of the organization as it relates to governance, structure, and management of the institution.

624 Finance and Fiscal Management in Higher Education (3:0:0) Overview of higher education finance and fiscal management.

626 Assessment in Higher Education (3:3:0) Focuses on political and historical context of assessment in higher education, and teaches strategies for classroom, program, and institutional assessment. Develops skills in survey and focus group research, and teaches how to develop and implement assessment plan.

641 Introduction to Counseling (3:3:0) Introduces profession and its practice in various settings. Examines history and development of counseling; national associations; ethical code; standards for preparation and credentials; and roles, functions, and responsibilities.

643 Counseling Theory and Practice in Higher Education (3:3:0) Study of historical contemporary approaches to counseling. Emphasizes applications of theoretical models as appropriate for higher education.

644 Student Services in Higher Education (3:3:0) Focuses on development and organization of student personnel
programs and services in institutions of higher learning. Covers philosophy, methods, and techniques.

645 The Contemporary College Student (3:3:0) Analyzes changing demographics, barriers, and developmental issues facing college students. Studies impact of college environment on student development, and interaction between students of varying subcultures and the environment. Examines technology issues and their impact.

685 Practicum (3:3:0) Prerequisites: Admission to certificate, MAIS/CCT or MAIS/Higher Education program; approval of advisor and practicum coordinator; 12 credits of core requirements; and 3 additional credits. Serves as an essential part of the certificate and MAIS programs. Supervised on-the-job experience in approved college or university setting or public agency involved in higher education. Develops skills applicable to college-based teaching or higher education administration or policy. Approval of practicum coordinator needed one semester before registration. Minimum 150 hours of work and participation in internship seminar. Graded S/NC.

792 Special Topics in Higher Education (1–6:1–6:0) Prerequisite: admission to doctoral program, or permission of instructor. Covers current issues in teaching and learning in higher education. May be repeated for credit when topic is different.

821 History of Higher Education in the United States (3:3:0) Key issues and moments in the history of higher education are examined as a way to understand current structures, cultures, policies, and purposes. Historical perspective will also be used to consider the near future of higher education. Students will examine current trends and possible futures for a specific topic by doing historical research on the issue.

826 Advanced Institutional and Program Assessment in Higher Education (3:3:0) Examination of educational assessment and evaluation, practices, and methods. Students critique and design an evaluation study and an evaluation report. Reviews ethical issues and impact of assessment and evaluation for students, employees, and programs.

830 Ethics in Higher Education: Personal, Organizational, and Institutional Realities (3:3:0) Explores theories, definitions, and applications of ethics across multiple higher education settings, with particular attention to critical theory contributions. Includes an in-depth analysis of major complex ethical issues in higher education settings using ethical frameworks.

885 Doctoral Internship in College Teaching and Administration (3:1:0) Prerequisites: admission to doctoral program, approval of advisor and internship coordinator, 18 credits of education core requirements, and 6 additional credits in knowledge area. Students must contact the program at least one semester before enrolling. Supervised internship at community college, four-year college/university, or non-teaching higher-education setting such as government agency or administrative office. Develops skills applicable to college-based teaching or higher education administration or policy. Minimum 180 hours of work and participation in internship seminar. Graded S/NC.

897 Directed Reading in Higher Education (1–6:0:0) Prerequisite: admission to doctoral program and permission. Independent reading on topic agreed on by student and instructor.

998 Doctoral Dissertation Proposal (1–3:0:0) Prerequisite: completion of at least one internship and all other course work and qualifying exams. Contact program for permission to register. Work on research proposal that forms basis for doctoral dissertation. Graded S/NC.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: CTCH 998, two internships, and appointed dissertation committee. Doctoral dissertation research and writing under direction of dissertation committee. Graded S/NC.

College of Visual and Performing Arts (CVPA)

College of Visual and Performing Arts

101 Arts Pass (2:2:0) Introduction to appreciation of the arts through lecture, demonstration in visual art, music, dance, and theater. Emphasizes aesthetic principles in modern society. Students attend performances and exhibitions, and develop analytical skills through written journal and discussion. May be repeated for total 4 credits.

102 Experiencing the Arts (3:1:2) Reserved for high school students enrolled in CVPA. Introduces collaborative and interdisciplinary arts experiences in visual art, music, dance, theater, film, and media through daily intensive immersion in the arts for two and one half weeks. Not repeatable. Graded S/NC.

105 Special Topics in the Arts (1–3:1–3:0) Exploration of topical studies on the arts. Subject matter varies. May be repeated for a maximum 12 credits when taken under different topics.

305 Seminar in Arts Management (3:3:0) Prerequisite: junior standing, admission to arts administration minor, or permission of instructor. Covers planning, programming, presentation, funding, and communications in managing visual and performing arts. Includes guest speakers, case analyses, and semester-long individual and group projects.

308 Cross-Cultural Arts Appreciation (3:3:0) Provides cumulative arts experience by tying subject matter to major cultural production of Center for the Arts. Subject matter varies. May be repeated for maximum 12 credits when taken under different topics.

399 Special Topics in the Arts (1–6:1–6:3) In-depth presentation and exploration of topical studies on the arts. Subject matter varies. May be repeated for maximum 24 credits when taken under different topics.

430 Topics in Arts and Wellness (1–3:1–3:0) Prerequisite: junior standing, or permission of instructor. In-depth presentation and exploration of topical studies in arts and wellness or related areas such as injury prevention, performance enhancement, and health and wellness training. Topic depends on instructor. May be repeated for up to 9 credits taken under different topics.

498 Field Experience in the Arts (3–6:0:0) Prerequisite: junior standing; completion of 6 credits in CVPA courses in area of residency; CVPA 305; or permission of instructor. Apprenticeship, internship, or project with organization or individual in the arts. Must be prearranged with division director before enrollment. May be repeated for maximum 6 credits.

499 Research/Performance/Topics in the Arts (3–6:0:0) Advanced research, performance, or exploration of topical studies in arts. May be repeated for maximum 6 credits.
530 Topics in Arts and Wellness (1–3:103:0) Prerequisite: 90 hours or permission of the instructor. In-depth presentation and exploration of topical studies in arts and wellness and/or related areas (e.g., injury prevention, performance enhancement, health and wellness training to educators and arts professionals). Topic depends on instructor. May be repeated up to 9 credits taken under different topics.

592 Special Topics in Interdisciplinary Arts Studies (1–3: 3:0) Prerequisite: undergraduate degree or equivalent, or permission of instructor. Topics in interdisciplinary arts. May be repeated for maximum 12 credits.

599 Independent Study (1–6:1–6:0) Prerequisite: undergraduate degree or equivalent, or permission of instructor. Independent reading, performance, or research on specific project under direction of selected faculty member. May include attendance in parallel undergraduate course. May be repeated for total 12 credits.

Communication (COMM)

100 Public Speaking (3:3:0) Presents principles to develop effective presentations for public and professional settings while integrating appropriate technologies. Emphasizes analyzing audience; composing meaningful, coherent messages; conducting responsible research; developing effective arguments; and improving delivery skills to strengthen confidence and credibility.

101 Interpersonal and Group Interaction (3:3:0) Presents principles to develop appropriate and effective communication strategies in one-to-one and small group communication settings. Emphasizes analyzing and assessing communication skills to create and sustain effective communication in personal and professional relationships.

140 Forensics Seminar in Creative Arts (1:0:6) Prerequisite: audition. Intensive work in creative forensics events, including theatrical criticism and informative, persuasive, extemporaneous, after-dinner, and impromptu speaking. May be taken four times.

141 Forensics Seminar in Recreational Arts (1:0:6) Prerequisite: audition. Intensive work in recreational forensics events, including dramatic duo, program interpretation, poetry interpretation, dramatic interpretation, and prose interpretation. May be taken four times.

142 Forensics Seminar in Debate: Affirmative Strategies (1:0:6) Work in affirmative research, case construction, and oral presentation, directed toward affirmative analysis of intercollegiate debate proposition. May be taken four times.

143 Forensics Seminar in Debate: Negative Strategies (1:0:6) Work in negative research, case attacks, and oral presentation directed toward negative analysis of intercollegiate debate proposition. May be taken four times.

145 Newspaper Workshop I (1:1:2) Practical experience in writing, editing, or business aspects of newspaper production at Broadside or other papers. Coordinated by newspaper faculty advisor. May be repeated for total 3 credits.

148 Radio Workshop I (1:1:3) Prerequisite: 100-level COMM course, or permission of instructor. Practical experience in production, news writing, promotions, advertising, public relations, programming, or newscasting for student radio station WGMU. May be taken three times.

150 Communication Skills for International Students (3:3:0) Prerequisite: international student in first year of study in the United States, non-native speakers of English with some difficulty speaking clearly and accurately, or permission of instructor. Introduction to speaking, listening, and nonverbal skills required to communicate appropriately in university study.

157 Video Workshop (1:1:2) Students who have already completed or are in COMM 355 are not eligible to take this course. Practical experience in learning production basics including camera, video, and lighting. May be taken three times.

200 Introduction to Communication (3:3:0) Introduces the field of communication, including perspectives on theory and research, topical areas within the discipline, basic research methodologies, and a survey of theories in those areas. Covers basic procedures for theory-building, research, and writing about communication. May be repeated only once.

201 Small Group Communication (3:3:0) Prerequisite: COMM 101 or equivalent course. Principles of communicating effectively in small group situations. Emphasizes problem-solving group communication. Practice in working cooperatively with others to complete projects using systematic approach to problem solving.

202 Mass Media and Communication Systems (3:3:0) Study of the development of various telecommunications and media systems in the United States, including print media, motion pictures, recording industry, telegraphy and telephony, broadcasting and cable, and new communications technologies.

203 Introduction to Journalism (3:3:0) American journalism including history and First Amendment components; role of professional journalist; print, broadcast, and computer-assisted news operations; economics of publishing; and effect of new technologies. Serves as starting point for those interested in journalism careers, and as orientation for those interested in learning more about news business operations.


230 Case Studies in Persuasion (3:3:0) Examines common persuasive message strategies and approaches. Covers basic principles of persuasive process. Case studies include advertisements, speeches, and persuasive activities from all segments of society.

255 Introduction to Media Literacy (3:3:0) Principles and practices of media literacy. Emphasizes critical viewing, listening, and reading media skills; and media effects on consumer.

260 Basic Debate Theory and Practice (3:1:3) Theory and practice of formal debate, including approaches to analytical reasoning, research, delivery, and conceptual basis for debate. Does not require tournament participation.

261 Theories of Argumentation (3:3:0) Analyzes argument within communicative settings. Emphasizes deductive and inductive forms of reasoning, fallacies in reasoning, tests of evidence, and models for such analyses.

299 Research Practicum in Communication (1–3:0:0) Introduces research methods in communication in the context
of assisting with faculty research. Individualized sections taught by arrangement with full-time faculty. Methods taught vary, but generally include data collection, data analysis, and report construction.

300 Foundations of Public Communication (3:3:0) Prerequisites: 3 credits of 100- or 200-level COMM courses, or 60 credits; grade of C or better in COMM 250. Theories and principles of public communication, emphasizing methods of persuasion, critical analysis, speaker-listener alignments in public setting, and measurements of effective public communication.

301 Foundations of Interpersonal Communication (3:3:0) Prerequisite: 3 credits of 100- or 200-level COMM courses, or 60 credits; grade of C or better in COMM 250. Theories and principles of interpersonal communication emphasizing models of communication, verbal and nonverbal message systems, and analysis of communicative relationships.

302 Foundations of Mass Communication (3:3:0) Prerequisite: 3 credits of 100- or 200-level COMM courses, or 60 credits; grade of C or better in COMM 250. Theories and principles of mass communication emphasizing effects, the media as institution, and role of society.

303 Writing across the Media (3:3:0) Prerequisites: 30 credits and ENGL 302. Prerequisite for all communication media writing courses. Introductory course focusing on writing for newspapers, press releases, broadcast and advertising; and computer-assisted reporting. Lab work required.

305 Foundations of Intercultural Communication (3:3:0) Prerequisite: 3 credits of 100-200-level COMM courses or 60 credits; grade of C or better in COMM 250. Analyzes communication variables as they relate to intercultural encounters. Emphasizes culture’s influence on communication process, particularly influence of verbal and nonverbal communication on how message is interpreted.

306 Issues in Intercultural Communication (3:3:0) Prerequisite: COMM 305, or permission of instructor. Continuation of COMM 305. Applies basic principles of intercultural communication to analyze specific situations involving communication and cultural differences.

307 Field Study in Communication (3:3:0) Prerequisite: permission of instructor. Structured communication learning experience: one to three weeks of travel in a foreign environment involving another country or relevant U.S. co-cultures. Students must complete appropriate readings, laboratory assignments, and personal learning paper to process communication concepts and experiences. May be repeated once with a different field of study.

310 Oral Interpretation (3:3:0) Principles and theories of oral interpretation. Practice in oral communication of prose, poetry, and drama.

320 Business and Professional Communication (3:3:0) Study of basic theories and skills of communication in professional contexts, including interviewing, relationship maintenance, small group teams, and public presentations. Emphasizes developing practical and critical thinking skills.

326 Rhetoric of Social Movements and Political Controversy (3:3:0) Prerequisite: COMM 300. Social and political forces of contemporary era from communication perspective, emphasizing political leadership, pressures for social and political change, and transformations in communicative environment.

330 Principles of Public Relations (3:3:0) Prerequisites: 3 COMM credits and 60 credits, or permission of instructor. Surveys nature, history, scope, and practice of public relations in business, trade associations, nonprofit organizations, and educational and government institutions. Covers principles, practice of public relations, including media relations, issues management, and public service announcements; marketing and research; planning and publicity for special events; house publications; and institutional advertising.

332 Nonverbal Communication (3:3:0) Prerequisite: 3 COMM credits. Theory, principles, and methods to analyze nonverbal communication. Emphasizes physical behavior, facial expression, personal space and territoriality, physical appearance, vocal cues, and environment.

335 Organizational Communication (3:3:0) Prerequisite: COMM 100, 101, or 301; or permission of instructor. Theory, practice, and methods to analyze communication in organizations. Emphasizes process and structure, interaction formats, mechanisms for modification, and career paths in organizational communication.

340 Forensics Seminar in Creative Arts (1:0:6) Prerequisites: 4 credits of COMM 140, or 60 credits and audition. Intensive work in various types of creative forensics events, including rhetorical criticism and informative, persuasive, extemporaneous, after-dinner, and impromptu speaking. May be taken four times.

341 Forensics Seminar in Recreational Arts (1:0:6) Prerequisites: 4 credits of COMM 141, or 60 credits and audition. Intensive work in various types of creative forensics events, including dramatic duo, program interpretation, poetry interpretation, dramatic interpretation, and prose interpretation. May be taken four times.

342 Forensics Seminar in Debate: Affirmative Strategies (1:0:6) Prerequisites: 4 credits of COMM 142, or 60 credits and audition. Work in affirmative research, case construction, and oral presentation directed toward affirmative analysis of intercollegiate debate proposition. May be taken four times.

343 Forensics Seminar in Debate: Negative Strategies (1:0:6) Prerequisites: 4 credits of COMM 143, or 60 credits and audition. Work in negative research, case attacks, and oral presentation directed toward negative analysis of intercollegiate debate proposition. May be taken four times.

344 Parliamentary Procedure (1:1:0) Prerequisite: 60 credits, or permission of instructor. Procedures of parliamentary law as practiced in voluntary organizations. Practice in leading groups that conduct business according to Roberts Rules of Order, Newly Revised. Brief review of other parliamentary manuals.

345 Newspaper Workshop II (1:1:2) Prerequisite or corequisite: 3 credits of COMM 143, COMM 351, or permission of instructor. Practical experience in writing and editing for student newspaper or other papers. May be taken three times.

346 Yearbook Workshop (1:1:2) Practical experience in promotion, marketing, and sales of video yearbook, or practical experience working on Senior Expressions, a print
supplement to the video yearbook. May be taken three times.

348 Radio Workshop II (1:1:3) Prerequisite: COMM 148, or permission of instructor. Intense practical application of previously acquired skills in production, promotions, advertising, public relations, programming, or news writing for student radio station WGMU. May be taken three times.

349 Student Leadership Seminar (1:3:0) Prerequisite: 60 credits, or permission of instructor. Introduction to leadership concepts. Experiential seminar focusing on practical application of leadership concepts in student organization.

350 Mass Communication and Public Policy (3:3:0) Prerequisite: COMM 102, 202, or 302; or permission of instructor. Investigates how matters of public importance are communicated via various mass communication channels. Emphasizes regulations to minimize influence of mass media on public decision-making, and media manipulation by pressure groups, politicians, and media gatekeepers.

351 News Writing and Reporting (3:3:0) Prerequisite: COMM 303. Experience in actual news gathering. Students write and report for print and online outlets. Numerous in-class and out-of-class writing assignments train students in unique styles of print and online journalism.

352 News Editing: Print and Beyond (3:3:0) Prerequisite: COMM 303. Copy preparation, headline writing, news judging, and layout for various forms of print and electronic formats. Introduces working on news copy desks.


354 Radio Production (3:1:4) Prerequisite: COMM 302, or permission of instructor. Theory and practice of operational radio broadcasting. Topics include programming, production, and promotion aspects of commercial and non-commercial radio.

355 Video I: Principles and Practices (3:3:2) Prerequisite: All for Video II level courses. Basic video production techniques. Emphasizes camera, audio, lighting, and editing. Lab work required.

356 Video: Performance and Writing (3:3:0) Writing for video, performance skills for on-air work, interviewing.

357 Video II: Producing and Directing (3:2:4) Prerequisite: COMM 355 or portfolio assessment. Introduces techniques, theory, and practices in producing, directing, and distributing video productions.

359 Media Management (3:3:0) Principles, practices of media management from general techniques to operation of individual departments within a media organization.

360 Video II: Video Editing (3:2:3) Prerequisite: COMM 355 or portfolio assessment. Focus on advanced techniques in editing analog and digital, and visual communication theories of video editing.

361 Online Journalism (3:3:0) Prerequisite: COMM 303, or permission of instructor. Focuses on online journalism, research, reporting, webpage and weblog creation, and writing for Internet.

362 Argument and Public Policy (3:3:0) Develops argumentative skills while examining contemporary public policy. Applies methods of argumentative analysis to design, implementation of public policy. Students learn by constructing, examining, and using public argument.

363 Advanced Media Production (1:1:3) Prerequisite: two completed in area of media production focus. Practicum for students with production experience; students produce a final resume in area of expertise.

365 Women and Media (3:3:0) Prerequisite: COMM 302, or permission of instructor. Introduces concepts of power, influence of mass media. Allows students to see themselves as products, producers of media influence, and gives sense of women’s roles as media professionals and consumers.

366 Visual Communication (3:3:0) Prerequisites: IT 103 and COMM 355. Teaches visual communication theories and applies them to creation of videos, web pages, multimedia production, Computer Based Training (CBT) and other technologies. Covers limits of visual communication in terms of perception, economics, and technology. Partial distance course includes viewing video modules, and using electronically mediated discussion.

369 Telecommunications Systems (3:3:0) Prerequisite: 60 credits, or permission of instructor. Studies evolution and operation of telecommunications systems from wireline telegraphy to wireless voice, video, and data services. Topics include communication coding systems, analog and digital modulation schemes, twisted pair telephony, broadband coaxial cable, and high-power direct-to-home digital satellite.

370 Feature Writing (3:3:0) Prerequisite: COMM 303. Introduces aspiring journalists to research techniques and critical writing skills needed to produce publishable magazine or newspaper feature stories.

371 Sports Writing and Reporting (3:3:0) Prerequisite: COMM 303 or permission of instructor. Experience in actual sports-related news gathering and reporting. Covers writing and reporting on sports-related subjects for print and online media. Numerous in-class and out-of-class writing assignments train students in the unique style of covering sports events, reporting breaking news, and writing feature stories.

373 Business and Economic Journalism (3:3:0) Prerequisite: COMM 303 or permission of instructor. Writing and reporting about business and the economy with focus on understanding financial news, and reporting about companies, trade, and markets for print, broadcast, and online media. Students practice through in-class and out-of-class writing assignments.

374 Political Journalis (3:3:0) Prerequisite: COMM 303 or permission of instructor. Writing and reporting about politics, elections and campaigns, and the legislative and executive branches of government for print, broadcast, and online media. Students practice the style and substance of covering political news through in-class and out-of-class writing assignments. A unique collaboration with C-SPAN including video conference opportunities with political and media personalities.

375 Mass Communication Advertising and Promotions (3:3:0) Prerequisite: COMM 302, or permission of instructor. History, regulation, and ratings of advertising, as well
as media buying, advertising campaigns, and strengths and weaknesses of media vehicles used in advertising.

380 Media Criticism (3:3:0) Examines practical criticism of a wide variety of media texts including television programs, newspapers, articles, films, photographs, and advertisements. Introduces principles of major contemporary modes of analysis for systematically interpreting visual and verbal forms of communication.

389 Association Communication (3:3:0) Prerequisite: 60 credits, or 3 credits of lower-division COMM courses. Principles of editing and journalism applied to publications, public relations, and advertising needs within corporate environment. Job requirements of editorial positions in public relations, publications, and information as defined by trade associations, nonprofit organizations, and large corporations.

390 Case Studies in Public Relations (3:3:0) Prerequisite: COMM 330. Focuses on current issues in corporate, government, and nonprofit public relations.

391 Writing for Public Relations (3:3:0) Prerequisite: COMM 303. Focuses on public relations writing including news releases, client memos, broadcasting, speeches, brochures, journals, and advertisements. Includes writing styles, formats, organization, and writing research.

399 Special Topics in Communication (1–3:3:0) Prerequisite: permission of instructor. Topics vary; some require laboratories. May be repeated.

400 Research Methods in Communication (3:3:0) Prerequisites: COMM 250; and at least two of COMM 300, 301, 302 or 303. Explores applications for primary research methodologies used in communication. Research project, with focus on survey, critical ethnographic, or experimental methodologies.

401 Interpersonal Communication in the Workplace (3:3:0) Prerequisite: COMM 301, or permission of instructor. Comprehensive study of theories and research associated with dynamics of interpersonal relationships in the workplace. Emphasizes individual motivation, interpersonal needs, communication styles, leadership, problem solving, decision making, diversity, interpersonal conflict, individual adaptation to organizational change, and influence of technology on workplace relationships.

412/GOVT 412 Politics and the Mass Media (3:3:0) Prerequisite: GOVT 103, or permission of instructor. Covers responsibilities, freedoms of mass media in a democracy; and media influence on citizens' opinions, elections, and decisions of public officials.

420 Senior Seminar in Theories of Communicative Interaction (3:3:0) Prerequisite: minimum satisfactory grade in COMM 250, 300, 301, and 302. Explores primary theories explaining human communicative behavior, including traditional rhetorical, contemporary social science, critical, and mass communication.

425 Honors Seminar in Communication (3:3:0) Prerequisite: 80 credits, cumulative GPA of 3.50. Examines foundations, connectedness, and applications of numerous communication theories across the discipline. Honors project required.

430 Persuasion (3:3:0) Prerequisite: COMM 230 or permission of instructor. Theories of persuasive communication including traditional and contemporary attitudinal change; relationship among speaker, message, and audience; and relationship between attitudinal and behavioral change.

431 Information Technology and the Political Process (3:3:0) Prerequisite: 60 credits or permission of instructor. Studies impact of information network of wire and wireless communications and computers on political process in advanced industrial countries.

432 Political Communication (3:3:0) Studies how political communication shapes development of “political reality.” Examines interactions between media and politics with respect to the ways communication functions in political settings.

434 Interviewing (3:3:0) Prerequisite: 60 credits. Offers practical application, skill development, and theoretical and critical assessment of computer-mediated communication. Discusses culture and language, functional and dysfunctional communication, social interaction, critical perspectives and ideology, freedom and responsibility, and images of future. Students contract for course assignments within course categories.

450 Internship in Communication (3:1:5) Prerequisite: 75 credits, major or minor in telecommunications or electronic journalism, 15 credits in COMM for majors, 12 credits for non-COMM majors, and permission of department. See department for procedures. On-the-job training in communication through approved field work study programs. Internships arranged and supervised by Department of Communication through internship coordinator. Related class work in resume preparation and job interviewing. May be repeated up to a maximum of 6 credits.

451 Facilitating Communication Education (3:1:5) Theory and practice in facilitating learning of communication principles and skills. Students work as instructor aides in lower-division classes under supervision of faculty member. Activities include facilitating small-group activities, and individually critiquing oral performances.

452 Media Production Practicum (3:1:0) Prerequisite: COMM 302, 348, or 355. Theory and practice in creation, distribution, and response to media productions. Students complete minimum 150 hours of work as assistants to engineers, producers, directors, and organizers of media production facilities on campus, under supervision of faculty members. Activities include working on telecourses, public relations videos, and multimedia projects; aiding in creating in-house productions for departments; and working as cable caster for master control campus operations.

454 Free Speech and Ethics (3:3:0) Prerequisites: COMM 300, 302; or permission of instructor. Major issues surrounding roles of speech, press, and electronic media in society. Includes history of free speech and press issues in society, government role in regulating marketplace of ideas, and responsibility of individual in free society.

455/HIST 455 History of Print Journalism (3:3:0) Prerequisite: 3 credits in COMM or HIST courses. Development of print journalism, emphasizing interaction of technology,
456 Comparative Mass Media (3:3:0) Prerequisite: COMM 302 or permission of instructor. Survey of major foreign mass media systems as they compare with American system. Focuses on broad dimensions of international mass media, and describes issues facing global journalism and media systems. Provides substantive framework to critically evaluate various national media systems.

465 Topics in Communication and Gender (3:3:0) Topics may include gender and culture, women as rhetors, male and female communication, and communication and gender roles. Examines specific interests, ideally in seminar setting. Course may be repeated with department approval.

469 Structure of the Telecommunications Industry (3:3:0) Prerequisite: 90 credits or permission of instructor. Explores complex interrelationships that affect modern telecommunications and how major mergers, acquisitions, regulatory decisions, congressional initiatives, or engineering breakthroughs can profoundly affect telecommunications industry at any given time. Serves as capstone seminar in telecommunications minor.

475 Journalism Law (3:3:0) Prerequisite: 60 credits or permission of instructor. Examines law as it relates to working journalist. Topics include libel, invasion of privacy, free press and fair trial, First Amendment, broadcast regulation, access to media, advertising, and effect of new technologies on these issues. Uses case approach to study leading court decisions in mass media law.

499 Independent Study in Communication (3:0:0) Prerequisites: 75 credits and permission of department. Study of a selected area in communication. Independent study application must be processed before start of semester in which work is to take place. May be repeated. Communication courses at the 500 level open to postbaccalaureate students or advanced undergraduates with permission of department.

504 Communication and Interpersonal Conflict (3:3:0) Focuses on interpersonal interactions, including dyadic and small-group levels in various settings such as friendships, marriage, family, and workplace. Examines factors that generate conflicts, and communication strategies and skills that help shape conflict interaction toward productive ends.

506 Communication in International Organizations (3:3:0) Analyzes communication variables as they relate to organizational and managerial functions in international organizations. Topics include developing understanding of how cultural differences influence managerial activities, and learning to deal effectively with differences.

510 Studies in Oral Interpretation (3:3:0) Examines role of oral communicator in selection, adaptation, and performance of literature. Topics vary depending on genre being considered. May be repeated three times for credit if each course devoted to a different genre.

530 Theories of Small Group Communication (3:3:0) Advanced-level theory and practice of small group interaction. Examines current research, focusing on learning applications of theories to relevant settings.

542 Directing Debate Activities (3:3:0) Theory and practice of competitive debate. Emphasizes traditional and contemporary theories; administrative activities related to direction of a debate program; and methods of instruction, including analysis of current debate topic. Designed for novice and experienced debate coaches.

551 Developing Students’ Speaking and Listening Skills (3:3:0) Emphasizes development of assignments that develop communication facilitation skills in children and adolescents. Covers five communication functions and their development to integrate basic skills at elementary level and direct teaching at secondary level, and philosophies of communication education and curriculum development as well as competency assessment.

554 Telecommunications Policy and Regulation (3:3:0) Reviews history and principles of telecommunications regulation. Studies relevant policy-making and regulatory institutions and their roles in charting U.S. telecommunications course. Examines role of citizens and lobby groups in regulatory process.

590 Seminar in Communication (3:3:0) Intensive study of specific topics; content varies. May be repeated for credit.

600 Introduction to Graduate Studies (3:3:0) This course offers a broad introduction to the field of communication in terms of communication-based theories and research.

601 Communication in Professional Relationships (3:3:0) Explores theoretical perspectives and relevant research to communication strategies and skills for various professional roles and situations. Relates theoretical foundations to practice, assessing theories and applications in individual professional fields.

602 Theories and Research of Mass Communication (3:3:0) Explores theories that have guided development of mass media. Emphasizes major scientific and humanistic approaches to mass media effects.

604 Communication Research Practicum (3:3:0) Prerequisites: COMM 634 or permission of instructor. Helps communication master’s students determine focus for program of study, thesis, and projects. Includes readings in applied communication research, and exercises in topic selection, analysis.

605 Intercultural Communication (3:3:0) Analyzes communication variables related to communication across cultures. Topics include nonverbal communication, time conceptualizations, perceptions and attitudes, values, social organization patterns, cultural norms, language, ethics, conflict across cultures, and research in intercultural communication.

620 Health Communication (3:3:0) Examines interpersonal communicative processes associated with health in consumer-provider, family, and health communication campaign contexts. Particular attention to understanding cultural differences in perceptions of and communication about health and disease.

621 Media Advocacy for Nonprofit Organizations (3:3:0) Drawing from scholarship in media studies, critical theory, and public health campaign literature, provides graduate-level introduction to media advocacy strategies for nonprofit organizations with limited financial resources.
630 Theories of Public Relations (3:3:0) Provides a survey of public relations theories and major ethical issues. Examines ways theories relate to organizations, mass and international communication research, rhetoric, persuasion, and social movements.

631 Approaches to Group Facilitation (3:3:0) Introduces various theoretical and practical approaches to group facilitation with in-depth focus and practice in one approach. Students participate in group sessions, analyze videotapes of decision-making groups, and practice methodologies for facilitating group interaction.

634 Theories of Interpersonal Communication (3:3:0) Prerequisite: COMM 301 or permission of instructor. Analyzes contemporary theories, concepts, and approaches to improving interpersonal communication. Examines interpersonal communication research.

635 Organizational Communication (3:3:0) Analyzes communication systems, processes in public and private organizations. Topics include conflict management, group decision making, interviewing, technical presentations, and using various channels for improving internal and external communication.

636 Communication Consulting (3:3:0) Investigates theories providing foundation for communication consulting. Provides theoretical information and mechanisms for application necessary to modify communicative behavior within organizations.

637 Risk Communication (3:3:0) Research on sharing information about physical hazards such as toxic waste, radiation, disease, injury, and biohazards. Topics include communication concerning workplace safety, environmental problems, risk assessments, and scientific uncertainties.

650 Research Methodologies in Communication (3:3:0) Prerequisite: graduate standing. Introduces various research methods used by communication professionals. Focus is to achieve understanding and knowledge of social scientific research, qualitative and quantitative, and critical analysis through use and application.

651 Communication in the Classroom (3:3:0) Communication theories and skills to manage communicative environment in classroom. Considers nonverbal aspects of space, time, action, and form as they affect teaching choices. Covers verbal patterns for skills of classroom management, including questioning skills, enhancement of students’ self-concept, systematic feedback, parental communication, and student development.

653 Graduate Communication: Research and Teaching (3:3:0) Investigates theoretical and philosophical implications of communication instruction. Exposes graduate students to principles and practices of teaching college communication courses at upper and lower divisions.

655 Theories of Visual Communication in Telecommunications (3:3:0) Theories of visual communications and how they are used in creating images for web sites, video productions, corporate presentations, virtual reality, computer graphics. Explores problems of fitting messages to various telecommunications media, how target audience perceives the visual image, and aesthetic demands of products imposed by new technologies.

656 Global Communication (3:3:0) Study of global telecommunications channels and artifacts of international mass communication, with focus on discussion of problems of free flow of information, roles of nations and international organizations in fostering global communication, and other technologies. Develops perspectives on worldwide social, political, educational, and economic development.

675 Content Analysis (3:3:0) Introduces content analysis, a research technique for making replicable and valid inferences about text in sources such as news articles, advertisements, and television programs. Students design and conduct research using content analysis techniques.

694 Communication Internship (3–6:1–2:0) Prerequisites: 18 graduate credits and permission of department. Students work in approved, professional-level communication positions, meeting regularly with internship supervisor from department. Requires paper, journal, minimum 60 hours work for each credit of enrollment. Students usually enroll in internships at end of program of study.

696 Directed Readings and Research (1–3:0:0) Prerequisite: permission of department. Reading and research on specific topic under direction of faculty member. Written report required; oral or written exam may be required. May be repeated for maximum 6 credits.

705 Intercultural Health and Risk Communication (3:3:0) Examines intercultural health and risk communication interventions, including health communication campaigns, public relations and advertising for health organizations, and how the media and Internet present health information.

706 Strategic Communication (3:3:0) Prerequisite: COMM 630 or permission of the instructor. Examines commonalities of strategic communication campaigns across fields (e.g., military, diplomacy, health, politics, marketing, public relations) in order to understand strategic communication, compare fields, and emphasize strategic and evaluative research across fields.

720 Consumer-Provider Health Communication (3:3:0) Examines relational communication research and practice. Examines the role of interpersonal communication in health care delivery, health promotion, disease prevention, risk communication, as well as in promoting personal and psychosocial well being.

721 E-Health Communication (3:3:0) Explores the use of computer-mediated communication technologies in health care and health promotion, including examination of technology in health information dissemination, health education, health communication interventions, and the management of health care delivery.

725 Qualitative Methods (3:3:0) Examines qualitative research in communication. Emphasis is placed on techniques of naturalistic inquiry such as observation, interviewing, focus group methods, and ethnography, as well as tools for analyzing and reporting qualitative data.

735 Crisis Communication (3:3:0) Prerequisite: permission of the instructor. Examines crisis communication contexts
with a particular emphasis on the role of communication in a variety of crises and how the media and Internet present crisis information to the public.

750 Research Methods II (3:3:0) Prerequisite: COMM 650. Extends basic research knowledge and skills learned in COMM 650 Research Methods I. Students will be taught to analyze and synthesize literature, develop theoretical linkages, and construct measurement scales.

798 Communication Studies Project (3:3:0) Final research seminar for all MA in communication students. Students discuss practical and theoretical issues related to project or thesis. Includes readings related to underlying theoretical, methodological, and ethical issues facing contemporary communication researchers and practitioners.

799 Master’s Thesis (1–6:0:0) Prerequisite: 24 graduate credits and approval of thesis proposal by faculty committee. Original research endeavor related to student’s concentration in communication under supervision of faculty committee. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to doctoral program in communication. Program of studies designed by student’s discipline director and approved by doctoral committee. Students participate in research activity of discipline director, and write paper reporting original contributions. May be repeated.

806 International Public Relations (3:3:0) Prerequisite: COMM 706 or permission of instructor. Provides a survey of international public relations with an emphasis in three areas: applied knowledge for actual international practice, relevant theory, and ethical issues.

820 Health Communication Campaigns (3:3:0) Explores use of communication campaigns to promote health and reduce health risks, examines how health communication campaigns are designed, implemented, and evaluated, and describes the role of communication research throughout the campaign process.

890 Special Topics in Communication (3:3:0) Prerequisite: PhD rank or permission of instructor. Selected topics reflecting specialized areas in communication. Content varies. May be repeated.

896 Independent Study (3:3:0) Prerequisite: PhD rank or permission of instructor. Independent reading on a topic agreed on by student and faculty member. Content varies. May be repeated.


999 Doctoral Dissertation Research (3:3:0) Prerequisite: Completion of COMM 998. Research on an approved dissertation topic under the direction of dissertation committee. May be repeated. No more than 18 credits of COMM 998 and 999 may be applied to doctoral degree requirements. Graded S/NS.

Comparative Literature (CL)

300 Introduction to Comparative Literature (3:3:0) Prerequisite: 60 credits. Introduces methods of comparative literature through study, in translation, of selected theme or motif as it appears in various periods, genres, or national literatures. Readings drawn from English, American, or European literature; on occasion, non-Western literature featured.

514 Theories of Comparative Literature (3:3:0) Prerequisites: CL 300 and 90 credits, or permission of instructor. Intensive study of major theories of comparative literature, with special emphasis on international movements and characteristic themes. Students work with texts in foreign language of their concentration; other texts studied in translation.

Computational and Data Sciences (CDS)

College of Science

101 Introduction to Computational and Data Sciences (3:3:0) Introduction to the use of computers in scientific discovery through simulations and data analysis. Covers historical development and current trends in the field.

301 Scientific Information and Data Visualization (3:3:0) Prerequisites: CDS 101, CS 211, MATH 125, MATH 113. The techniques and software used to visualize scientific simulations, complex information, and data visualization for knowledge discovery. Includes examples and exercises to help students develop their understanding of the role visualization plays in computational science and provides a foundation for applications in their careers.

302 Scientific Data and Databases (3:3:0) Prerequisites: STAT 354, MATH 125. Data and databases used by scientists. Includes basics about database organization, queries, and distributed data systems. Student exercises will include queries of existing systems, along with basic design of simple database systems.

401 Scientific Data Mining (3:3:0) Prerequisite: CDS 302. Data mining techniques from statistics, machine learning, and visualization to scientific knowledge discovery. Students will be given a set of case studies and projects to test their understanding of this field and provide a foundation for future applications in their careers.

410/MATH 447 Modeling and Simulations I (3:3:0) Prerequisites: MATH 214 or 216, and 446. Numerical differentiation and integration, initial-value and boundary-value problems for ordinary differential equations, methods of solution of partial differential equations, iterative methods of solution of nonlinear systems, and approximation theory.

411 Modeling and Simulation I (3:3:0) Prerequisites: CDS 410 or Math 447. This course covers the application of modeling and simulation methods to various scientific applications, including fluid dynamics, solid mechanics, materials science, molecular mechanics, and astrophysics. It will also provide an introduction to modeling and simulation software, as well as high-performance computing.

421 Introduction to Computational Fluid Dynamics (3:3:0) Prerequisites: MATH 446, proficiency in at least one computer programming language and computer operating system, or permission of instructor. The course will cover
the governing equations of fluid dynamics; numerical discretization of the governing equations and popular techniques for solving flow problems; applications of CFD to some classic fluid dynamics problems; and setting up the CFD simulation using a CFD software package. At the end of the course, students will understand the process of developing a geometrical model of the flow, applying appropriate boundary conditions, specifying solution parameters, and visualizing the results. The students are expected to complete several computer projects, including writing their own CFD computer program to analyze simple fluid flow problems, as well as setting up the CFD simulation using a CFD software package.

461 N-Body Simulation Methods (3:3:0) Prerequisites: PHYS 510 and MATH 446. Covers particle methods to solve variety of physical systems. Emphasizes study and development of numerical results, and visualization of these results in complex physical systems. Applications and projects include stellar and galaxy dynamics, smoothed particle hydrodynamics, plasma simulations, and semiconductor device theory algorithms on parallel and vectorized systems.

486 Topics in Computational and Data Sciences (3:3:0) Prerequisite: permission of instructor. Covers selected topics in computational and data sciences not covered in fixed-content courses.

487 Electronic Structure Computations (3:3:0) Prerequisite: PHYS 308. Covers computational aspects of materials science, such as first-principles methods of electronic structure calculations of solids, clusters, and molecules, as well as the use of empirical potentials. Examples will be drawn from metals, insulators, and semiconductors. The students will be directed to construct simple codes and guided in the use of the more sophisticated available computational packages.

Computational Sciences and Informatics (CSI) Courses

600/SYST 500 Quantitative Foundations for Computational Sciences (3:3:0) Not applicable to 48-credit course total for CSI PhD. Prerequisites: MATH 213 and 214. Accelerated review of mathematical tools for scientific applications and analysis. Topics include vectors and matrices; differential and difference equations; linear systems; Fourier, Laplace, and Z-transforms; and probability theory.

601 Computational Science Tools I (1:1:0) Not applicable to 48-credit course total for CSI PhD. Prerequisites: year of college calculus, and course in computer programming. Introduces basic tools in computational science. Covers UNIX, editors, LaTeX, HTML, and graphics. Emphasizes application and use rather than theory. Substantial portion of instruction delivered via distance-learning web interface.

602 Computational Science Tools II (1:1:0) Not applicable to 48-credit course total for CSI PhD. Prerequisites: CSI 601, and knowledge of matrix algebra. Introduces basic tools in computational science. Covers MATLAB, MAPLE, and GNUPlot. Emphasizes application and use rather than theory. Substantial portion of instruction delivered via distance-learning web interface.

603 Introduction to Scientific Programming I (1:1:0) Not applicable to the 48-credit course total for CSI PhD. Prerequisite: CSI 601, or permission of instructor. Introduces programming in C or Fortran. Emphasizes application and languages rather than theory. Features lecture-lab combination. Assignments completed via distance-learning web interface.

604 Introduction to Scientific Programming II (1:1:0) Not applicable to 48-credit course total for CSI PhD. Prerequisites: CSI 601 and 603, or permission of instructor. Introduces programming in object-oriented language such as C++. Features lecture-lab combination.

605 Software Construction Tools for Scientists (1:1:0) Not applicable to 48-credit course total for CSI PhD. Prerequisite: CSI 601, or permission of instructor. Introduces use of scientific visualization tools for data analysis. Teaches use of specific packages on rotating basis. Packages include PV-WAVE, S-Plus, SV, XMGR, and pnm tools.

607 Database Tools for Scientists (1:1:0) Not applicable to 48-credit course total for CSI PhD. Prerequisites: CSI 601 and 602, or permission of instructor. Introduces database tools. Covers relational model used in Oracle and other database packages. Includes database design concepts, table operations, triggers, sequences, and introduction to structured query language (SQL).

610 Introduction to Computational Sciences (3:3:0) Not applicable to 48-credit course total for CSI PhD. Prerequisites: CSI 601, 602, 603, 604, 605, and 700; or permission of instructor. Introduces computational architecture, and scientific software development. Includes software design, construction, and validation techniques commonly used in industry. Also introduces high-performance computing.

615 Quantum Computation (3:3:0). Prerequisites: undergraduate course in quantum physics, and undergraduate degree in physical or computer sciences, or permission of instructor. Introduces field of quantum computation. Emphasizes scientific principles involved and presentation of strengths and weaknesses of approach. Topics include basic quantum physics and quantum algorithms.

632 Global Ecology (3:3:0) Prerequisites: general chemistry, general physics, introductory statistics, and calculus. Intensive review to begin research in global change. Covers basic principles of physiological ecology; population dynamics; dynamics of ecological communities and ecosystems; biogeography; biological diversity; and dynamics of biosphere, including effects of life on atmosphere, oceans, and solid surfaces.

638 The Policy Process for Scientists (3:3:0). Prerequisite: graduate standing. Introduces relationship among government, science, scientists, and issues and processes that shape
science policy. Emphasizes examples taken from space weather and meteorology.

639 Ethics in Scientific Research (3:3:0) Reviews purpose of scientific research and principles for evaluating ethical issues. Teaches skills for survival through training in moral reasoning and responsible conduct. Discusses ethical issues and applying critical-thinking skills to design, execution, and analysis of experiments. Issues include using animals, humans in research; ethical standards in computer community; research fraud; and currently accepted guidelines for data ownership, manuscript preparation, and conduct of those in authority.

654 Data and Data Systems in the Physical Sciences (3:3:0) Prerequisite: competency in programming at CSI 601–607 level, or permission of instructor. Introduces data issues associated with modern physical sciences. Examines data access, formats, browsing, analysis, visualization, and data information systems in federated environments. Uses examples from physical sciences, including astronomy and space sciences; Earth sciences; Earth observing and other examples from physical sciences, including astronomy and information systems in federated environments. Uses examples from physical sciences, including astronomy and space sciences; Earth sciences; Earth observing and other fields of physics; and model output data and associated special issues. Introduces mathematical techniques particularly important for large databases.

655/PHYS 575 Introduction to Physics and Chemistry of the Atmosphere (3:3:0) Prerequisites: PHYS 305 and 262. Introduces basic physical and chemical processes that operate in Earth’s atmosphere. Emphasizes concepts that provide global description of current atmospheric state, and processes that relate to global change and atmospheric evolution. Covers equilibrium structure, radiative transfer models, thermodynamics of various atmospheric layers, and various processes defining these layers.

659 Dispersal Methods of Hazardous Releases (3:3:0) Prerequisite: CSI 655, or permission of instructor. Covers physics of aerosols; engineering, mechanics of building ventilation systems; and mechanical dissemination utilizing hand-held, automatic, vehicle, and truck mounted systems. Also discusses basic concepts, theories, and models of pollutant dispersal in atmosphere, and related atmospheric systems affecting dispersal of biological agents.

660/ASTR 535 Space Instrumentation and Exploration (3:3:0) Prerequisites: PHYS 262, MATH 213, or equivalent; or permission of instructor. Surveys instruments, devices, and methods for space and planetary exploration. Covers remote sensing of Earth and other solar system bodies; and planned manned and unmanned missions by the United States and other countries.

661/ASTR 530 Astrophysics (3:3:0) Prerequisites: PHYS 303, 305, 308; MATH 214. Survey of contemporary astrophysics. Topics include physical concepts, stellar spectra, Hertzsprung-Russell diagram, stellar atmospheres, stellar structure, interstellar matter, stellar evolution, high-energy phenomena. Covers the solar magnetic field, solar flares, coronal mass ejections, particle acceleration mechanisms, the solar wind, and the Earth’s magnetic field, radiation belt, geomagnetic storms, and ionospheric disturbances.

670 Economic Systems Design (3:3:0) Prerequisite: course in linear and nonlinear optimization, and course in linear algebra; or permission of instructor. Introduces analytical and engineering principles used to develop exchange systems. Covers behavioral aspects of auction systems; matching, assignment, and transportation problems; and information markets. Introduces methods for testbedding systems using experimental economics.

672/STAT 652 Statistical Inference (3:3:0) Prerequisites: STAT 544, or permission of instructor. Covers critical aspects of probability, random variables and distributions, characteristic functions, stochastic convergence, optimal estimation, maximum-likelihood estimation, asymptotic theory, Bayesian methods, likelihood-ratio tests, statistical decision theory, sequential methods.

678/STAT 658 Times Series Analysis and Forecasting (3:3:0) Prerequisites: STAT 544 or CSI 672, or permission of instructor. Modeling stationary and nonstationary processes; autoregressive, moving average and mixed model processes; hidden periodicity models; properties of models; autocovariance and autocorrelation functions, and partial autocorrelation function; spectral density functions; identification of models; estimation of model parameters, and forecasting techniques.

685 Fundamentals of Materials Science (3:3:0) Prerequisite: undergraduate degree in physics, chemistry, materials, electrical or mechanical engineering, or related sciences; or permission of instructor. Covers fundamental concepts, methods, and applications of materials science; structure of modern materials such as metallic alloys and compounds, ceramic materials, semiconductors, polymers, and nanostructured materials; materials properties including mechanical, thermal, and electric; experimental methods of materials characterization; application of computers in materials science; and elements of materials design.

687/PHYS 512 Solid State Physics and Applications (3:3:0) Prerequisite: PHYS 502 or equivalent. Covers crystal structures, binding, lattice vibrations, free electron model, metals, semiconductors and semiconductor devices, superconductivity, and magnetism.

700/MATH 685 Numerical Methods (3:3:0) Prerequisites: MATH 214 and 203, and some programming experience. Covers computational techniques for solving science, engineering problems. Develops algorithms to treat typical problems in applications, emphasizing types of data encountered in practice. Covers theoretical development as well as implementation, efficiency, and accuracy issues in using algorithms and interpreting results. When applicable, uses computer graphical techniques to enhance interpretation.

701 Foundations of Computational Science (3:3:0) Prerequisites: competency in UNIX and programming at CSI 601–604 level, and CSI 700; or permission of instructor. Covers mapping of mathematical models to computer software, including all aspects of developing scientific software such as architecture, data structures, advanced numerical algorithms, languages, documentation, optimization, validation, verification, and software reuse. Examples in bioinformatics, computational biology, computational physics, and global change demonstrate scientific advances enabled by computation. Class projects involve working in teams to develop software that implements mathematical models,
using software to address important scientific questions, and conducting computational experiments with it.

702 High-Performance Computing (3:3:0) Prerequisites: CSI 700 and 701; or permission of instructor. Hardware and software associated with high-performance scientific computing. Computer architectures, processor design, programming paradigms, parallel and vector algorithms. Emphasizes importance of software scalability in science problems.

703 Scientific and Statistical Visualization (3:3:0) Prerequisite: STAT 354 or CS 652, or permission of instructor. Covers visualization methods used to provide new insights and intuition concerning measurements of natural phenomena, and scientific and mathematical models. Presents case studies from myriad disciplines. Topics include human perception and cognition, introduction to graphics laboratory, elements of graphing data, representation of space-time and vector variables, representation of 3-D and higher dimensional data, dynamic graphical methods, and virtual reality. Work on a visualization project required. Emphasizes software tools on Silicon Graphics workstation, but other workstations and software may be used.

709 Topics in Computational Sciences and Informatics (3:3:0) Prerequisites: admission to PhD program, and permission of instructor. Covers selected topics in computational sciences and informatics not covered in fixed-content computational sciences and informatics courses. May be repeated for credit as needed.

710 Scientific Databases (3:3:0) Prerequisite: INFS 614 or equivalent, or permission of instructor. Study of database support for scientific data management. Covers requirements and properties of scientific databases, data models for statistical and scientific databases, semantic and object-oriented modeling of application domains, statistical database query languages and query optimization, advanced logic query languages, and case studies such as the human genome project and Earth-orbiting satellites.

711/CHEM 633 Chemical Thermodynamics and Kinetics (3:3:0) Prerequisites: CHEM 331 and 332. Advanced study of thermodynamics and kinetics. Covers application of kinetics to elucidation of reaction mechanisms, and application of statistical thermodynamics to theory of elementary reaction rates.

712/CHEM 728 Introduction to Solid Surfaces (3:3:0) Prerequisite: CHEM 422 or equivalent. Introduces properties of solid surfaces. Includes gas absorption isotherms, surface-area measurement techniques, real and clean surfaces, physisorption and chemisorption, methods of gas absorption and desorption, measurement of heats of adsorption, desorption kinetics, electron spectroscopies and their surface sensitivities, instrumentation needed, and principles of vacuum technology.

713/CHEM 732 Quantum Chemistry (3:3:0) Prerequisite: CHEM 332. Illustrates fundamental concepts of quantum mechanics with applications to chemical systems, including atomic and molecular electronic structure and properties, molecular symmetry, and intermolecular forces.

714 Spectroscopy and Structure (3:3:0) Prerequisite: CHEM 332. Covers quantum mechanics of the interaction of atoms and molecules with electromagnetic radiation. Also covers modern spectroscopic methods as applied to the elucidation of molecular structure and dynamics.

715 Quantum Complexity Theory (3:3:0). Prerequisite: CSI 615 or equivalent, or permission of instructor. Discusses fundamental aspects of complexity theory and its applications from perspective of quantum physics. Explores current research in emerging field of quantum complexity theory, and discusses related issues in quantum algorithms.

716 Quantum Information Theory (3:3:0). Prerequisites: CSI 615, and CSI 783 or 784; or permission of instructor. Introduces quantum information theory and its practical applications to information processing and secure communications. Emphasizes applications involving commercial and defense systems.

717 Quantum Computer Programming (3:3:0). Prerequisite: CSI 615 or equivalent, or permission of instructor. Covers methods for programming quantum computers. Topics include quantum computing concepts, currently known algorithms for quantum computers, denotational semantics, existing languages for quantum computers, application of logic programming to quantum computers, and programming for different types of novel computer architectures.

718 Quantum Computer Realization (3:3:0). Prerequisites: CSI 615, and 784 or equivalent; or permission of instructor. Introduces physical implementation of quantum computation, and practical applications to developing scalable quantum computers. Special emphasis on various schemes for achieving practical quantum computers.

719 Topics in Computational Chemistry (3:3:0) Prerequisite: permission of instructor. Covers selected topics in computational chemistry not covered in fixed-content computational chemistry courses. May be repeated for credit as needed.

720 Fluid Mechanics (3:3:0) Prerequisites: CSI 700 and 780; or permission of instructor. Covers basic and advanced fluid mechanics and continuous hypothesis to define fluids. Introduces tensor analysis; Euclidean and Lagrangian representations of fluid flow; Laplace’s equation; continuity equation; Navier-Stokes equations; Bernoulli’s theorem and Crocco’s form of the equations; steady and unsteady flows; potential, incompressible, and compressible flows; gravity and sound waves; gas dynamics; and viscous flows.

721 Computational Fluid Dynamics I (3:3:0) Prerequisites: course in partial differential equations such as MATH 678 or equivalent; knowledge of linear algebra at level of MATH 603 or CSI 740/MATH 625; coding experience in FORTRAN or C; or permission of instructor. Covers fundamentals including spatial and temporal approximation techniques for partial differential equations, solution of large systems of equations, data structures, solvers of the Laplace full potential equation, and simple Euler solvers. Includes two major projects Laplace solver, and 2-D Euler solver on unstructured grids. Students expected to write their own codes.

722 Computational Fluid Dynamics II (3:3:0) Prerequisite: CSI 721 or permission of instructor. Covers more advanced topics in computational fluid dynamics, including high-resolution schemes for hyperbolic PDEs, advanced Euler solvers, Navier-Stokes solvers, grid generation, adaptive mesh refinement, efficient use of supercomputing hardware, and future trends. Projects include topics in grid generation and adaptive refinement. Students expected to write their own codes.
723 Fluid Mechanics II (3:3:0) Prerequisite: CSI 720 or permission of instructor. Covers gas dynamics, shock waves, method of characteristics, boundary layer flows, instabilities, and turbulence modeling. Special topics include biological, non-Newtonian, and free surface flows; aeroelasticity; and magneto-hydrodynamics.

729 Topics in Continuum Systems (3:3:0) Prerequisite: permission of instructor. Covers selected topics in the computational aspects of continuum systems not covered in fixed-content courses in dynamical systems. May be repeated for credit as needed. Possible topics are smooth-particle hydrodynamics, radiation hydrodynamics, algorithms for continuum systems, adaptive grids for continuum computations, spectral methods in computational fluid dynamics, algorithms for concurrent machines, formation of high-energy particle jets in astrophysical applications, application to Earth atmospheric problems, and flow considerations in molten materials.

739 Topics in Bioinformatics (3:3:0) Prerequisite: permission of instructor. Selected topics in bioinformatics not covered in fixed-content bioinformatics courses. May be repeated for credit as needed.

740/MATH 625 Numerical Linear Algebra (3:3:0) Prerequisites: MATH 203 and some programming experience. Covers computational methods for matrix systems; theory and development of numerical algorithms for the solution of linear systems of equations, including direct and iterative methods; analysis of sensitivity of system to computer round off; and solution of least squares problems using orthogonal matrices. Also covers computation of eigenvalues and eigenvectors, singular value decomposition, and applications.

742/MATH 687 The Mathematics of the Finite Element Method (3:3:0) Prerequisite: MATH 446 or 685, or permission of instructor. The finite element method is commonly used for developing numerical approximations to problems involving ordinary and partial differential equations. Course develops underlying mathematical foundation, examines specific types of finite elements, analyzes convergence rates and approximation properties, and uses method to solve important equations. Students develop their own codes and are expected to complete independent projects.

744 Linear and Nonlinear Modeling in the Natural Sciences (3:3:0) Prerequisite: permission of instructor. Develops tools of mathematical modeling while carrying out numerical simulations. Considers examples from across the sciences. Topics include basic issues such as models, simplification, linearity, and nonlinearity; dimensionless parameters; dimensional analysis; models involving differential equations; examples from population growth and chemical kinetics; models involving partial differential equations; diffusion, transport, nonlinearity and shocks; probabilistic modeling; perturbation methods; extrapolation; and introduction to stability.

746/MATH 772 Wavelet Theory (3:3:0) Prerequisites: knowledge of convolution and Fourier transforms of sequences; some familiarity with Hilbert space theory helpful but not required; knowledge of scientific programming language. Studies theory and computational aspects of wavelets and wavelet transform. Emphasizes computational aspects of wavelets. Defines Fast Wavelet Transform in one and two dimensions, and develops appropriate numerical algorithms, and theory of wavelet bases on the real line.

747 Nonlinear Optimization and Applications (3:3:0) Prerequisites: MATH 213 and 216, or permission of instructor. Introduction to practical aspects of nonlinear optimization. Covers applications of optimization algorithms to solving problems in science and engineering. Applications include data analysis, materials science, nanotechnology, mechanics, optical design, shape design, and trajectory optimization.

748/MATH 629 Symbolic Computation (3:3:0) Prerequisites: undergraduate degree in scientific discipline and course in abstract algebra. Provides mathematical and computational background for computational algebraic geometry and its applications. Includes algebra, geometry, algorithms, concept of Groebner bases, automatic theorem proving, and serial and parallel algorithms and their complexity. Topics are related to applications in engineering and computer science. Students expected to complete projects.

749 Topics in Computational Mathematics (3:3:0) Prerequisite: permission of instructor. Selected topics in computational mathematics not covered in fixed-content computational mathematics courses. May be repeated for credit as needed.

750 Earth Systems and Global Changes (3:3:0) Prerequisite: course in ecology, environmental geology, or atmospheric physics; or permission of instructor. Introduces global system interactions responsible for global environmental change. Discusses natural causes of past and present global changes, and how human activities affect them; and ecological and human consequences of global changes. Topics include climate and hydrological systems, global warming, deforestation, ozone depletion, ecological system dynamics, introduction to climate and global change monitoring, satellite instrumentation and calibration, and model predictions.

758 Visualization and Modeling of Complex Systems (3:3:0) Prerequisite: permission of instructor. Covers elements of modeling and analysis of Earth and space sciences data and systems. Concentrates on sample projects and student-initiated projects to use visualization and graphical analysis techniques as they apply to modeling of complex data sets and systems. Uses several different analysis and visualization packages. Spacecraft data sets from the Naval Research Laboratory (NRL) Backgrounds Data Center and other NRL data sets are available for course projects; perusal of web data sets also possible. Modeling and analysis accompanied by appropriate readings from current literature.

761/ASTR 761 N-Body Methods and Particle Simulations (3:3:0) Prerequisites: PHYS 613/CSI 780 and CSI 700, or permission of instructor. Covers particle methods to solve variety of physical systems. Emphasizes study and development of numerical results, and visualization of these results in complex physical systems. Applications and projects include stellar and galaxy dynamics, smoothed particle hydrodynamics, plasma simulations, and semiconductor device theory algorithms on parallel and vectorized systems.

763 Statistical Methods in Space Sciences (3:3:0) Prerequisite: ASTR 530 or permission of instructor. Covers statistical and data analysis methods applicable to problems in space science, remote sensing, and astrophysics. Includes parametric and nonparametric hypothesis testing, parameter
estimation, correlation analysis, time series analysis, spatial analysis, and image reconstruction. Emphasizes imperfect nature of data, experimental sets and hypothesis. Examples drawn from current space science research.

764/ASTR 764 Computational Astrophysics (3:3:0)  
**Prerequisite:** ASTR 530. Covers statistical mechanics concepts important in astrophysics. Presents unified approach to particle acceleration and interaction theory based on analytical and numerical analysis of Boltzmann and Liouville equations. Discusses computational methods relevant to particle transport problems, with emphasis on Fokker-Planck and Monte Carlo solution techniques. Applications from space sciences include studies of cosmic ray acceleration, photon comptomization, particle transport in the near-Earth environment, energy transport in stellar atmospheres, and self-gravitating system dynamics.

765/ASTR 765 High-Energy and Accretion Astrophysics (3:3:0)  
**Prerequisite:** PHYS 502, ASTR 530, and PHYS 613/CSI 780; or permission of instructor. Overview of atomic and nuclear physics. Covers nuclear reactions of use to high-energy astrophysics; radiation processes in cosmic plasmas, emphasizing quantum mechanical calculations; stellar evolution and nucleosynthesis; computational models of stellar evolution; binary stars and accretion disks; numerical models of the structure of accretion disks; compact stars, white dwarfs, neutron stars, and black holes; acceleration processes and cosmic rays; interstellar medium and propagation of cosmic rays; high-energy processes in the center of galaxies; and ground- and space-based techniques and observations.

766/ASTR 766 Relativity and Cosmology (3:3:0)  
**Prerequisites:** ASTR 530 and MATH 314; or permission of instructor. Covers special relativity, four-dimensional space-time, general relativity, non-Euclidean geometries, geodesic and field equations, test of general relativity theory, black holes, cosmic background radiation, thermodynamic considerations in cosmology, and cosmological models.

769/ASTR 769 Topics in Space Sciences (3:3:0)  
**Prerequisite:** permission of instructor. Selected topics in space sciences not covered in fixed-content space sciences courses. May be repeated for credit as needed.

771/STAT 751 Computational Statistics (3:3:0)  
**Prerequisites:** STAT 544, 554, and 652. Covers basic computationally intensive statistical methods and related methods, which would not be feasible without modern computational resources. Covers nonparametric density estimation including kernel methods, orthogonal series methods and multivariate methods, recursive methods, cross-validation, nonparametric regression, penalized smoothing splines, the jackknife and bootstrapping, computational aspects of exploratory methods including the grand tour, projection pursuit, alternating conditional expectations, and inverse regression methods.

772 Statistical Learning (3:3:0)  
**Prerequisites:** CSI 672 or equivalent, or permission of instructor. The course focuses on statistical learning theory by introducing the statistical and optimization background essential for developing new efficient statistical learning algorithms. Also discusses applications of statistical learning algorithms to the solution of important problems in many areas of science.

773/STAT 663 Statistical Graphics and Data Exploration (3:3:0)  
**Prerequisite:** 300-level course in statistics; STAT 554 strongly recommended. Exploratory data analysis provides a reliable alternative to classical statistical techniques, which are designed to be the best possible when stringent assumptions apply. Topics include graphical techniques such as scatter plots, box plots, parallel coordinate plots, and other graphical devices; re-expression and transformation of data; influence and leverage; and dimensionality reduction methods such as projection pursuit.

775/OR 719/STAT 719 Computational Models of Probabilistic Reasoning (3:3:0)  
**Prerequisites:** STAT 652 or 664, or permission of instructor. Introduces theory and methods for building computationally efficient software agents that reason, act, and learn environments characterized by noisy and uncertain information. Covers methods based on graphical probability and decision models. Students study approaches to representing knowledge about uncertain phenomena, and planning and acting under uncertainty. Topics include knowledge engineering, exact and approximate inference in graphical models, learning in graphical models, temporal reasoning, planning, and decision-making. Provides practical model building experience. Students apply what they learn to semester-long project of their own choosing.

776/IT 746 Stochastic Calculus (3:3:0)  
**Prerequisites:** STAT 652, ECE 630 or 632, or permission of instructor. Introduces modern theory of stochastic calculus. Covers stochastic integrals, martingales, counting processes, diffusion processes, and Ito-type processes in general. Considers applications of these methods to engineering, biology, and economics.

777 Principles of Knowledge Mining (3:3:0)  
**Prerequisites:** INFS 614 or equivalent, or permission of instructor. Principles and methods for synthesizing task-oriented knowledge from computer data and prior knowledge, and presenting it in human-oriented forms such as symbolic descriptions, natural language-like representations, and graphical forms. Topics include fundamental concepts of knowledge mining; methods for target data generation and optimization; statistical and symbolic approaches; knowledge representation and visualization; and new developments such as inductive databases, knowledge generation languages, and knowledge scouts.

778/IT 776 Real Analysis and Statistics (3:3:0)  
**Prerequisites:** STAT 652; ECE 620, 621, or 630; or permission of instructor. Advanced calculus and linear algebra needed for doctoral work in statistics and related fields. Covers topology, vector spaces, matrices, continuity, differentiation, sequences and series of real numbers and real-valued functions, Riemann and Riemann-Stieltjes integrals, and multidimensional calculus. Presents applications in probability and statistics, including response surface methodology.

779 Topics in Computational Statistics (3:3:0)  
**Prerequisite:** permission of instructor. Selected topics in computational statistics not covered in fixed-content computational statistics courses. May be repeated for credit as needed.

780 PHYS 613 Computational Physics and Applications (3:3:0)  
**Prerequisites:** PHYS 502; FORTRAN, C, or C++ programming; or permission of instructor. Applies numerical methods to study of variety of physical systems, with emphasis on modeling and simulation. Develops numerical algorithms and simulation codes to gain understanding of mechanisms, processes in physical systems. Includes several projects drawn from such areas as atomic and molecular
interactions, molecular dynamics, lattice dynamics, quantum systems, chaos, percolation, random walks, aggregation mechanisms of soft solids, nanomaterials, and nonlinear dynamics.

781 Plasma Science (3:3:0) Prerequisites: PHYS 513 or PHYS 722/CSI 785; PHYS 711/CSI 782/CHEM 730; or permission of instructor. Study of ionized matter, theory, and some computation with application to astrophysics, industrial plasma processing, magnetosphere, and ionosphere problems. Vlasov and fluid equations derived and applied in plasma science, including study of plasmas with and without magnetic fields.

782/PHYS 711/CHEM 730 Statistical Mechanics for Modeling and Simulation (3:3:0) Prerequisites: PHYS 502 and CSI 780, or permission of instructor. Studies microcanonical, canonical, and grand canonical ensembles and fluctuations, as well as Fermi-Dirac and Bose-Einstein statistics. Modeling of ideal, dilute, and diatomic gases, liquids, and crystals. Also covers Liouville equation and simulation in classical statistical mechanics. Introduces Brownian motion, kinetic theory, and transport processes.

783/PHYS 736/CHEM 736 Computational Quantum Mechanics (3:3:0) Prerequisites: PHYS 502 and PHYS 613/CSI 780, or permission of instructor. Studies fundamental concepts of quantum mechanics from computational point of view, review of systems with spherically symmetric potentials, many electron atom solutions to Schrödinger’s equation, electron spin in many-electron systems, atomic structure calculations, algebra of many-electron calculations, Hartree-Fock self-consistent field method, molecular structure calculations, scattering theory computations, and solid-state computations.

784/PHYS 684 Quantum Mechanics (3:3:0) Prerequisite: PHYS 502 or permission of instructor. Studies fundamental concepts of quantum mechanics, time evolution, Schrödinger and Heisenberg formalism, harmonic oscillators, propagators, Feynman path integrals, rotations and angular momentum, angular momentum eigenvalues and eigenstates, Bell’s inequality, symmetries, conservation laws, degeneracy, perturbation theory, WKB methods, and scattering theory.

785/PHYS 685 Electromagnetic Theory (3:3:0) Prerequisites: PHYS 513 and PHYS 613/CSI 780, or permission of instructor. Advanced study of electric and magnetic fields. Topics include electrostatic and magnetostatic fields, boundary-value problems in field theory, multipole, simple radiating systems, relativistic electrodynamics, and radiation by moving charges.

786 Molecular Dynamics Modeling (3:3:0) Prerequisite: PHYS 613/CSI 780 or CHEM 633/CSI 711, or permission of instructor. Introduces simulation methods in physical chemistry sciences. Covers computational approaches to modeling molecular and condensed matter systems, including interatomic and molecular potentials, molecular dynamics, time averages, ensemble distributions, numerical sampling, thermodynamic functions, response theory, transport coefficients, and dynamic structure. Includes stochastic simulations such as Brownian motion, Langevin dynamics, Monte Carlo methods and random walks, and introduction to cellular automata.

787 Computational Materials Science (3:3:0) Prerequisites: PHYS 512/CSI 687 and PHYS 736/CSI 783, or permission of instructor. Covers selected topics in computational aspects of condensed matter, such as methods of electronic structure calculations, surface science, molecular clusters, lattice dynamics, nanomaterials, semiconductors, superconductivity, quantum Hall effect, magnetism, Hubbard model, mesoscopic systems, and liquids.

788/PHYS 728 Simulation of Large-Scale Physical Systems (3:3:0) Prerequisites: PHYS 613/CSI 780 and CSI 700, or permission of instructor. Study of diverse, large-scale physical systems emphasizing modeling and simulation of these multifaceted systems. Several projects are undertaken, drawn from such areas as many-body dynamics, atmospheric structure and dynamics, high-temperature plasmas, stellar structure, hydro dynamical systems, galactic structure and interactions, and cosmology.

789/PHYS 780 Topics in Computational Physics (3:3:0) Prerequisite: permission of instructor. Selected topics in computational physics not covered in fixed-content computational physics courses. May be repeated for credit as needed.

796 Directed Reading and Research (1–6:0:0) Prerequisite: permission of instructor. Reading, research on specific topic in computational sciences and informatics under direction of faculty member. May be repeated as necessary.

798 Research Project (3:0:0) Prerequisites: 12 graduate credits, and permission of instructor. Project chosen and completed under guidance of graduate faculty member, resulting in acceptable technical report.

799 Master’s Thesis (1–6:0:0) Prerequisites: 12 graduate credits, and permission of instructor. Project chosen and completed under guidance of graduate faculty member, resulting in acceptable technical report (master’s thesis) and oral defense. Graded S/IP.

819 Quantum Information Science Topics (3:3:0). Prerequisite: permission of instructor. Selected topics in quantum information science not covered in fixed-content computational sciences courses. Course may be repeated for credit as needed.

853 Atmospheric Transport and Dispersion (3:3:0) Prerequisite: CLIM 710 or 711 or equivalent, or permission of instructor. Develops basic concepts, theories, and models describing pollutant dispersal in atmosphere. Discusses related atmospheric systems affecting transport, transformation, and removal of air pollutants, with strong emphasis on fundamental issues associated with hazard prediction. Content essential for students engaging in graduate research in atmospheric transport and dispersion modeling.

854 Computing and Communication Systems for Earth Observing (3:3:0) Prerequisite: EOS 754 or permission of instructor. In-depth study of computing and communications systems, emphasizing performance issues and capacity for sustaining modern Earth-observing systems. Covers functional breakdown of ground-receiving stations, international communications standards for space data telemetry (such as CCSDS) and their impact on data fidelity and processing, and instrumentation for ground stations and tradeoff between onboard versus ground-station processing. Also covers computer system performance appreciation and limitations; implications of data product levels and standards for processing, input/output, and storage requirements; and applications of high performance computing, storage hierarchies, and
parallel input/output concepts and systems for speeding data access and processing.

873 Computational Learning and Discovery (3:0:0) Prerequisite: CS 580 or equivalent, or permission of instructor. Presents modern ideas, theories, and methods for computational learning and discovery, along with relevant applications including medical diagnosis, Earth science data analysis, and neuronal modeling. Includes background elucidation of fundamental concepts in computational learning, addressing discovery of equations, theory of causality, and comparison with biological and cognitive models. Students make presentations on topics of their research interest, and work on projects involving state-of-the-art systems.

876/IT 876 Measure and Linear Spaces (3:3:0) Prerequisite: IT 776/CSI 778, or permission of instructor. Covers measure theory and integration, convergence theorems, and the theory of linear spaces and functional analysis, including normed linear spaces, inner product spaces, Banach and Hilbert spaces, Sobolev spaces, and reproducing kernels. Topics include wavelets, applications to stochastic processes, and nonparametric functional inference.

877/IT 877 Geometric Methods in Statistics (3:3:0) Prerequisite: STAT 751 or permission of instructor. Develops foundations of geometric methods for statistics. Topics include n-dimension Euclidean geometry; projective geometry; differential geometry, including curves, surfaces, and n-dimensional differentiable manifolds; and computational geometry, including computation of convex hulls, tessellations of two-, three-, and n-dimensional spaces, and finite element grid generation. Examples include applications to scientific visualization.

885 Atomistic Modeling of Materials (3:3:0) Prerequisite: CSI 685, 700, and 786; or permission of instructor. Advanced course focusing on utilization of atomistic modeling and computer simulation techniques to analyze structure of crystalline materials. Introduces modern methodology of large-scale atomistic simulations, and provides hands-on experience through numerous examples and homework assignments based on simulation package SOLD (Simulator of Lattice Defects). Provides background knowledge on theory of lattice defects (point defects, interfaces, dislocations) and thermal and mechanical properties of solid materials (plastic deformation, fracture).

888 Topics in Quantum Systems (3:3:0) Prerequisite: PHYS 736/CSI 783 or PHYS 732/CSI 784; or permission of instructor. Selected topics in quantum systems in physics and chemistry not covered in fixed-content courses, in quantum mechanics. May be repeated for credit as needed. Possible topics are new spectroscopic methods, density functional theory, energy transfer and fluorescence, nuclear magnetic resonance, Mossbauer spectroscopy, advanced computational considerations in atomic or molecular structure, nuclear scattering theory, quantum considerations in condensed matter problems, and quantum gravity.

890 Research Colloquium in Computational Sciences and Informatics (1:1:0) Presentations in specific research areas in computational sciences and informatics by SCS faculty and staff members, and professional visitors. May be repeated for credit, but maximum 3 credits of CS 898, 899, and 991 may be applied to PhD.

893 Colloquium in Computational Sciences and Informatics (1:1:0) Presentations in a variety of areas of computational sciences and informatics by SCS faculty and staff members, and professional visitors. May be repeated for credit, but maximum 3 credits of CS 898, 899, and 991 may be applied to PhD.

909 Advanced Topics in Computational Sciences and Informatics (3:3:0) Prerequisite: permission of instructor. Covers selected topics in computational sciences and informatics not covered in fixed-content courses. May be repeated for credit as necessary.

972/IT 972 Mathematical Statistics I (3:3:0) Prerequisite: STAT 652 or equivalent. Focuses on theory of estimation, exploring method of moments, least squares, maximum likelihood, and maximum entropy methods. Details methods of minimum variance unbiased estimation. Other topics include sufficiency and completeness of statistics, Fisher information, Cramer-Rao bounds, Bhattacharyya bounds, asymptotic consistency and distributions, statistical decision theory, minimax and Bayesian decision rules, and applications to engineering and scientific problems.

973/IT 973 Mathematical Statistics II (3:3:0) Prerequisite: CSI 972. Continuation of CSI 972. Concentrates on theory of hypothesis testing. Topics include characterizing the decision process; simple versus simple hypothesis tests; Neyman Pearson Lemma; and uniformly most powerful, unbiasedness, invariance, randomized, and sequential tests. Applies testing principles to situations in normal distribution family and other families of distributions.

976/IT 976 Statistical Inference for Stochastic Processes (3:3:0) Prerequisite: CSI 776 or permission of instructor. Covers modern theory of parameter estimation and hypothesis testing for stochastic processes, counting processes with random intensities, and solutions to stochastic differential equations driven by martingales. Considers applications to engineering, biology, and economics.

978/IT 978 Statistical Analysis of Signals (3:3:0) Prerequisite: STAT 544 and 658, or equivalent. Advanced course in analysis of discrete- and continuous-time signals using methods of stochastic differential equation and time series. Presumes familiarity with methods of harmonic analysis and times series modeling. Topics include state-space modeling and eigen-value processing, nonlinear modeling of signals, non-Gaussian stochastic process structure, detection and estimation of vector-valued signals, robust signal detection, and array processing and target tracking.

979/IT 979 Advanced Topics in Computational Statistics (3:3:0) Prerequisite: permission of instructor. Covers selected topics in computational statistics not covered in fixed-content computational statistics courses. May be repeated for credit as needed.

980 Advanced Topics in Large-Scale Physical Simulation (3:3:0) Prerequisite: permission of instructor. Covers simulation of physical systems not covered in fixed-content physical simulation courses. May be repeated for credit as needed.

991 Seminar in Scientific Computing (1:1:0) Considers selected topics in specific area of computational sciences and informatics not covered in fixed-content courses or as extension of fixed-content courses. Format for presentation is seminar with student participation. May be repeated for credit, but maximum 3 credits of CS 898, 899, and 991 may be applied to PhD.
996 Doctoral Reading and Research (1–6:0:0) Prerequisite: admission to doctoral program, and permission of instructor. May be repeated as needed.

998 Doctoral Dissertation Proposal (1–12:0:0) Prerequisite: permission of advisor. Covers development of research proposal under guidance of dissertation director and doctoral committee. Proposal forms basis for doctoral dissertation. Course may be repeated as needed, but no more than 12 credits of CSI 998 may be applied to doctoral degree.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: admission to doctoral candidacy. Involves doctoral dissertation research under direction of dissertation director. May be repeated as needed, but no more than 24 credits in CSI 998 and 999 may be applied to doctoral degree.

Computational Social Science (CSS)

600 Introduction to Computational Social Science (3:3:0) Graduate-level introduction to computational concepts, principles, and modeling approaches in social sciences, emphasizing simulations and elements of complexity theory as they apply to social phenomena. Survey includes systems dynamics, cellular automata, and agent-based models.

605 Object-Oriented Modeling in Social Science (3:3:0) Prerequisite or corequisite: CSS 600, or approval by instructor and program director. Presents and applies concepts and principles from object-based modeling paradigm. Emphasizes Unified Modeling Language (UML) to render structure and operation of complex social systems and processes.

610 Computational Analysis of Social Complexity (3:3:0) Prerequisite or corequisite: CSS 600, or permission of instructor. Provides hands-on examination of agent-based models in social sciences by examining and experimenting with variety of social-simulation projects conducted in modeling environments such as Swarm, Repast, Ascape, and MASON (Multi-Agent Simulator of Networks and Neighborhoods).

620 Origins of Social Complexity (3:3:0) Prerequisite or corequisite: CSS 600, or permission of instructor. Examines when, where, and how social complexity emerged in human societies, emphasizing long-term analysis and comparative information processing in four civilizations of the ancient world: West Asia, East Asia, Andean Peru, and Mesoamerica.

625 Complexity Theory in the Social Sciences (3:3:0) Prerequisite or corequisite: CSS 600. Examines social phenomena including language, terrorism, the Internet, warfare, and wealth based on power laws and far-from equilibrium nonlinear dynamics. Emphasizes data analysis, and modeling and interpreting complexity-theoretic dynamics.

630 Comparative Computational Social Science (3:3:0) Prerequisite or corequisite: CSS 600, or permission of instructor. Applies comparative method for analyzing different types of computational models in the social sciences. Strong cross-domain and interdisciplinary emphasis akin to comparative economic systems, government, or linguistics.

635 Cognitive Foundations of Computational Social Science (3:3:0) Prerequisite or corequisite: CSS 600 and 610, or permission of instructor. Examines cognitive foundations and information processing in computational social agents, and compares to comparable human cognitive phenomena, including emotions, trust, and reciprocity. Emphasizes modeling project.

640 Human and Social Evolutionary Complexity (3:3:0) Prerequisite or corequisite: CSS 600 and 620, and permission of instructor. Examines long-term evolution of human and societal complexity from global, cross-cultural perspective, emphasizing computational aspects leading to today’s globalization. Global history from the computational social science perspective.

643 Land-Use Modeling Techniques and Applications (3:3:0) Prerequisite or corequisite: CSS 600, or permission of instructor. Survey of literature on spatially explicit empirical models of land-use change. Hands-on experience developing and running simple models. Techniques include statistical models, mathematical programming models, cellular automata, agent-based models, and integrated models.

645 Spatial Agent-Based Models of Human-Environment Interactions (3:3:0): Prerequisite or corequisite: GEOG 631 or CSS 600, or permission of instructor. CSS 600 may be taken concurrently. Discusses key challenges in spatial modeling of human-environment interactions. Reviews agent-based modeling applications in urban and rural interactions, agriculture, forestry, and other areas. Hand-on development of simple ABM models. Investigates linkages between GIS and ABM.

650 Physics Methods for Analyzing Social Complexity (3:3:0) Prerequisite or corequisite: CSS 600, and permission of instructor. Surveys complexity theoretic tools including strange attractors, Ising models, correlation functions, ergodic theory, power spectra, meanfield theory, and renormalization group. Emphasizes application to social, economic, or political systems.

655 Social Systems Dynamics (3:3:0) Prerequisite or corequisite: CSS 600. Introduces systems dynamics modeling of social systems governed by levels/rates or stocks/flows processes, with applications to global modeling, terrorism, urban dynamics, organizations, and social and international conflict.

660 Computational Social Science of Spacefaring Civilization (3:3:0) Prerequisite or corequisite: CSS 600 and 610, and permission of instructor. Focuses on goals, resources, history, and modeling issues concerning human and social dimensions of space program using CSS. Design and development of socially viable human communities in extreme environments.

692 Social Network Analysis (3:3:0) Prerequisite or corequisite: GEOG 631 or CSS 600, or permission of instructor. Examines social networks and compares to comparable human cognitive phenomena, including emotions, trust, and reciprocity. Emphasizes modeling project.

693 Topics in Computational Social Science (3:3:0) Prerequisite: permission of instructor. Selected topics in computational social science not covered in fixed-content computational social science courses. May be repeated for credit as needed.

796 Directed Reading and Research (3:3:0) Prerequisite: permission of instructor. Reading and research on specific topic in computational social science under direction of a faculty member. May be repeated as necessary.
798 Research Project (3:0:0) Prerequisites: 12 graduate credits from core requirements, and permission of instructor. Project chosen and completed under guidance of graduate faculty member, resulting in acceptable technical report.

799 Master’s Thesis (1–6:0:0) Prerequisites: 12 graduate credits from CSS core, and permission of instructor. Project chosen and completed under guidance of graduate faculty member, resulting in acceptable technical report (master’s thesis) and oral defense. Graded S/IP.

898 Research Colloquium in Computational Social Science (1:1:0) Presentations in specific research areas in computational social science by Center for Social Complexity-associated faculty and professional visitors. May be repeated for credit, but maximum 3 credits of CSS 898 and 899 may be applied toward PhD.

899 Colloquium in Computational Social Science (1:1:0) Presentations in variety of areas of computational social science by Center for Social Complexity-associated faculty and professional visitors. May be repeated for credit, but maximum 3 credits of CSS 898 and 899 may be applied toward PhD.

909 Advanced Topics in Computational Social Science (3:3:0) Prerequisite: permission of instructor. Covers selected topics in computational social science and socioinformatics not covered in fixed-content courses. May be repeated for credit as necessary.

909 Doctoral Reading and Research (1–12:0:0) Prerequisites: admission to doctoral program, and permission of instructor. Reading and research on specific topic in computational social science under direction of faculty member. May be repeated as necessary.

998 Doctoral Dissertation Proposal (1–12:0:0) Prerequisite: permission of advisor. Covers development of research proposal, which forms basis for doctoral dissertation, under guidance of dissertation director and doctoral committee. May be repeated as needed, but no more than 12 credits of CSS 998 may be applied toward satisfying doctoral degree requirements.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: approval of dissertation proposal. Doctoral dissertation research under direction of dissertation director. May be repeated as needed, but no more than 24 credits in CSS 998 and 999 may be applied toward satisfying doctoral degree requirements.

Computer Science (CS)

Computer Science

101 Preview of Computer Science (2:2:0) Corequisite: CS 112. All computer science majors are required to take this course within their first year. Offers a broad overview of computer science designed to provide students with an introduction to the field of computer science and an orientation to the Computer Science Department and the computing environment at the university. Includes a project to introduce problem solving using computers.

105 Computer Ethics and Society (1:1:0) Prerequisite: 12 credits of undergraduate course work. Intensive introduction to legal, social, and ethical issues surrounding software development and computer use. Stresses professional conduct, social responsibility, and rigorous standards for software testing and reliability. Examines issues such as liability, ownership of information, and computer crime.

112 Introduction to Computer Programming (4:3:1) Prerequisite: satisfaction of prerequisites for MATH 113. This course introduces the use of computer programming as a problem-solving tool. Topics in procedural programming include expressions, control structures, simple data types, input/output, graphical interfaces, testing, debugging, and programming environments.

123 Computing: From the Abacus to the Web (3:3:0) Prerequisites: none. Students may not take this course for credit once they have successfully completed CS 211. This course, intended for nonmajors, will give students the ability to relate to existing and emerging technologies (such as e-mail, the Internet, search engines, blogs, computer games, and robotics) by educating them on the underlying computer science concepts. Historical, social, and technical issues related to each topic will be discussed.

211 Object-Oriented Programming (3:3:1) Prerequisite: CS 112. This course continues to focus on problem solving, testing, and debugging and introduces object-oriented programming. Topics include classes, inheritance, packages, collections, exceptions, and polymorphism. Examples in the course may include the use of basic data structures.

222 Computer Programming for Engineers (3:3:0) Prerequisites: CS 112. A second course in computer programming. Introduces object-oriented programming and elementary data structures. The emphasis is on problems and language features relevant to engineers. (Intended as terminal course in computer programming.)

225 Culture and Theory of Games (3:3:0) Explores the theory, history, culture, and lore of games with particular emphasis on the varieties of computer game environments.

261 Introduction to a Second Language (1:1:0) Prerequisite: grade of C or better in CS 211. Not available for credit for CS majors. Advanced programming using Java programming language. Other languages may be offered at times.

262 Introduction to Low-Level Programming (1:1:0) Prerequisites: grade of C or better in CS 211. Introduction to the language C, as well as operating system concepts, in UNIX, to prepare students for topics in systems programming.

306 Synthesis of Ethics and Law for the Computing Professional (3:3:0) Prerequisite: CS 105, junior standing (at least 60 credit hours). Corequisite: all required general education courses. Computers science majors may use this course to satisfy the general education synthesis requirement, so long as they have not previously taken CS 305 for credit. Practical course to become effective computer professional. Examines legal and ethical issues surrounding computer technology and its use, as well as the foundation building that is necessary to deal with those challenges. Applies philosophical bases for ethical decision making to modern concerns raised by computers and technology. Addresses topics covered by CS 105 in a more intensive manner and focuses on the emerging legal and ethical issues involved in e-commerce and widespread use of the Internet.
310 Data Structures (3:3:0) Prerequisite: CS 211. Corequisite: CS105. This course continues to focus on object-oriented programming with an emphasis on tools and techniques for developing moderate to large programs. Topics include use and implementation of linear and nonlinear data structures, and the design and analysis of elementary algorithms.

325 Introduction to Game Design (3:3:0) Prerequisite: CS 211. Game design, in various electronic entertainment technologies, involves a diverse set of skills and backgrounds from narrative and art to computer programming. This course surveys the technical aspects of the field, with an emphasis on programming.

330 Formal Methods and Models (3:3:0) Prerequisites: grade of C or better in CS 211 and MATH 125. Abstract concepts that underlie much advanced work in computer science, with major emphasis on formal languages, models of computation, logic, and proof strategies.

332/SWE 332 Object-Oriented Software Design and Implementation (3:3:0) Prerequisite: CS 211. In-depth study of software design and implementation using a modern, object-oriented language with support for graphical user interfaces and complex data structures. Topics covered will be specifications, design patterns, and abstraction techniques, including typing, access control, inheritance, and polymorphism. Students will learn the proper engineering use of techniques such as information hiding, classes, objects, inheritance, exception handling, event-based systems, and concurrency.

363 Comparative Programming Languages (3:3:0) Prerequisite: grade of C or better in CS 367. Key programming mechanisms described independently of particular machines or languages including control, binding, procedural abstraction, and types. Systematically surveys diverse high-level language capabilities.

365 Computer Systems Architecture (3:3:0) Prerequisite: grade of C or better in ECE 303 or 331. Computer subsystems and instruction set architectures. Single cycle, multiple-cycle, and pipeline architectures. Memory hierarchy, cache, and virtual memory input-output processing.

367 Computer Systems and Programming (3:3:0) Prerequisite: Grade of C or better in CS 262 or 222 and ECE 301 or 331. Introduces students to computer systems from the perspective of a programmer. Topics covered include data representation, assembly and machine-level representation of high-level language programs, the memory hierarchy, linking, exceptions, interrupts, processes and signals, virtual memory, and system-level I/O. This course serves as a foundation for courses on compilers, networks, operating systems, and computer architecture, where a deeper understanding of systems-level issues is required.

391 Advanced Programming Lab (1:0:1) Corequisite: grade of C or better in CS 310 and permission of instructor. Programming-intensive lab course. Students refine problem-solving and programming skills while gaining experience in teamwork. Focuses on data structures, recursion, backtracking, dynamic programming, and debugging. Central focus is applying familiar and new algorithms and data structures to novel circumstances.

421/SWE 421 Software Requirements and Design Modeling (3:3:0) Prerequisite: CS 211. An introduction to concepts, methods, and tools for the creation of large-scale software systems. Methods, tools, notations, and validation techniques to analyze, specify, prototype, and maintain software requirements. Introduction to object-oriented requirements modeling, including use of case modeling, static modeling, and dynamic modeling using the Unified Modeling Language (UML) notation. Concepts and methods for the design of large-scale software systems. Fundamental design concepts and design notations are introduced. A study of object-oriented analysis and design modeling using the UML notation. Students participate in a group project on software requirements, specification, and object-oriented software design.

425 Game Programming I (3:3:0) Prerequisite: CS 325 and 367. The course will provide an introduction to technologies and techniques used in modern computer games. Teams will explore the various facets of a complete design, using sophisticated tools. The course will involve a project in which a game is prototyped; this prototype and initial design will serve as the starting point for the project in CS 426.

426 Game Programming II (3:3:0) Prerequisite: CS 425. This project-oriented course is a continuation of CS 425 with an emphasis on the implementation of a complete game.

440 Language Processors and Programming Environments (3:3:0) Prerequisites: grade of C or better in CS 310, 330, and 367. Survey of basic programming language processors and software development tools such as assemblers, interpreters, and compilers. Topics include design and construction of language processors, formal syntactic definition methods, parsing techniques, and code-generation techniques.

450 Database Concepts (3:3:0) Prerequisite: grade of C or better in CS 310 and 330. This course covers basics to intermediate knowledge for the design, implementation, and use of relational database systems. The main topics include the Entity-Relationship (ER) and Entity-Enhanced Relationship (EER) models for database design, Relational Algebra (RA), Structured Query Language (SQL), SQL programming techniques, functional dependencies and normalization, object and object-relational databases, and security. Students will practice to design, develop, and implement a relational ORACLE database and use the database for queries, transaction processing, and report generation.

451 Computer Graphics (3:3:0) Prerequisites: grade of C or better in MATH 203, CS 310, and CS 367. Basic graphics principles and programming. Topics include scan conversion, transformation, viewing, lighting, blending, texture mapping, and some advanced graphics techniques.

455 Computer Communications and Networking (3:3:0) Prerequisites: grade of C or better in CS 310 and 367, and STAT 344. Data communications and networking protocols, with study organized to follow layers of Internet Protocol Suite (TCP/IP family of protocols). Topics include role of various media and software components, local and wide area network protocols, network performance, and emerging advanced commercial technologies.

468 Secure Programming and Systems (3:3:0) Prerequisite: grade of C or better in CS 310 and CS 367, or permission of instructor. Fundamental principles and techniques for implementing secure computer systems. Topics include security and cryptography basics, vulnerability analysis, secure software development, and distributed system security. Projects involve designing and programming basic security tools, secure programs, and distributed systems.

471 Operating Systems (3:3:0) Prerequisites: grade of C or better in CS 310 and 367. Issues in multiprogramming. Covers concurrent processes and synchronization mechanisms; processor scheduling; memory, file, I/O, and deadlock management; performance of operating systems; and projects dealing with synchronization in multiprogrammed OS and virtual memory management.

475 Concurrent and Distributed Systems (3:3:0) Prerequisite: grade of C or better in CS 310 and 367, or permission of instructor. Practical issues in designing and implementing concurrent and distributed software. Topics include concurrent programming, synchronization, multitreading, local- and wide-area network protocols, distributed computation, systems integration, and techniques for expressing coarse-grained parallelism at the application level. Projects involve network programming at application level.

480 Introduction to Artificial Intelligence (3:3:0) Prerequisites: grade of C or better in CS 310 and 330. Principles and methods for knowledge representation, reasoning, learning, problem solving, planning, heuristic search, and natural language processing and their application to building intelligent systems in a variety of domains. Uses LISP, PROLOG, or expert system programming language.

482 Computer Vision (3:3:0) Prerequisite: grade of C or better in MATH 203, STAT 344, and CS 310. Basic principles of visual perception and their implementation on computer systems. Topics include early visual processing, edge detection, segmentation, intrinsic images, image modeling, representation of visual knowledge, and image understanding. Students complete projects involving real images.

483 Analysis of Algorithms Prerequisite: grade of C or better in CS 310 and 330 and MATH 125. Analyzes computational resources for important problem types by alternative algorithms and their associated data structures, using mathematically rigorous techniques. Specific algorithms analyzed and improved.

484 Data Mining (3:3:0) Prerequisite: grade of C or better in CS 310 and STAT 344, or permission of instructor. Basic principles and methods for data analysis and knowledge discovery. Emphasizes developing basic skills for modeling and prediction, on one side, and performance evaluation, on the other. Topics include system design; data quality, preprocessing, and association; event classification; clustering; biometrics; business intelligence; and mining complex types of data.

490 Design Exhibition (3:3:0) Prerequisites: grade of C or better in CS 421, 483; two other CS 400-level courses; and senior standing. Capstone course focusing on design and successful implementation of major software project, encompassing broad spectrum of knowledge and skills, developed by team of students. Requires final exhibition to faculty-industry panel.

498 Independent Study in Computer Science (1–3:0:0) Prerequisites: 60 credits, major in computer science, and permission of instructor. Research and analysis of selected problems or topics in computer science. Topic must be arranged with instructor and approved by department chair before registering. May be repeated for maximum 6 credits if topics substantially different.

499 Special Topics in Computer Science (3:3:0) Prerequisites: 60 credits and permission of instructor; specific prerequisites vary with nature of topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics substantially different.

540 Language Processors (3:3:0) Prerequisites: MATH 125; and CS 365, 310, and 330. Basic programming language processors such as assemblers, interpreters, and compilers. Topics include design and construction of language processors, formal syntactic definition methods, parsing techniques, and code generation techniques. Lab includes construction of language processors, and experience with programming environments.

555 Computer Communications and Networking (3:3:0) Prerequisites: STAT 344 or equivalent. Techniques and systems for communication of data between computational devices and layers of Internet Protocol Suite. Topics include role of various media and software components, local and wide area network protocols, network design, performance and cost considerations, and emerging advanced commercial technologies. Emphasizes TCP/IP family of protocols.

571 Operating Systems (3:3:0) Prerequisites: CS 310 and 365. Models of operating systems. Major functions including processes, memory management, I/O, interprocess communication, files, directories, shells, distributed systems, performance, and user interface.

580 Introduction to Artificial Intelligence (3:3:0) Prerequisites: CS 310 and 330. Principles and methods for knowledge representation, reasoning, learning, problem solving, planning, heuristic search, and natural language processing and their application to building intelligent systems in a variety of domains. LISP, PROLOG, or expert system programming language.

583 Analysis of Algorithms (3:3:0) Prerequisites: CS 310 and 330, and MATH 125. Topics include analyzing sequential and parallel algorithmic strategies such as greedy methods, divide and conquer strategies, dynamic programming, and approximation algorithms; and analyzing specific algorithms falling into these classes, NP-Hard and NP-Complete problems.

600 Theory of Computation (3:3:0) Prerequisites: CS 583 and discrete mathematics. Introduction to logic and proof techniques, formal languages, automata theory, and computational complexity. Specific topics include regular and context-free languages, Turing machines, NP-completeness, and undecidability.

631 Object-Oriented Design Patterns (3:3:0) Prerequisite: SWE 619 or 620, or CS 540 or 571; or graduate course in object-oriented programming or equivalent. Principles of object-oriented design through design patterns. Studies selection of appropriate object-oriented structure after system requirements or requirements specification of software system have been developed. Design patterns created in logic view of software system. Studies generalized design solutions
for generalized software design problems, and reuse of design patterns. Once developed, design patterns may be specified in any object-oriented language.

633 Computational Geometry (3:3:0) Prerequisite: CS 583. Basic principles and methods for computing in field of geometric modeling. Emphasizes data structures used to represent geometric objects, and algorithms for manipulating those data structures. Topics include range searching, polygon triangulation, convex hulls, motion-planning, visibility, and mesh generation.

635 Foundations of Parallel Computation (3:3:0) Prerequisites: CS 583, and 540 or 571; or equivalent. Covers three major parallel computing paradigms: MIMD computation, SIMD computation, and data flow computation. Emphasizes interfaces between algorithm design and implementation, architecture, and software. Examines parallel algorithms and parallel programming languages relative to architecture of particular parallel computers.

640 Advanced Compilers (3:3:0) Prerequisites: CS 540 and 583, or equivalent. Examines advanced compiler techniques such as code optimizations for sequential and parallel machines; compilers for logical, functional, or object oriented languages; and other topics in current literature.

645 Programming Language Semantics (3:0:0) Prerequisites: CS 540, language processors. This course introduces basic concepts and techniques in the foundational study of programming languages. The central theme is the view of individual programs and whole languages as mathematical objects about which precise claims may be made and proved. Particular topics include operational techniques for formal definition of language features, type systems and type safety properties, polymorphism and subtyping, and foundations of object-oriented programming.

650 Database Engineering (3:3:0) Prerequisites: CS 540, 583, and 571. Data models for network, hierarchical, object-oriented, and relational management information systems. Covers development (including internal structures) of a database system.


662 Computer Graphics Game Technologies (4:3:1) Prerequisite: CS 652. Topics include modeling, rendering, and simulation in real time. Addresses some graphics game techniques including collision detection, levels of detail, physics-based simulations, textures, maps, and shadows.

668 Computer Architecture Systems (3:3:0) Prerequisite: CS 571 or 540, or equivalent. Examines principles and practices relating computer architecture to programming execution and efficiency. Presents new approach that stresses performance and cost of architecture. Examines principles of compiler and OS implications, instructions sets, basic processors, pipelines, and memory-hierarchy. Topics may include RISC machines, cache memories, register usage, and vector machines.

671 Advanced Operating Systems (3:3:0) Prerequisite: CS 571, or permission of instructor. Advanced topics in design and implementation of microkernel-based, object-oriented, and distributed operating systems. Specific topics include support for interprocess communication, interaction between computer architecture and operating systems, distributed file systems, transactions, and distributed shared memory.

672 Computer System Performance Evaluation (3:3:0) Prerequisites: CS 571 and MATH 351, or permission of instructor. Theory and practice of analytical models of computer systems. Topics include queuing networks, single and multiple class mean-value analysis, models of centralized and client-server systems, software performance engineering, and web servers performance.


675 Distributed Systems (3:3:0) Prerequisites: CS 571 or permission of instructor. Issues in design and implementation of distributed systems and applications. Topics include distributed communication paradigms, middleware, coordination and synchronization, distributed transactions, consistency and replication, fault-tolerance and reliability, and peer-to-peer systems.

680 Natural Language Processing (3:3:0) Prerequisites: CS 540 and 580. Explores principles of designing computer programs that respond appropriately to questions, commands, and statements expressed in human language, particularly English. Role of knowledge representation and linguistic theory. Students become familiar with current literature to implement a limited natural language processor.

681 Designing Expert Systems (3:3:0) Prerequisite: CS 580. Design, construction, and evaluation of software systems that solve problems generally deemed to require human expertise. Focuses on study and use of relevant languages, environments, mathematics, and logic. Case studies of successful systems. Programming projects include development of tools or small-scale systems.

682 Computer Vision (3:3:0) Prerequisite: CS 580 and 583. Study of computational models of visual perception and their implementation in computer systems. Topics include early visual processing, edge detection, segmentation, intrinsic images, image modeling, representation of visual knowledge, and image understanding.

683 Parallel Algorithms (3:3:0) Prerequisite: CS 583; CS 635 recommended. Examines design and analysis of parallel algorithms. Material focuses on algorithms for both theoretical and practical models of parallel computation. Considers algorithm design and analysis for PRAM and existing SIMD and MIMD type architectures. Topics include sorting, graph algorithms, numerical algorithms, and computational complexity.

684 Graph Algorithms (3:3:0) Prerequisite: CS 583. Data structures and analytical techniques to study graph algorithms. Data structures include disjoint sets, heaps, and dynamic trees. Algorithms include minimum spanning trees, shortest path, maximum flow, and graph planarity.

685/ECE 651/SYST 672 Intelligent Systems for Robots (3:3:0) Prerequisite: One of CS 580, ECE 650, SYST 611 or 555, or equivalent. Reviews developments in intelligent autonomous systems. Studies applications of artificial intelligence, computer vision, and machine learning to robotics.
Topics include analysis and design of algorithms and architectures for planning, navigation, sensory data understanding, sensor fusion, spatial reasoning, motion control, knowledge acquisition, learning concepts and procedures, self-organization, and adaptation to environment.

686 Image Processing and Applications (3:3:0) Prerequisites: CS 583 and either STAT 344 or MATH 351, or equivalent. Concepts and techniques in image processing. Discusses methods for image capture, transformation, enhancement, restoration, and encoding. Students complete projects involving naturally occurring images.

687 Advanced Artificial Intelligence (3:3:0) Prerequisite: CS 580. Explores foundational issues of artificial intelligence, such as roles of knowledge and search, formalization of knowledge and inference, and symbolic versus emergent approaches to intelligence. Studies advanced programming techniques for artificial intelligence, relationship to foundational issues, and important application areas for artificial intelligence. Major programming project required.

688/IT 688 Pattern Recognition (3:3:0) Prerequisites: CS 580 or equivalent. Explores statistical pattern recognition and neural networks. Pattern recognition topics include Bayesian classification and decision theory, density (parametric and nonparametric) estimation, linear and nonlinear discriminant analysis, dimensionality reduction, feature extraction and selection, mixture models and EM, and vector quantization and clustering. Neural networks topics include feed-forward networks and back-propagation, self-organization feature maps, and radial basis functions. Course emphasizes experimental design, applications, and performance evaluation.

695 Topics in Computer Science (3:3:0) Prerequisites: completion of two core courses, and permission of instructor. Special topics in computer science not occurring in regular computer science sequence. May be repeated for credit when subject distinctly different.

697 Independent Reading and Research (1–3:0:0) Prerequisites: graduate standing; completion of at least two of core courses CS 540, 571, 580, and 583; and permission of instructor. In areas of importance but insufficient demand to justify a regular course, students may undertake a course of study under supervision of consenting faculty member. Students usually submit written statement of course content and tentative reading list as part of request for approval. Literature review, project report, or other written product usually required.

700 Quantitative Methods and Experimental Design in Computer Science (3:0:0) Prerequisites: STAT 344, at least two 600-level courses in computer science, and doctoral status. Integrated treatment to models and practices of experimental computer science. Topics include scientific methods applied to computing, workload characterization, forecasting of performance and quality metrics of systems, uses of analytic and simulation models, design of experiments, interpretation and presentation of experimental results, hypothesis testing, and statistical analyses of data. Involves one or more large-scale projects.

706 Concurrent Software Systems (3:3:0) Prerequisites: CS 571 and SWE 621 or 631, or equivalent. Topics include concurrent programming languages and constructs; and specification, design, verification, and validation of concurrent programs. Students required to solve concurrent programming problems and check solutions by using verification, testing, and debugging tools.

719/IT 809 Scaling Technologies for E-business (3:3:0) Prerequisites: at least one operating system and one networking course, and admission to IT&E doctoral program. Discusses, from quantitative point of view, characteristics of most important technologies used to support implementation of e-business sites. Includes topics such as hardware and software architectures of e-business sites, authentication, payment services, understanding customer behavior, workload characterization, scalability analysis, and performance prediction. Term paper and project required.

732/IT 822 Software Maintenance and Reuse (3:3:0) Prerequisites: CS/SWE 621 or equivalent, data structures, principles of modern programming, and discrete mathematics; or permission of instructor. Perfective maintenance, reuse of software components and patterns, evolving software systems, principles of object-oriented analysis and development. Presents issues regarding technologies supporting perfective software maintenance and reuse.

735 Concurrency (3:3:0) Prerequisite: CS 635 or 706, or equivalent. Studies techniques, tools for specifying and verifying concurrent and distributed programs. Topics may include model checking, temporal logic, process algebra, and test generation. Automated verification tools used to specify and verify concurrent programs.

750/IT 750 Theory and Applications of Data Mining (3:3:0) Prerequisites: CS 688 or permission of instructor. Concepts and techniques in data mining and multidisciplinary applications. Topics include databases; data cleaning and transformation; concept description; association and correlation rules; data classification and predictive modeling; performance analysis and scalability; data mining in advanced database systems, including text, audio, and images; and emerging themes and future challenges. Term project and topical review required.

752 Interactive Graphics Software (3:3:0) Prerequisite: CS 652. Advanced graphics methods and tools. Topics include visualization, modeling, rendering, animation, simulation, virtual reality, graphics software tools, and current research topics.

753/IT 815 Parallel Computation (3:3:0) Prerequisites: CS 635 or CSI 801. Covers topics illustrating contemporary thinking on architectures, application, development environments, algorithms, operating systems, language requirements, and performance.

755 Advanced Computer Networks (3:3:0) Prerequisite: CS 555. Current and emerging issues in advanced computer networks and applications. Topics include software systems associated with packet and cell-switched networking architectures and protocols, high-performance LANs, scheduling and congestion control, mobile networking, multimedia applications, and next generation of Internet.

756 Performance Analysis of Computer Networks (3:3:0) Prerequisite: CS 656 or equivalent. Analytical and simulation techniques for modeling and analyzing computer networks. Examines elementary queuing analysis; networks of queues; routing and flow controls; and applications to local and wide area networks, Internet, and emerging networking technologies.
758/IT 758 Networked Virtual Environments (3:3:0)
Theory and practice of advanced distributed simulation via networks using highly realistic graphic environments. Networked virtual environment principles, networking technology for distributed simulation, networked multimedia concepts, virtual simulation concepts, efficiency/performance issues, and online conferencing/virtual classrooms. Term project required.

771/IT 817 Neural Networks (3:3:0) Prerequisite: CS 688, or permission of instructor. Studies adaptive and competitive principles using distributed and parallel computation. Topics include background from statistics, control, adaptive signal processing, and neurosciences. Basic models, such as those suggested by Grossberg, Hopfield, and Kohonen, discussed in terms of analytical characteristics and applications. Neural networks assessed as universal approximators. Connections to fuzzy approach established through the Radial Basis Function approach. Presents applications to perception, knowledge-based systems, and robotics.

773 Real-Time Systems Design and Development (3:3:0) Prerequisite: CS 656 or 671. Real-time systems and principles supporting design and implementation. Emphasizes fundamental results from real-time scheduling theory, and relevance to computer system design. Topics include system design issues for real-time applications involving communication networks, operating systems, databases, and multimedia.

774/IT 835 Computational Vision (3:3:0) Prerequisites: CS 68 and 686; or permission of instructor. Studies recent advances in development of machine vision algorithms and knowledge-based vision systems. Topics include scalespace; Gabor and wavelet processing; distributed and hierarchical processing using neural networks; motion analysis; active, functional, and selective perception; object and target recognition; expert systems; data fusion; and machine learning. Emphasizes system integration in terms of perception, control, action, and adaptation. Presents applications to robotics, intelligent highways, inspection, forensic, and data compression.

775/IT 844 Advanced Pattern Recognition (3:3:0) Prerequisite: CS 68 or permission of instructor. Covers statistical pattern recognition, neural network, and statistical learning theory approaches. Topics include decision theory and Bayes' theorem, density (parametric and nonparametric) estimation, linear and nonlinear discriminant analysis, SVM and kernel methods, SRM and model selection, performance evaluation, mixture of experts (AdaBoost), dimensionality reduction, feature selection and extraction, and clustering. Emphasizes experimental design, applications, and performance evaluation.

776/IT 852 Graphical Real-Time Simulation (3:3:0) Prerequisite: CS 652 or IT 875. Current research in advanced computer graphics, and applications in realistic real-time simulations. Topics include physically based modeling, real-time simulation, distributed interactive simulation (DIS), network virtual environments (NVE), and virtual reality (VR).

777 Human-Computer Intelligent Interaction (3:3:0) Prerequisites: CS 580, and 652 or 682; or permission of instructor. Current and emerging issues in human-computer intelligent interaction, and human-centered systems and their applications. Topics include video processing, visualization, virtual environments, adaptation and tutoring, image and scene modeling, analysis and synthesis, face and gesture recognition, and speech and natural language processing. Term project and topical review required.

778/IT 778 Biometrics (3:3:0) Prerequisites: CS 688 or permission of instructor. Basic principles and methods for automatic authentication of individuals. Technologies include face, fingerprint and iris recognition, and speaker verification. Additional topics cover multimodal biometrics, system design, performance evaluation, and privacy issues. Term project required.

780/INFS 780 Data Mining in Multimedia Databases (3:3:0) Prerequisite: INFS 755 or CS 750 or permission of instructor. This course covers advanced algorithms for data management, learning, and mining large multimedia databases. Issues related to handling such data including feature selection, high dimensional indexing, interactive search and information retrieval, pattern discovery, and scalability to large datasets are discussed. Mining techniques and data types to be covered include texts/web, images, videos, DNA, temporal, spatial, spatiotemporal databases, graph mining, stream mining, and data visualization.

782 Machine Learning (3:3:0) Prerequisite: CS 681, 687, or 688; or permission of instructor. Surveys machine learning concerning development of intelligent adaptive systems that are able to improve through learning from input data or from their own problem-solving experience. Topics provide broad coverage of developments in machine learning, including basic learning strategies and multistrategy learning.

785 Knowledge Acquisition and Problem Solving (3:3:0) Prerequisite: CS 680, 681, or 687; or permission of instructor. Principles and major methods of basic stages of knowledge acquisition such as systematic elicitation of expert knowledge, knowledge base refinement, and knowledge base optimization in the context of general problem-solving methods. Includes case studies of successful knowledge acquisition and problem-solving systems, and projects involving development or application of knowledge acquisition tools for knowledge-based systems.

795 Advanced Topics in CS (3:3:0) Prerequisite: admission into computer science PhD program. Advanced topics not occurring in regular sequence. May be repeated for credit when subject differs. Satisfies MS breadth requirement only if explicitly stated in syllabus in given section. Only one such course should be used for breadth requirements.

798 Project Seminar (3:3:0) Prerequisite: 18 credits applicable toward MS in computer science. Master’s degree candidates undertake a project using knowledge gained in MS program. Topics chosen in consultation with advisor. Meets project or thesis requirement for MS in computer science.

799 Thesis (3–6:0:0) Prerequisite: 18 credits applicable toward MS in computer science. Original or expository work evaluated by committee of three faculty members.

800 Computer Science Colloquium (1:0:0). Prerequisites: Admission to CS PhD program. This course introduces PhD students to research topics in computer science. Students are required to attend colloquia including talks by distinguished speakers, faculty candidates, and Mason faculty. This course can be taken twice for credit.
803, 804 Doctoral Tutorial in Information Technology (3:3:0) Individualized intensive study of information technology. May be repeated as needed.

811/IT 811 Research Topics in Machine Learning and Inference (3:3:0) Prerequisite: CS 580 or 681, or permission of instructor. Presents unifying principles that underlie diverse methods, paradigms, and approaches to machine learning and inference. Reviews most known learning and inference systems, discusses strengths and limitations, and suggests most appropriate areas of application. Hands-on experience by experimenting with state-of-the-art learning and inference systems, and working on projects tailored to research interests.

818/IT 818 Topics in Computer Systems (3:3:0) Discussion of current research topics in computer systems. Topics vary according to faculty interest. Possible topics include peer-to-peer computing, high-performance distributed computing, sensor and ad hoc networks, autonomic computing, virtualization, and web services and middleware.

850/IT 915 Research Topics in Parallel Computation (3:3:0) Prerequisite: CS 815. Discusses current research topics that vary according to student and faculty interest. Possible topics include formal models of concurrency, specification and design of parallel programming languages, logic programming in a parallel environment, and parallel distributed processing (neural networks).

880/IT 910 Research Topics in Artificial Intelligence (3:3:0) Prerequisite: graduate course in artificial intelligence. Special topics in artificial intelligence not occurring in regular computer science sequence. Requires substantial student participation. Subject matter may include continuation of existing 600- or 700-level courses in artificial intelligence or other topics. May be repeated for credit when subject matter differs.

884/IT 940 Advanced Topics in Computer Vision and Robotics (3:3:0) Prerequisite: CS 682 or 685, or permission of instructor depending on topics offered. Covers recent developments. Topics motivated by applications to autonomous robotic systems, mobile robot navigation, multirobot systems, human-computer-environment interaction, image/video search and analysis, content discovery, and visual surveillance. Topics include 3D structure and motion recovery, motion understanding, map building and localization, object detection and recognition, and target tracking. Projects and experimental evaluation emphasized. Course may be repeated with change of topic.

895 Research Topics in CS (3:3:0) Prerequisite: admission into computer science PhD program, or permission of instructor. Advanced topics not occurring in regular sequence. May be repeated for credit when subject differs. Only one such course should be used for breadth requirements.

998 Doctoral Dissertation Proposal (1–12:0:0) Work on research proposal that forms basis for doctoral dissertation. May be repeated as needed. No more than 24 credits of CS 998 and 999 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1–12:0:0) Formal record of commitment to doctoral dissertation research under direction of faculty member in computer science. May be repeated as needed. No more than 24 credits of CS 998 and 999 may be applied to doctoral degree requirements.

**Conflict Analysis and Resolution (CONF)**

Institute for Conflict Analysis and Resolution

Unless otherwise noted, all nondepartmental majors and extended study students require permission of instructor to register for graduate-level CONF classes.

101 Conflict and Our World (3:3:0) Brief history of field, survey of key conflict resolution themes and theories, and intervention methods. Overview includes general factors of conflict and its resolution; and nature of conflict in interpersonal, group, organizational, and international situations.

202 Dialogue and Difference (3:3:0) Communicating effectively across differences of age, gender, language, culture, and political orientation, and in different contextual situations is a skill useful for every individual. It is also integral to the success of any attempt to resolve conflict, whether individual, group/institutional, or global. Through this course, students will gain an understanding of the challenges of communicating across differences and the skills required to communicate effectively. Students will engage in preparing and analyzing communication strategies and over the term will participate in a dialogue group that explores the meaning and experience of difference on the Mason campus.

240 Social Dynamics of Terrorism, Security, and Justice (3:3:0) Terrorism is a significant factor in conflict worldwide, yet the underlying causes and conditions that give rise to terrorist activity are often misunderstood and misrepresented. Through case studies of terrorist groups around the world, this course presents students with an analytic framework to account for terrorist acts and organizations. Course lectures and materials will also explore the various social dynamics underlying the development of terrorism and responses to it. Topics include, but are not limited to, defining terrorism, recruitment into violent groups, dynamics of terrorist organizations, counterterrorism and human rights concerns, the role of religious and political ideologies in terrorism and counterterrorism, media coverage of terrorism, and effects of terrorism on social structures and processes.

300 Conflict Resolution Techniques and Practice (3:3:0) Prerequisites: CONF 101 or permission of instructor. Advanced consideration of CONF 101 topics, introduction of core notion of reflective practice, conflict resolution techniques, practice, third party roles, and ethics.

301 Research and Inquiry in Conflict Resolution (3:3:0) Prerequisites: CONF 101 or permission of instructor. Introduces social science research methods at undergraduate level. Covers basic epistemology of social research, including quantitative and qualitative methods, emphasizing participatory action research, and evaluation and assessment work.
302 Identity Conflicts and their Resolution (3:3:0) Covers deeply rooted, intractable, or protracted social conflicts around core issues of identity, including race, ethnicity, religion, and nationalism. Explores cultural, symbolic, and discursive approaches to identity conflict.

320 Interpersonal Conflict Analysis and Resolution (3:3:0) Covers conflict at micro level, introducing theories drawn from various disciplines including psychology, anthropology, and conflict resolution. Uses readings, case studies, and role plays to develop ability to analyze and intervene in interpersonal conflicts. Also prepares for further course work for interpersonal conflict concentration.

330 Community, Group, and Organizational Conflict Analysis and Resolution (3:3:0) Covers conflict at mezzo level, introducing theories of social harmony and conflict, drawing on sociology, social psychology, community psychology, organizational psychology, administration of justice, philosophy, and conflict resolution. Uses case studies, class presentations, and group projects to develop ability to analyze conflict and make recommendations for change. Also prepares for further course work for community and organizational conflict concentration.

340 Global Conflict Analysis and Resolution (3:3:0) Covers conflict at macro level, introducing theories of international and global violence and conflict, drawing from disciplines of international relations, political science, intercultural communication, and conflict resolution. Covers impact of globalization, and structural causes of conflict. Uses class discussions, case studies, and final paper to develop analytical skills to help in analysis of conflict. Prepares for further course work for international conflict concentration.

375 Special Programs Field Experience (1–6:0:0) Prerequisite: Permission of instructor and director, controlled enrollment form required. Learning experience in the application of conflict analysis and resolution (CAR) skills in special program settings. Provides supervised practice in CAR techniques, leadership, program implementation, and strategies to facilitate conflict resolution in educational institutions or community settings.

385 International Field Experience (3:3:0) Prerequisites: CONF 101, and permission of instructor. Investigates conflict theory through international field experience including participation in formally organized course offered by Center for Global Education or another form of international field experience approved by program director. May be repeated for up to 6 credits.

393 Philosophy, Conflict Theory, and Violence (3:3:0) Prerequisite: CONF 101 or permission of instructor. Examines causes, sources, and origins of group violence with particular attention to group violence of ethnicity conflict. Explores alternative proposals that explain why violence becomes primary, or at least viable, form of revolving conflict in some societies.

399 Special Topics in Conflict Analysis and Resolution (3:3:0) Examines selected topics relating to analysis or resolution of conflict. Topics vary but may include historical examination of conflict, social issues stemming from conflict, ethical issues in intervention, globalization, human rights, sources of conflict, or relationship of particular identity domains to conflict. May be repeated for up to 9 credits if topics vary.

490 Integration (3:3:0) Prerequisites: CONF 101 and degree status; or permission of instructor. Capstone course in which students reflect on what they have learned, integrating knowledge from course work and synthesizing it to cognate body of knowledge. Includes class discussion and final project that demonstrates understanding of conflict theory and reflective practice.

495 Organizations and Actors in the Conflict Field (3:3:0) This seminar acquaints students with the work of professionals in the conflict field through lectures, guest speakers, and field trips to organizations and institutions located in the region. Topics will vary and may include the role and structure of nongovernmental organizations engaged in conflict resolution, the ethical challenges facing conflict practitioners, and the translation of theoretical concepts into practical action.

499 Independent Research in Conflict Analysis and Resolution (1–3:0:0) Prerequisites: CONF 101 and permission of instructor. Readings and research conducted on individual basis in consultation with instructor. Student may not present more than 3 credits for graduation credit.

501 Introduction to Conflict Analysis and Resolution (3:3:0) Prerequisite or corequisite for all MS CONF majors. Introduces field of conflict analysis and resolution. Examines definitions of conflict and diverse views of its “resolution.” Explores thinking about human behavior, and social systems as they relate to origins of conflict and role of conflict in violent and peaceful social change. Considers appropriate responses to conflict at interpersonal, intergroup, industrial, communal, and international levels.

502 Intensive Introduction to Conflict Analysis and Resolution (3:3:0) Introduces field of conflict analysis and resolution. Examines the origins of social conflict, the practices and strategies for responding to conflict, and frameworks for constructive intervention. Considers interpersonal, community, and large-scale intergroup conflict.

595 Selected Topics (3:3:0) Prerequisite: CONF 501. Topics vary each semester and are announced each academic year.

601 Theories of Conflict and Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801. Examines major theories of conflict causation and motivation. Emphasizes need for theories to inform processes of conflict resolution. Weaves together ideas from conventional disciplines with new approaches, especially with regard to causes and methods of resolving deep-rooted conflict.

610 Philosophy and Methods of Conflict Research (3:3:0) Prerequisite: CONF 501 or 801. Introduces students to the philosophies behind social science research and the methods for conducting research in the field of conflict resolution. Focuses on the identification of research problems associated with particular conflict situations, selection of appropriate research methods, and the design of effective research projects.

611 MS Research I (3:3:0) Prerequisite: CONF 501 and 610. Builds on CONF 610. Guides students through design, execution, interpretation, analysis, presentation, and evaluation of field research in conflict and resolution.

642 Integration of Theory and Practice (3:3:0) Prerequisite or corequisite: CONF 501, 601, 610, and 713. Taken in last semester of master’s student course work. Assists in developing students’ own theories of conflict and conflict.
resolution by reviewing and integrating prior course work. Students expected to demonstrate holistic comprehension by writing major essay of publishable quality.

650 Conflict Analysis and Resolution Advanced Skills (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Introduces innovative practices and provides structure to reflect on and improve ability to work within conflict settings. Considers the intersection of theory and practice, with special attention to the challenges of translation, adaptation, and transfer of skills and models.

651 Conflict Analysis and Resolution for Collaborative Leadership in Community Planning (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers designing collaborative processes to work with diverse stakeholders to build meaningful and lasting shared agreements. Considers applications in land use, development, or other community-planning contexts.

652 Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Contexts (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Considers conflict analysis and resolution approaches to designing, implementing, and evaluating holistic cross-sectoral, conflict-sensitive initiatives in areas of potential violence and post-conflict reconstruction and stabilization contexts.

653 World Religions, Diplomacy, and Conflict Resolution (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Analyzes ways world religions play role in conflicts, war, diplomacy, peace making, and conflict resolution.

656 Integrating Complementary Approaches in Conflict Analysis and Resolution (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers range of skills in group facilitation processes, with emphasis on conflict analysis and resolution approaches to improve group communication. Includes skill-building exercises.

657 Facilitation Skills (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers diversity and difference in conflict analysis and resolution that integrate multiple approaches, stakeholders, and methods. Applies to social conflicts in local and international contexts.

658 Diversity and Difference in Conflict Analysis and Resolution (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers elements of cultural diversity, understanding and awareness; and creative ways of approaching issues of diversity, identity, worldviews, and territory. Considers individuals, organizations, communities and nations.

659 Leadership in Conflict Analysis and Resolution (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers roles and styles of leadership in interpersonal, organizational, community, group, and international conflicts. Considers cultural roles of leaders as insider-partials, negotiators, facilitators, and mediators.

660 Conflict Assessment and Program Evaluation (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers assessment methods appropriate to conflict contexts, and related evaluation approaches and techniques for use in areas of peace building, community processes, or interpersonal conflict.

668 Applied Integration for Graduate Certificates (3:3:0) Prerequisites: CONF 501 or 502; CONF 660; and CONF 650, 651, 652 or 653. Capstone course facilitating integration of learning in the graduate certificate programs, and appropriate mentored application and experiential learning.

690 Practicum in Conflict Analysis and Resolution (6:1:5) Prerequisite: CONF 501 or 801, and 713. Two semesters, 3 credits per semester. In-depth field study of ongoing conflict situations, and design and delivery of intervention processes to manage or resolve conflicts.

694 Internship (1–6:0:1–6) Prerequisite: 21 credits, including CONF 713. Under direction of internship coordinator, students spend at least 160 hours on project involving study, resolution of conflict for each 3-credit internship. Students are expected to mesh theory and practice through observation and experience. Includes comprehensive report analyzing experiences.

695 Selected Topics (3:3:0) Topics vary; they are announced each academic year.

697 Directed Reading (1–3:0:1–3) Independent reading at master’s level on specific topic related to conflict analysis and resolution, as agreed to by student and faculty member. May be repeated up to 6 credits.

701 Theories of Social Harmony (3:3:0) Prerequisite: CONF 501 or 801; CONF 601 recommended but not required. Explores theories that define and explain social harmony and cooperation. Examines social institutions that manage and mediate conflict at all levels. Draws from major social science theorists from a variety of disciplines.

702 Peace Studies (3:3:0) Examines diverse meanings of peace, conflict, and violence, and then reviews different issues relevant to understanding peace and conflict, including the sources of war, poverty and economic disparities, and ecological degradation. Other topics to be covered are peace keeping, peace building, sustainable development, ecological preservation, nonviolence, and peace movements.

703 Conceptions of Practice (3:3:0) Prerequisites: CONF 501, 601, 713. Provides framework for integrating theory and practice in conflict resolution. Reviews types of practice and theories of intervention and change, discusses analytic process of assessment and diagnosis before intervention. Considers how research can be incorporated into practice, and how thoughtful practice generates research questions. Includes methods of program evaluation and action research. Students encouraged to identify, develop their own theories.

708 Identity and Conflict (3:3:0) Explores complex interrelations of social identity and postmodern conflicts in society. Emphasizes the role of identity in processes of conflict resolution and transformation. Critical rethinking of ethnic, national, and religious identities as both generators and outcomes of conflict are an important part of the course. Extends knowledge on structure and dynamics of identity-based conflicts and develops a framework for their resolution. Course includes lectures, simulations, and case studies.

709 War, Violence, and Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801. Considers various theories, causes, and conditions of violence, and applies them to variety of cases: family abuse, religious and ethnic violence, terrorism, revolution, and warfare. Applies insights from study of initiation, escalation, management, resolution, and prevention of violence to theories about resolving deep-rooted conflicts.
711 The Conventions of Statistical Methodology (3:3:0)
This course introduces students to study design, data collection, and measurement. Teaches students how to identify research problems, formulate research questions, and hypotheses. Exposes students to various design strategies and provides a working knowledge of indicator construction, validity threats, and sampling techniques. The course moves on to take up in detail a variety of approaches as exemplified by such topics as the experimental method, survey methodology, longitudinal/pooled data studies, and game theoretical approaches. Emphasis is placed on recognizing the relationship between theoretical and substantive questions; the methodology employed and the analytical strategies that are utilized. The course will focus on developing the conceptual tools necessary to design and assess empirical research studies, and the technical and basic computer skills necessary to conduct statistical research.

713 Reflective Practice in Interpersonal-Multiparty Conflicts (3:0:3) Prerequisite or corequisite for all CONF majors: CONF 501 or 801. Introductory skill-building course integrating conflict theory and practice using reflective practitioner model. Students learn necessary skills for third-party facilitation and mediation, including active listening, empathy, paraphrasing, reframing, and negotiation, and analytical skills of problem solving and creation of transformational processes. Cases for practice focus on interpersonal and intergroup conflict.

714 Reflective Practice in Organizational or Community Conflict (3:0:3) Prerequisites: CONF 501 or 801 and 713. Moves from conflicts that are simply described to those with multilevel components, such as community and organizational conflicts. Expands skills acquired in CONF 713 by adding recording chronology, identifying roles played by various participants, observing turning points in process, and precisely stating agreed-on solution.

715 Reflective Practice in International Conflict and Civil Strife (3:0:3) Prerequisites: CONF 501, 713, and 714. Continues study of resolution processes as applied to highly complex systems, especially where one party denies legitimacy of existing political authority. Considers third-party options for intervention in revolutionary and international conflicts, building communication and trust among parties, and implementing agreements.

720 Ethnic and Cultural Factors in Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801. Examines the role culture plays in genesis, structuring, and resolution of processes of conflict within and between groups. Special attention to ethnicity and other subcultural markers of identity in complex social systems as generators and outcomes of conflict. Explores relevance of variables to success or failure of conflict resolution.

721/SOCI 523 Conflict and Race (3:3:0) Prerequisite: CONF 501 or 801. Addresses historic analyses of racial and ethnic identity conflicts and their resolution.

722 Conflict and Religion (3:3:0) Prerequisite: CONF 501 or 801. Explores role of religious ideas, practices, and organizations in conflict, war, peace making, and conflict resolution.

723 Conflict and Gender (3:3:0) Prerequisite: CONF 501 or 801. Examines constructs of gender and conflict as they relate to critical analysis of theory and practice. Reviews feminist theories for contributions to social and conflict theories. Uses narratives to explore how gender, power dynamics interact in conflict.

726 Moral and Philosophical Foundations of Conflict (3:3:0) Prerequisite: CONF 501 or 801. Explores major historical and contemporary positions on the intellectual, moral, and religious foundations for analyzing and resolving conflict. Enhances critical abilities in metacritique, dialectics, and intellectual self-appropriation.

727 Cross-Cultural Analysis of Conflict (3:3:0) Prerequisite: CONF 501 or 801. Introduces techniques of participant observation and anthropological research. Provides insights into cross-cultural fieldwork experience, an important skill to facilitate working with groups outside own “‘worldview.’” Highly recommended for students interested in understanding diverse groups and gaining insights into world views and values held by different people.

728 Human Rights Theory and Practice in Comparative Perspective (3:3:0) Prerequisite: CONF 501 or 801, or permission of instructor. Introduces major controversies and debates surrounding use of human rights theory and practice cross-culturally. After basic study of human rights philosophy, uses case studies from around the world to examine problems and potential of human rights in today’s globalized world.

729 Approaches to Violence (3:3:0) Prerequisite: CONF 501 or 801. Explores violence from variety of intellectual and political perspectives. Readings are wide-ranging and interdisciplinary, addressing levels of analysis from biological to nation-state and transnational processes.

730 Structural Sources of Conflict (3:3:0) Prerequisites: CONF 501 or 801, and 601 for MS; or 803 for PhD. Examines how structures and institutions affect behavior and give rise to conflictual relationships at all social levels, from interpersonal to the international. Explores role of conflict resolution as political process providing opportunities for nonviolent system change.

731 Conflict in Organizations (3:3:0) Prerequisite: CONF 501 or 801. Explores intersection and dynamics of organizational behavior and dimensions of conflict. Involves theoretical perspectives and case examinations of conflict analysis and resolution. Practices strategies for prevention and intervention. Field research in greater metropolitan area integrates course content.

732 Conflict in Development (3:3:0) Prerequisite: CONF 501 or 801. Examines the relationship between processes of political and economic change and conflict; the relationship between democratization and conflict; the relationship between structural adjustment policies and conflict; and the challenges of postconflict reconstruction.

733 Law and Justice from a Conflict Perspective (3:3:0) Prerequisite: CONF 501 or 801. Contrasts legal processes and institutions with alternative approaches to dispute resolution. Defines and distinguishes among legal, “alternative dispute resolution,” and problem-solving analysis as methods for resolving rather than controlling conflict. Asks to what extent legal procedures are truly applicable to resolving deep-rooted conflict.

735 Global Context of Conflict (3:3:0) Prerequisite: CONF 501 or 801. Advances skills and knowledge base in critical analysis and creative problem-solving. Examines root causes of conflict in global context in terms of gender inequality,
cultural differences, unequal North and South relations, militarism, economic oppression, genocide, maldevelopment, religious and ethnic struggles, and environmental scarcity. Students develop their own conceptual tool boxes to analyze conflicts in different parts of the world.

736 Globalization and International Conflict (3:3:0)  
Prerequisite: CONF 501 or 801. Explores economic, political, social, and cultural meanings of globalization; how they affect conflict processes at international level; and when and under what conditions globalization promotes cooperation or conflict.

738 Researching Conflict in Health Systems (3:3:0)  
Capstone seminar; final course in graduate certificate program in conflict resolution for health professionals. Involves conducting research and analyzing specific conflict situation in depth. Builds on theory, research, and practice learned in previous courses for this certificate.

739 Collective Action, Social Movements, and Globalization (3:3:0)  
Prerequisite: CONF 501 or 801. Explores how people translate underlying grievances into collective action. Examines how groups organize, frame issues and develop strategies and tactics to pursue agendas, and how processes of globalization have influenced social movement dynamics.

740 Conflict Roles, Resources, and Ethics (3:3:0)  
Prerequisites: CONF 501 or 801, 713. Analyzes and critiques nature and roles in conflicts. Uses theoretical perspectives, case histories to understand how settings affect roles. Includes ethical assessment of interventions in variety of conflict settings.

741 Negotiations (3:3:0)  
Prerequisite: CONF 501 or 801. Uses negotiating experiences to construct framework for thinking about and analyzing negotiation processes. Frame-work then used to organize review of research literature on rhythms and patterns of negotiation, and to analyze actual cases. Interweaves exercises, class projects with state-of-the-art concepts and findings.

743 Dynamics of Conflict Termination (3:3:0)  
Prerequisite: CONF 501 or 801. Investigates a number of themes relating to war termination with an emphasis on contemporary civil war. Examines how the nature of civil war, political and historical attention on a number of contemporary cases, raises questions relating to settlement, and series of themes relating to peace implementation and peace building.

745 Leadership Roles in Conflict and Conflict Resolution (3:3:0)  
Prerequisite: CONF 501 or 801. Leadership responses to conflict are affected by several variables, including race, ethnicity, and gender. Explores roles of leadership decision-making styles as agents of conflict across range of conflict scenarios at interpersonal, community, organizational, and international levels.

746 Peace Building (3:3:0)  
Prerequisite: CONF 501 or 801. Building on initiatives of United Nations and other multilateral organizations, explores dynamics of post-conflict peace building. Prepares students of conflict resolution to play innovative roles in reconstruction of civil societies.

747 Reconciliation (3:3:0)  
Prerequisite: CONF 501 or 801. Explores processes of acknowledgment, reconciliation, forgiveness, and restitution. Reviews literature, case studies, and other research to assess applicability and impact of these efforts.

748 Comparative Peace Processes (3:3:0)  
Prerequisites: CONF 501 or 801, and 601 or 803. Compares case studies drawn from actual peace processes, both successful and unsuccessful, to illuminate principles and complexities.

749 World Religions, Violence, and Conflict Resolution (3:3:0)  
Prerequisite: CONF 501 or 801. Examines how world religions play a role in conflict and conflict resolution. Investigates how values, world view, and hermeneutics influence strategies for successful conflict interventions.

750 Evaluation of Conflict Resolution Initiatives (3:3:0)  
Prerequisite: CONF 501 or 801. Examination of models and methodologies for evaluation of conflict resolution initiatives. Evaluation approaches taught will include action evaluation, program evaluation, formative evaluation, and summative evaluation. Students will be expected to complete an evaluation design for an actual conflict resolution-related initiative as the major course requirement and participate in the class evaluation project.

795 Professional Development Seminars (1–3:1–3:0)  
Prerequisite: CONF 501 or 801. These 1- and 2-credit courses are scheduled nonconventionally using weekends, concentrated presentations, and intersession periods to develop advanced professional skills. Possible topics include marketing conflict resolution services, academic course design, training design, mediation, facilitation, family practice, fundraising, writing for publication, advanced field research techniques, and grassroots applications of conflict resolution. May be repeated.

798 Thesis Proposal (1:0:0)  
Prerequisites: CONF 501 and 610. Covers development of research proposal for masters’ thesis, including framing a question, and literature review; and designing appropriate methodology. Students form master’s thesis committee and review Human Subject Review Board’s guidelines and procedures.

799 Master’s Thesis (1–6:0:1–6)  
Prerequisites: CONF 501, 713, 610. Two semesters, usually taken as 3 credits per semester. Original research or analysis under direction of thesis committee.

801 Introduction to Conflict Analysis and Resolution (3:3:0)  
Prerequisite or corequisite for all PhD CONF students. Introduces field of conflict analysis and resolution for doctoral students. Examines definitions of conflict and diverse views of resolution. Explores thinking about human behavior and social systems as they relate to origins and role of conflict in violent and peaceful social change. Considers appropriate responses to conflict at interpersonal, intergroup, industrial, communal, and international levels.

802 Theories of the Person (3:3:0)  
Prerequisites or corequisite: CONF 801. Understanding human conflict requires knowledge of human behavior, motivation, and perception. Reviews and critically analyzes several psychological theories for application to conflict analysis and resolution theory and practice.

803 Structural Theories (3:3:0)  
Prerequisites: CONF 801. Understanding social conflict and potential for conflict resolution requires that both conflict and cooperation be perceived in relation to patterns of social change. Course reviews and critiques significant theories of social change to establish a basis for creative conflict analysis and resolution.
810 Philosophy and Conflict Research (3:3:0) Prerequisite: CONF 801. Philosophy of knowledge acquisition. Assesses close link between ways we think and ways we build and test theories about the world. Explores and critiques thinking of major 20th-century thinkers from the social sciences, thus forming a critical framework for working with multiple research methodologies.

811 Advanced Quantitative Research Methods (3:3:0) Prerequisites: CONF 711, 801 and 810. Building on logic of inquiry, introduces steps in research process to prepare dissertation and implement published research. Covers wide array of quantitative research approaches in social sciences, with emphasis on conflict analysis.

812 Advanced Qualitative Research Methods (3:3:0) Prerequisite: CONF 801 and 810. Continuation of steps in research process to prepare dissertation and implement published research. Builds on CONF 811 by examining qualitative research approaches used in social sciences, with emphasis on conflict analysis.

890 Practicum in Conflict Analysis and Resolution (6:1:5) Prerequisites: CONF 801 and 713; two semesters. In-depth field study of ongoing conflict situations. Design and delivery of intervention processes to manage or resolve conflicts.

897 Directed Reading (3:3:0) Independent reading at doctoral level on a specific topic related to conflict and conflict resolution as agreed to by student and faculty member.

900 Integrating Theory, Practice, and Method in Conflict Analysis (3:3:0) Prerequisites: CONF 801 and 802, and at least 9 additional credits of required doctoral courses. Analyzes theoretical basis undergirding methods of research in conflict resolution. Explores how theory is built through reciprocal influence of research and practice. Assists students to fill in gaps in their knowledge and prepare for comprehensive examinations. Prepares students to write integrated research proposals.

998 Doctoral Dissertation Proposal (1–6:1–6:0) Prerequisite: successful completion of all course work and doctoral qualifying exams. Work on research proposal that forms basis for doctoral dissertation. May be repeated.

999 Doctoral Dissertation Research (1–12:0–12) At least 12 credits of 998 and 999 must be accumulated toward degree. Research on approved dissertation topic under direction of committee. Student’s dissertation proposal must be approved before registering for 999.

Counseling and Development (EDCD)

Graduate School of Education

500 In-Service Educational Development (1–6:1–6:0) Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

525 Advanced Human Growth and Development (3:3:0) Covers human development throughout the life span, including emotional, physical, and cognitive development; and emphasizes personal adjustment and achievement.

597 Special Topics in Education (1–6:1–6:0) Prerequisite: admission to program in Graduate School of Education. Provides advanced study on selected topic or emerging issue in American or international education. May be repeated for credit with GSE permission.

598 Directed Reading, Research, and Individual Projects (1–6:1–6:0) Prerequisites: admission to degree program and permission of dean. Presents various subjects and projects, principally by directed study, discussion, research, and participation under supervision of graduate faculty member. May be repeated for up to 12 credits.

599 Thesis (6:6:0) Study of problem of significant interest to student using accepted research methods and under supervision of graduate faculty member.

600 Workshop in Education (1–6:1–6:0) Offers full-time workshops and weekend seminars on selected topics in education and education tour seminars. May be repeated for credit.

601 Introduction to Research in Counseling (3:3:0) Enhances knowledge of and involvement in counseling research by introducing techniques and principles to design, implement, and evaluate research projects and program development in community and school settings.

602 Foundations in Counseling (3:3:0) Emphasizes history of counseling; multifaceted role of counselors, professional organizations, and memberships; and APA style. Provides a thorough understanding of the CNDV Mission Statement, Mason’s Honor Code and Professional Dispositions. Basic skills are briefly introduced and an orientation to multiculturalism and social justice is provided.

603 Counseling Theories and Practice (3:3:0) Prerequisites: admission to CNDV program; EDCD 602 (course may be taken concurrently). Covers major theoretical approaches to counseling from a multicultural perspective and provides supervised introduction to basic skills.

604 Assessment and Appraisal in Counseling (3:3:0) Prerequisites: Admission to CNDV program, EDCD 525, and EDCD 601. Prepares students to become informed about psychological and educational tests and assessment procedures that are used and applied in a counseling context.

606 Counseling Children and Adolescents (4:4:0) Prerequisites: Admission to CNDV program, EDCD 525, EDCD 603, EDCD 608, and EDCD 660. Presents theories, techniques, and counseling issues relevant to children and adolescents. Counseling lab provides practice with an emphasis on process and culturally competent counseling strategies.

608 Group Processes and Analyses (4:3:1) Prerequisites: admission to CNDV program, EDCD 603. Presents theories appropriate to various types of groups and descriptions of group practices, methods, dynamics, and facilitative skills. Focuses on applying theory to practice. Includes lab.

609 Advanced Counseling Skills and Strategies (4:3:1) Prerequisites: Admission to CNDV program, EDCD 525, EDCD 603, EDCD 608, and EDCD 660. Covers counseling skills and process, counselor self-awareness, and strategies associated with major counseling theories. A counseling lab provides skills practice with an emphasis on process and culturally competent counseling strategies.
610 Career and Educational Counseling (3:3:0) Prerequisite: Admission to CNDV program; EDCD 525; and EDCD 604 (course may be taken concurrently). Presents theories and counseling issues relevant to career counseling in schools and community agencies.

611 Introduction to Ethical and Legal Issues in School Counseling (2:2:0) Prerequisites: admission to counseling and development program and EDCD 602. Prerequisite or corequisite: EDCD 626. Introduces principles, practices, and application of ethical and legal issues in school counseling.

616 Counseling Skills in International Schools (3:3:0) Introduces skills applicable to international school settings. Students study, discuss, and develop skills with emphasis on multicultural counseling and multiethnic student populations.

617 Group Counseling in International Schools (3:3:0) Discusses group counseling in context of international schools and multicultural counseling, describing types of groups, group counseling practices, methods, group dynamics, and facilitation skills. Attention to applying theory to practice.

618 Principles and Practices of Counseling in International Schools (3:3:0) Discusses philosophy, principles, and practices for effective international school counseling programs including leadership, advocacy, and program evaluation.

619 Multicultural Counseling in International Schools (3:3:0) Covers issues, characteristics, skills, and needs relevant to internationally diverse populations in the international school context.

620 Counseling Children and Adolescents in International Schools (3:3:0) Discusses counseling international school students K–12 from developmental and multicultural perspectives.

626 Principles and Practices of School Counseling (3:3:0) Prerequisites: admission to CNDV program, EDCD 602 (course may be taken concurrently). Introduces school counseling program development at K–12 levels. Presents philosophy, principles, and practices of effective school counseling.

628 Counseling and Social Justice (3:3:0) Prerequisites: admission to CNDV program, EDCD 603, and EDCD 626 or EDCD 654. Studies relationship between counseling and social justice, and theories, models, and strategies of social justice, social change, leadership, and advocacy in community and school settings. Emphasizes application of theories and models.

631 Ethical and Legal Issues in Counseling (3:3:0) Prerequisites: admission to counseling and development program and EDCD 605, or postgraduate counseling students by permission of program coordinator or instructor. Covers principles, practices, and application of ethics and law in counseling.

652 Introduction to Substance Abuse Counseling (3:3:0) Prerequisites or corequisites: admission to counseling and development program, EDCD 603. Introduces substance abuse counseling. Covers addiction issues, diagnosis and treatment planning, and individual and group counseling strategies with diverse populations.

654 Counseling, Ethics, and Consultation in Community Agencies (3:3:0) Prerequisites or corequisites: admission to counseling and development program, EDCD 603. Emphasizes types of services and facilities provided, needs and problems of client population served, role and function of counselor in agency setting, and personnel needs of the individual agency.

656 Diagnosis and Treatment Planning for Mental Health Professionals (3:3:0) Prerequisites: admission to CNDV program, EDCD 603 (course may be taken concurrently). Reviews diagnostic criteria associated with mental illness, emphasizes the cultural component of mental illness, and helps students develop written plans and simulate implementation for overall diagnosis and treatment of clients and their families.

658 Couples and Family Counseling (3:3:0) Prerequisites: Admission to CNDV program; EDCD 603 (course may be taken concurrently). Introduces major approaches to counseling couples and families. Uses case studies and simulations to facilitate transition from theory to practice.

660 Multicultural Counseling (3:3:0) Prerequisites: admission to CNDV program, EDCD 603. Covers counseling from a multicultural perspective. Explores counseling issues for diverse populations with a focus on ethnicity and race.

754 Practicum in Counseling and Development (3–6:3:3) Prerequisites: completion of counseling and development program except for practicum and internship; permission of advisor; overall GPA of 3.00; no grade of C in skills courses EDCD 605, 607, 608, and 610; and no more than two grades of C in any other graduate course work required by counseling and development program. Provides supervised practice in counseling setting similar to setting in which student may work. Weekly graduate class emphasizes site processing.

755 Practicum in Counseling (3:0:3) Prerequisites: completion of CNDV program course work except for EDCD 610 or 611 or electives (total credits cannot exceed 3 credits); permission of advisor; overall GPA of 3.00; no grade lower than B in skills courses EDCD 603, 606, 608, and 609; no more than two grades of C in any other graduate course work required by CNDV program. Provides supervised practice for a minimum of 200 hours (for school counseling students) and 300 hours (for community agency students) in counseling setting similar to setting in which student may work. Weekly graduate class emphasizes site processing.

790 Internship in Counseling and Development (3–6:3:3) Prerequisites: completion of counseling and development program except for internship; permission of advisor; overall GPA of 3.00; no grade of C in any skills courses EDCD 605, 607, 608, 610, and 754; no more than two grades of C in any other graduate course work required by counseling and development program. Provides supervised practice in counseling setting similar to setting in which student may work. Skills and practice build on previous practicum experiences. Weekly graduate class emphasizes site processing.

791 Internship in Counseling (3:0:3) Prerequisites: completion of counseling and development program except for electives (total credits cannot exceed 3 credits) and internship; permission of advisor; overall GPA of 3.00; no grade lower than B in skills courses EDCD 603, 606, 608, 609; no more than two grades of C in any other graduate course work required by CNDV program. Provides supervised practice for minimum of 200 hours (for school counseling students)
and 300 hours (for community agency students) in counseling setting similar to setting in which student may work. Skills and practice build on previous practicum experiences. Weekly graduate class emphasizes site processing.

797 Advanced Topics in Education (1–6:1–6:0) Prerequisite: admission to CNDV program or permission of instructor. See EDUC 797.

895 Emerging Issues in Counseling and Development (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Examines issues in counseling profession, including counseling theory and methodology, development of client groups, new roles and settings for counselors, emerging assessment procedures, new understanding of diagnosis, and impact of societal changes on counseling profession.

896 Advanced Multicultural Counseling (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from accredited institution of higher education, EDCD 660 or equivalent, EDCD 895, and admission to counseling and development PhD specialization; or permission of instructor. Focuses on advanced issues in multicultural counseling, including multicultural counseling theories, skills, assessment, supervision, research, and ethics.

897 Advanced Group Counseling (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from accredited institution of higher education, EDCD 608 or equivalent, EDCD 895, and admission to counseling and development PhD specialization; or permission of instructor. For doctoral students who have had experience and training in group work. Provides greater understanding and advanced skill application in group dynamics, group process, and group leadership.

898 Grant Writing and Publishing (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from accredited institution of higher education, EDCD 895, and admission to counseling and development PhD specialization; or permission of instructor. Focuses on grant writing and publishing in counseling and psychology.

900 Advanced Internship in Counseling Leadership (3:3:0) Prerequisites: admission to counseling and development PhD specialization, EDCD 895, and EDCD 628 or equivalent. Provides supervised practice in counseling leadership setting or position. Emphasizes counseling leadership in practice. Biweekly class emphasizes site processing, leadership skills, and topical seminars.

990 Advanced Internship in Multicultural Counseling (3:3:0) Prerequisites: admission to counseling and development PhD specialization; and EDCD 895, 896, and 628 or equivalent. Provides supervised practice in multicultural training setting. Emphasizes intensive use of multicultural competencies in practice, supervision, and program development and evaluation in school and community agency settings. Biweekly class emphasizes site processing, leadership skills, and topical seminars.

992 Advanced Internship in Social Justice (3:3:0) Prerequisites: admission to counseling and development PhD specialization, EDCD 628 or equivalent, and EDCD 895. Provides opportunities to implement programs and strategies to affect social justice for clients in school or community settings. Biweekly class emphasizes topical seminars and supervision.

Cultural Studies (CULT)

Cultural Studies

320 Globalization and Culture (3:3:0) Examines relationship between cultures and globalization through texts and points of view. Starting from development of capitalism, looks at age of imperialism and colonialism, finishing in present. Considers how globalization affects dynamics of cultural change. Emphasizes extraordinary role of new media and technologies in defining and shaping cultural spaces in which people live.

802 Histories of Cultural Studies (3:3:0) Prerequisite: admission to program, MA feeder track, or permission of instructor. Required of all students. Historical survey of principal works and theories of cultural studies. Provides overview of contemporary situation of cultural studies, and assesses possibilities for future development.

806 Research Seminar in Cultural Studies (3:3:0) Prerequisites: admission to program and CULT 802. Introduces research methods in cultural studies. Specific topics vary.

808 Student/Faculty Colloquium in Cultural Studies (1:1:0) Prerequisite: admission to program, or permission of instructor. Forum for presentation of original and current research in cultural studies. Students register for 1 credit per semester over a three-semester period.

810 Culture and Political Economy (3:3:0) Prerequisite: admission to program, or permission of instructor. Surveys social science and humanities classics that relate cultural production and consumption to underlying political economic conditions. Includes Marx, Lukacs, Frankfurt School, semiotic neo-Marxism, productivist theories of power indebted to Foucault, Baudrillard, Bourdieu, Harvey, Jameson, Mauss, Mill, Polanyi, Sahlins, A. Smith, and Weber.

812 Visual and Performance Culture (3:3:0) Prerequisite: admission to program, or permission of instructor. Examines theories, production, consumption, and reception of visual culture. Covers film, video, visual arts, music, display, ritual, performance, performativity, and theories of the aesthetic. Includes key readings from theorists such as Adorno, Artaud, Benjamin, Brecht, Bryson, Doane, Fiske, Heath, Marcuse, Merleau-Ponty, and Sartre.

814 Gender and Sexuality (3:3:0) Prerequisite: admission to program, or permission of instructor. Examines investigation of gender functions in maintaining and analyzing issues of social and cultural power. Examines conflicting notions of sexuality, and their role in cultural signification. Seeks to explicate relationship of sexuality, gender.

816 Science/Technology (3:3:0) Prerequisite: admission to program, or permission of instructor. Considers relationship of science, social construction of nature, and effects of technology on modern cultural forms. Includes readings from materials such as Nietzsche, Heidegger, Horkheimer, Feyerabend, Bahro, Haraway, and Latour.

818 Social Institutions (3:3:0) Prerequisite: admission to program, or permission of instructor. Considers theories of institutional practice and social structures, from Max Weber to Michel Foucault. Covers prisons, bureaucracies, museums, schools, political parties, and social movements.

820 After Colonialism: Race, Ethnicity, Nationalism (3:3:0) Prerequisite: admission to program, or permission
of instructor. Surveys racial, ethnic, caste, and national identities in colonial contexts; scientific racism in periphery and core sites; subsequent history of race, ethnic, national identities and conflicts; classical and contemporary texts by authors such as DuBois, Fanon, Gilroy, and Spivak; and particular place of issues of national, racial, and ethnic identities in contemporary cultural studies.

860 Special Topics in Cultural Studies (1–3:1–3:0) Prerequisite: admission to program, or permission of instructor. Specialized interdisciplinary topics in cultural theory and analysis. Content varies. May be repeated.

870 Directed Readings (3:0:0) Intensive reading course to develop comprehensive coverage for specific fields as agreed on in with advisors. May be repeated.

880 Independent Study (1–3:0:0) Reading and research on specific topic, resulting in a written project. May be repeated.

998 Doctoral Dissertation Proposal (1–6:0:0) Work on research proposal that forms basis for doctoral dissertation. Students must have completed all students courses work, fulfilled foreign language requirement, and passed comprehensive exam. Course may be repeated once for credit. Graded S/NC.


Dance (DANC)
College of Visual and Performing Arts


114 Rhythmic Analysis and Music Resources for Dance (3:3:0) Prerequisite: admission to dance major, or permission of instructor. Introduces rhythmic structure, notation, and basic forms of music. Experience with audio equipment in creating simple sound scores. Lecture, lab.

118 World Dance (3:3:0) Develops knowledge, skills, and appreciation of world dance forms through presentation of fundamental techniques, music, and culture. Area of concentration varies to include as many cultures as possible. May be repeated for total 6 credits. Fulfills non-Western requirement for CHSS and COS students, and global understanding of university general education.

119 Dance in Popular Culture: Afro-Latino Dance (3:3:0) Develops knowledge, skills, and appreciation of popular dance forms through presentation of fundamental techniques, music, and culture. Area of concentration varies to include as many idioms as possible. Meets general education fine arts requirement. May be repeated for total 6 credits.

120 Special Topics in Dance (1–3:1–3:0) Rotating topic. Introduction and exploration of topical studies in dance or related study areas; topic depends on instructor. May be repeated for total 9 credits if course content differs.

125 Beginning Modern Dance (3:3:0) Develops knowledge, skills, and appreciation of modern dance through presentation of fundamental techniques and creative movement experiences. Meets general education fine arts requirement. May be repeated for total 6 credits.

131 Beginning Jazz Technique (3:3:0) Introduces fundamentals of jazz dance technique and historical context. Emphasizes improving anatomical awareness and alignment, increasing strength and flexibility, and developing rhythmic sensitivity. Also introduces jazz improvisation and choreography. Meets general education fine arts requirement. May be repeated for 6 credits.

145 Beginning Ballet (3:3:0) Introduces elements of ballet technique and vocabulary. Stresses learning elementary positions and movements characteristic of this highly stylized art form. Meets general education fine arts requirement. May be repeated for total 6 credits.

150 Dance Improvisation (3:3:0) Prerequisite: admission to dance major, or permission of instructor. Explores movement invention and discovery. Movement explored in relation to other forms such as literature, painting, sculpture, and architecture; enhancing kinesthetic awareness; sensitivity to others; and the environment. Prerequisite for dance composition and choreography series.

161 Beginning Tap Dance (3:3:0) Elementary exploration into rhythms and steps basic to art form of tap dancing. Meets general education fine arts requirement. May be repeated for total 6 credits.

170 Orientation to Dance Production (1:1:1) Prerequisite: admission to dance major, or permission of instructor. Introduces sound, lighting, and stage management elements and terminology as related to dance performance. Intensive workshop setting emphasizes laboratory experience.

210 Dynamic Alignment (3:3:0) Prerequisite: admission to dance major or permission of instructor. Covers aspects of anatomy and kinesiology that directly apply to correct development of dance technique. Emphasizes exercise corrective and imagery to correct insufficient muscle pattern and reduce stress on the body.

225 Beginning Intermediate Modern Dance (3:3:0) Prerequisite: DANC 125 or permission of instructor. Further develops knowledge, skills, and appreciation of modern dance through continued exploration of techniques, aesthetics, and creativity. Meets general education fine arts requirement. May be repeated for total 9 credits.

231 Intermediate Jazz Technique (3:3:0) Prerequisite: DANC 131 or permission of instructor. Continued study of the concepts of jazz dance technique, and in-depth study of 20th century jazz dance forms. Emphasizes furthering anatomical awareness and alignment, developing technical clarity, and mastering rhythm and syncopation. Continues exploration of jazz improvisation and choreography. Meets general education fine arts requirement. May be repeated for 12 credits.

245 Beginning Intermediate Ballet (3:3:0) Prerequisite: DANC 145 or permission of instructor. Further development of knowledge, skills, and appreciation through technique, vocabulary, and history of ballet. Meets general education fine arts requirement. May be repeated for total 9 credits.

251 Dance Composition I (3:3:0) Prerequisite: DANC 150 or permission of instructor. Introduces basic principles for composing dance movement. Focuses on simple compositional
forms as they apply to solo performer, discussion, analysis, and evaluation of artistic choices. Students maintain video and written journals to document their artistic process.

252 Dance Composition II (3:3:0) Prerequisite: DANC 251 or permission of instructor. Explores compositional elements in dance as they apply to group forms. Offers continued experience in developing and manipulating movement phrases using a variety of compositional forms. Introduces conducting rehearsals and selecting music. Students discuss, analyze, and evaluate artistic choices in composition using appropriate dance arts vocabulary and terminology, and maintain video and written journals to document artistic process.

270 Dance Production Lab (1:1:1) Prerequisite: DANC 170 or permission of instructor. Practical experience in stage crew, sound, or lighting of dance productions through rehearsal to public performance for university dance concerts or guest artist programs. May be repeated for total 6 credits.

301 What is Dance? (3:3:0) Explores connections among literature, music, theater, and visual art within aesthetic frameworks and cultures. Examines development and ideals of Western theatrical dance, and historical and social context in which they were created. Method of instruction includes lecture, discussion, and studio experiences.

314 Music Accompaniment for Dance (3:3:0) Prerequisite: DANC 114 or permission of instructor. Lecture practicum course that gives both dance and music students practical experience in dance accompaniment, primarily through using percussion instruments. Students use knowledge of music and rhythm to accompany and enhance a dance technique class.

318 Global Perspectives: World Dance Forms (3:3:0) Prerequisite: completion of DANC 118, 119, or 120; or junior standing; or permission of instructor. Continued in-depth study of world dance form including technique, music, and culture. Texts, video, performances, music, participatory events, and guest artist presentations. Lecture, studio. Area of concentration varies to include as many cultures as possible. May be repeated for total 6 credits. Meets general education global understanding requirement.

325 Intermediate Modern Dance (1–3:1–3:0) Prerequisite: admission to dance major or permission of instructor. Explores intermediate level of modern dance technique. Emphasizes improving anatomical awareness, increasing strength and flexibility, expanding modern dance vocabulary, and developing flow and dynamic range. Meets general education fine arts requirement. May be repeated for total 24 credits.

326 Dance Performance Practicum (1:0:3) Prerequisite: audition. Practical experience in dance performance through rehearsal process of university dance concerts. May be repeated for total 8 credits.

330 Dance/Movement Therapy I (3:3:0) Prerequisites: DANC 325, 150; and PSYC 100, 211; or permission of instructor. Overview of dance/movement therapy exploring meaning of movement as communication and expression. Explores theoretical approaches, treatment goals, and interventions with wide variety of patient groups. Readings, movement explorations, and volunteer field observations.

331 Advanced Jazz Dance (3:3:0) In-depth studio study of 20th century jazz dance forms. Continues concepts and vocabulary introduced in DANC 231, and further emphasizes alignment, technical clarity, and virtuosity. Emphasizes mastery of rhythm and syncopation. Meets general education fine arts requirement.

345 Intermediate Ballet (1–3:1–3:0) Prerequisite: admission to dance major, or permission of instructor. Provides continued ballet training for intermediate-level dancer. Emphasizes increasing technical proficiency, improving anatomical awareness, and developing deeper understanding of skills and principles of ballet technique and how they provide foundation to teach and perform. Meets general education fine arts requirement. May be repeated for 24 credits.

350 Advanced Dance Improvisation (1–3:1–3:0) Prerequisite: DANC 325 and 150, or permission of instructor. Lecture and performance course for continued study of dance improvisation, including contact improvisation. Students create and direct advanced problems in dance improvisation. May be repeated for total 6 credits.

360 Choreography (3:3:0) Prerequisite: DANC 252, or permission of instructor. Continued choreographic exploration and research, culminating in bringing completed works to production.

362 Directed Choreography (1:0:3) Prerequisite: DANC 252 or permission of instructor. Faculty-guided, individual learning experience where students learn to choreograph a dance work by auditioning dancers, costuming, staging, lighting, selecting musical accompaniment, and composing original movement material. May be repeated for total 6 credits.

370 Dance Performance (1:0:3) Prerequisite: admission to dance major and audition; or permission of instructor. Practical experience in performance, repertory, and choreography through rehearsal and public performance of university dance concerts or guest artist programs. May be repeated for total 12 credits.

371 Residency Workshop (1:0:3) Prerequisite: admission to dance major and audition. Rehearsal and performance of new or restaged dance by guest choreographer in intensive rehearsal setting. May be repeated for total 6 credits.

372 Advanced Dance Production (1:1:1) Prerequisite: DANC 170 and 270, or permission of instructor. Methodology and practice of stage make-up, costume design, and lighting as dictated by specific needs of dance performance. Taught in series of workshop settings.

390 Dance History: Pre-Twentieth Century (3:3:0) Examines dance as it developed as Western theatrical form from its beginnings in social and folk dance through evolution into ballet. Emphasizes romantic and classical ballet. Also studies American dance forms as they evolved in spectaculars, burlesques, minstrelsy, and social dance. All forms of dance placed in social, political, cultural, aesthetic, and historical contexts. Meets general education fine arts requirement.

391 Dance History: Twentieth Century (3:3:0) Examines revolutions in transformation of 20th century Western dance into forms and institutions that radically departed from predecessors. Development of contemporary dance carried.
Dance (DANC) 455

with it reflections of the influence of technology and media as well as concept of global culture. Renewed interest in traditional dance forms acknowledges power of dance to serve as carrier of cultural and societal values. Dance forms placed in social, political, cultural, aesthetic, and historical contexts. Meets general education fine arts requirement.

399 Independent Study (1–3:0:0) Prerequisite: permission of instructor. Individual research or creative project supervised by faculty member. May be repeated for total 6 credits.

418 Global Dance Intensive (1–3:1–3:0) Intensive investigation of selected dance idioms within cultural and artistic contexts. Course work supplemented by participation in and observation of ambient culture. Analyzes similarities, differences, and common antecedents between selected culture and North American dance idioms. May be repeated for total 6 credits.

420 Special Topics in Dance (1–3:1–3:0) Prerequisite: 9 credits of dance courses, or permission of instructor. In-depth presentation and exploration of topical studies in dance or related study areas. Topic depends on instructor. May be repeated for total 9 credits.

425 Advanced Modern Dance (1–3:1–3:0) Prerequisite: admission to dance major, or permission of instructor. Advanced-level exploration of modern dance technique. Emphasizes refining alignment, developing ability to self-correct, and replicating sophisticated movement sequences. Preparation to enter professional field of dance. Meets general education fine arts requirement. May be repeated for 24 credits.

430 Dance/Movement Therapy II (3:3:0) Prerequisites: DANC 210, 350; and PSYC 324, 325; or permission of instructor. Applies dance/movement therapy as psychotherapeutic process to further emotional, cognitive, social, and physical integration.

445 Advanced Ballet (1–3:1–3:0) Prerequisite: admission to dance major, or permission of instructor. Provides pre-professional ballet training for advanced-level dancer. Emphasizes attainment of high-quality technical and performance skills, application of anatomical principles, and mastery of sophisticated classical movement sequences. Meets general education fine arts requirement. May be repeated for 24 credits.

453 Teaching Creative Movement (3:3:0) Prerequisites: DANC 325 and 150, or permission of instructor. Provides theory, methodology, and practicum experience in preparation for teaching creative movement to children K–12, with some application to special populations.

454 Methods of Teaching Dance (3:3:0) Prerequisite: 6 credits of intermediate or advanced dance technique, and DANC 210. Examines dance pedagogy, focusing on principles needed for teaching sound technique. Students learn skills, methods, and instructional procedures for classroom. Emphasizes curriculum development, proper course sequencing, implementation of teaching strategies, and classroom management techniques. Students study teaching methods appropriate for K–12, gifted and talented, and special-needs students. Intensive practice in implementing these skills includes lab, field-teaching experiences.

455 Teaching Practicum (1–6:3:0) Prerequisites: DANC 454, and permission of instructor. Full semester of supervised teaching experience in approved school or studio dance program. Credits based on number of teaching contact hours per week. May be repeated for total 12 credits.

480 Introduction to Laban Movement Analysis (3:3:0) Prerequisite: DANC 210, or permission of instructor. Introduces components of laban movement analysis: body, shape, effort, and space. Includes motif writing for recording and analyzing movement.

490 Senior Dance Seminar (3:3:0) Prerequisite: senior status in dance major program. Culminating seminar devoted to analyzing and synthesizing knowledge and skills gained through undergraduate course work as it applies to dance, arts education, and professional development. Students develop senior project including written and oral presentation in public forum.

501 Graduate Dance Seminar (3:3:0) Prerequisite: admission to MFA in dance program. Presentation and discussion of current issues in dance specific to education, research, and professional development.

520 Special Topics in Dance (1–3:1–3:0) Prerequisite: 9 credits of dance courses, or permission of instructor. In-depth presentation and exploration of topical studies in dance or related study areas. Topic depends on instructor. May be repeated for total 9 credits.

525 Advanced Modern Dance (1–3:1–3:0) Prerequisite: admission to MFA in dance program, or permission of instructor. Advanced training in modern technique emphasizing attainment of high technical ability and performing skills. May be repeated for total 18 credits.

545 Advanced Ballet (1–3:1–3:0) Prerequisite: admission to MFA in dance program, or permission of instructor. Advanced training in ballet technique with emphasis on high technical quality, performance skills, ballet vocabulary, and styles. May be repeated for total 18 credits.

553 Teaching Creative Movement (3:3:0) Prerequisite: graduate status, or permission of instructor. Provides theory, methodology, and practicum experience in preparation for teaching creative movement to children K–12, with some application to special populations.

560 Advanced Choreography (3:3:0) Prerequisite: admission to MFA in dance program, or permission of instructor. Intensive study and exploration of advanced choreographic forms culminating in public performance of complete dance work. May be repeated for total 12 credits.

562 Directed Choreography (1–3:3:0) Prerequisite: admission to MFA in dance program, and permission of instructor. Individual choreographic project supervised by faculty member. May be repeated for total 6 credits.

570 Advanced Dance Performance (1–3:0:3–9) Prerequisite: admission to MFA in dance program, and audition. Advanced performance through participation in university productions and professional dance companies. May be repeated for total 12 credits.

571 Residency Workshop (1:0:3) Prerequisite: admission to MFA in dance program, and audition. Rehearsal and performance of new or restaged dance by guest choreographer in intensive rehearsal setting. May be repeated for total 6 credits.
580 Laban Movement Analysis (3:3:0) Prerequisite: admission to MFA in dance program, or permission of instructor. Introduces components of laban movement analysis: body, shape, effort, and space. Includes motif writing for recording and analyzing movement.

598 Philosophy and Aesthetics of Dance (3:3:0) Prerequisites: DANC 390 and 391, or permission of instructor. Study of philosophical theories and aesthetic principles of dance as a performing art.

599 Independent Study (1–6:0:0) Prerequisite: Admission to MFA in dance program, and permission of instructor. Individual research or creative project in close consultation with instructor. May be repeated for total 6 credits.

615 Contemporary Trends (3:3:0) Prerequisite: graduate standing. Study of contemporary art and artists and their ideas and practices as they relate to the making of new work.

627 Advanced Teaching Seminar (3:3:0) Prerequisite: DANC 454, admission to MFA in dance program, or permission of instructor. Discussion of advanced problems in teaching from scientific and creative points of view.

680 Dance Management (3:3:0) Prerequisite: admission to MFA in dance program. Exploration of technical, financial, and economic aspects of dance management, including marketing, fundraising, publicity, incorporation, booking, nonprofit vs. profit-making groups, and issues relating to current practices in performing arts industry.

700 Internship (1–3:0:0) Prerequisites: admission to MFA in dance program, and permission of advisor. Study involving intensive professional experience through sponsorship by a dance company, agency, or other arts organization in management, administration, performance, choreography, or teaching. May be repeated for total 6 credits.

790 Thesis (1–6:0:0) Prerequisites: admission to MFA in dance program, permission of advisor, and approval of proposal. Original research, including written work and public performance, under direction of thesis committee. May be repeated for total 6 credits.

Early Childhood Education (Unified Transformative Early Education Model—UTEEM) (EDUT)

Graduate School of Education

411 Universality and Diversity in Child and Family Development, Ages 3–5 (3:3:0) Provides knowledge of child and family development from diverse and cultural perspectives, offering appreciation for critical role of families. Explores role of culture, various disabilities, and theories for understanding and interpreting child and family growth and development.

413 Language Development and Emergent Literacy for Diverse Learners, Ages 3–5 (3:3:0) Provides understanding of first and second languages. Explores impact of disability and second language acquisition; and covers interrelationship of speaking, listening, reading, and writing. Offers understanding of diversity of oral and written communication styles in families, communities, and cultures.

414 Creating Environments and Adapting Curriculum for Diverse Learners, Ages 3–5 (3:3:0) Provides understanding of developmentally appropriate programs and practices for culturally, linguistically, and ability diverse young children. Students explore, plan, and implement curricula and environments using individually, age-related, and culturally appropriate methods and materials. Provides understanding of the important role of play, active exploration, construction and representation of knowledge, and social interaction with peers and family.

423 Language Acquisition and Communication for Diverse Infants and Toddlers (3:3:0) Provides understanding of early language development in terms of the five major components of language. Speech, language, and communication are discussed, particularly in terms of interrelatedness with cognitive and sociocultural development. Explores importance of adult-child interaction; and impact of bilingualism, cultural diversity, cognitive ability, and language disorder.

424 Culturally, Linguistically, and Developmentally Appropriate Practices with Infants, Toddlers, and their Families (3:3:0) Provides understanding of culturally, linguistically, and developmentally appropriate programs and practices in community settings that provide services to infants and toddlers with varied abilities and their families. Students explore, plan, and implement developmentally supportive activities, and are expected to become familiar with cultural context of infants and toddlers with whom they are working. Special emphasis on providing home-based services.

511 Universality and Diversity in Child and Family Development, Ages 3–5 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Provides knowledge of child and family development from diverse and cultural perspectives. Students explore role of culture and theories for understanding and interpreting child and family growth and development; learn about various disabilities; and acquire appreciation for critical role of families.

512 Assessment of Diverse Young Learners, Ages 3–5 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Provides understanding of forms, functions, methods, and roles of assessment for planning and implementing effective early childhood programs for children ages 3–5 from diverse cultures and with varied learning needs. Teaches quantitative and qualitative approaches to evaluation and assessment. Students learn about technological adaptations, and gain understanding of appropriate strategies for conducting, reporting, and decision-making related to specific functions of assessment. They also learn about assessment strategies for second language learners, and adaptations for children with disabilities.

513 Language Development and Emergent Literacy for Diverse Learners, Ages 3–5 (3:3:0) Prerequisites: admission to UTEEM program, or permission of instructor. Provides understanding of first and second languages. Explores impact of disability and second language acquisition, and covers interrelationship of speaking, listening, reading, and writing. Students also gain understanding of the diversity of oral and written communication styles in families, communities, and cultures.

514 Creating Environments and Adapting Curriculum for Diverse Learners, Ages 3–5 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Provides understanding of developmentally appropriate
programs and practices for culturally, linguistically, and ability diverse young children. Students explore, plan, and implement curricula and environments using individually, age-related, and culturally appropriate methods and materials. Covers important role of play, active exploration, construction and representation of knowledge, and social interaction with peers and family members.

521 Infant/Toddler Development in Family and Cultural Contexts (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Teaches about development of infants and toddlers in family and cultural contexts. Students explore role of family, culture, and developmental theories in providing frameworks for understanding and interpreting behavior of children from birth to age 3. Students learn about factors that place infants and toddlers at developmental risk, and other disabilities.

522 Family-Centered Assessment of Diverse Infants and Toddlers (3:3:0) Prerequisite: family-centered practice in assessing infants and toddlers with diverse cultures and abilities. Teaches assessment practices that lead to plans for supporting infant development in individually and culturally relevant ways. Offers understanding of appropriate strategies for conducting, reporting, and decision making related to specific functions of assessment, and adapting assessment practices for culturally, linguistically, and ability diverse infants and toddlers and their families.

523 Language Acquisition and Communication for Diverse Infants and Toddlers (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Provides understanding of early language development in terms of five major components of language. Discusses speech, language, and communication, particularly in terms of interrelatedness with cognitive and sociocultural development. Also explores importance of adult-child interaction; and impact of bilingualism, cultural diversity, cognitive ability, and language disorder.

524 Culturally, Linguistically, and Developmentally Appropriate Practices with Infants, Toddlers, and Their Families (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Explores culturally, linguistically, and developmentally appropriate programs and practices in community settings that provide services to infants and toddlers with varied abilities and their families. Students explore, plan, and implement developmentally supportive activities with infants and toddlers and their families, and are expected to become familiar with cultural context of infants and toddlers with whom they are working. Special emphasis on providing home-based services.

614 Integrating and Adapting Curriculum across the Content Areas for Diverse Learners, K–3 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Explores developmentally appropriate programs and practices for teaching children in grades K–3. Covers strategies for planning and implementing community of learners inclusive of children with diverse abilities and needs. Integrative class links knowledge in specific content areas to broader picture of managing the classroom day, implementing integrated curriculum across content areas, and applying philosophical principles related to effective instruction of diverse young learners.

615 Developing Concepts in Early Childhood Mathematics and Science for Diverse Learners, K–3 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Examines preoperational and concrete operational thought processes of conservation, seriation, observation, comparison, classification, and early number concepts. Uses concrete science and math materials, experiences to foster development of quantitative thinking in geometry, measurement, graphing, and whole number arithmetic. Covers construction of math and science lessons and hands-on experiences that address needs of variety of student populations, such as children with disabilities, gifted and talented children, and minority and culturally diverse groups.

621 Development and Assessment of Diverse Learners, K–3 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Examines forms, functions, methods, and roles of assessment for planning and implementing effective early childhood programs across content areas for culturally, linguistically, and ability diverse children in kindergarten through third grade.

613 Language and Literacy Development for Diverse Learners, K–3 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Develops and applies knowledge of literacy stages in conjunction with appropriate instructional materials and techniques for grades K–3. Analyzes, synthesizes, and applies knowledge of recent research to teaching practices in literacy development. Applies instructional approaches in response to the needs of diverse students in culturally and developmentally sensitive manner.

781 Frameworks for Unified, Transformative Early Care and Education (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Provides opportunity to analyze foundational frameworks for developing unified perspective for working with culturally, linguistically, and ability diverse young learners, birth to age 8, and their families. Students examine foundational work from separate fields of early childhood education, early childhood special education, multicultural education, and second language acquisition and bilingual education.

782 Policy Perspectives Affecting Diverse Young Learners and Their Families (3:3:0) Prerequisites: admission to UTEEM program, or permission of instructor. Advanced seminar explores historical and current trends and issues involving legislation and policy in early childhood education, bilingual education, early childhood special education, and multicultural education. Focuses on historical role of social advocacy, development of advocacy skills, and collaboration and consultation with other professionals and staff in early childhood education. Provides understanding of continuum of services and context of service delivery.

790 Internship with Diverse Learners, Ages 3–5 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Enables students to participate full time in inclusive early childhood setting serving families of infants and toddlers with diverse learning needs. Links university course work to real world of working with diverse families and their infants and toddlers. Students engage in carefully planned learning sequence, including observing infants and toddlers, environments, and intervention strategies that identify family concerns, priorities, and resources.

791 Internship with Diverse Infants and Toddlers and Their Families (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Provides experience in working with infants and toddlers born to age 3, and their families in inclusive early childhood settings serving families of culturally, linguistically, and ability diverse children and their families. Provides experience in working with infants and toddlers born to age 3, and their families in inclusive early childhood settings serving families of culturally, linguistically, and ability diverse children and their families.
program, or permission of instructor. Enables students to participate full time in inclusive early childhood setting serving families of infants and toddlers with diverse learning needs. Links university course work to real world of working with diverse families and their infants and toddlers. Students engage in carefully planned learning sequence, including observing infants and toddlers, environments, and intervention strategies that identify family concerns, priorities, and resources.

792 Internship with Diverse Learners, K–3 (3:3:0) Prerequisite: admission to UTEEM program, or permission of instructor. Enables students to participate full time in early childhood setting serving children with diverse learning needs. Links university course work to real world of teaching. Students engage in carefully planned learning sequence, beginning with targeted observations and culminating with responsibility for entire planning process for three- to four-week period.

793 Specialization Internship with Diverse Learners and Their Families (6:6:0) Prerequisite: passing scores on Praxis I and II, and admission to UTEEM program; or permission of instructor. Enables students to participate full time in education setting serving diverse children and their families, becoming involved in range of activities to ensure experience and understanding of the complexity, uniqueness, and significance of the work done.

804 Families of Diverse Young Learners – Interdisciplinary and Cross-cultural Research, Policy, and Practice (3:3:0) Prerequisites: admission to doctoral program or post-master’s status and permission of instructor. Explores the relationship between families and professionals in providing appropriate early care and education for diverse young children. Course includes in-depth study, analysis, and discussion of original research as well as syntheses of findings.

805 Personnel Preparation and Professional Development in Early Education of Diverse Learners (3:3:0) Prerequisites: admission to doctoral program or post-master’s status and permission of instructor. Explores research and current recommended practices related to professional development and teacher education in early care and education of diverse learners. Provides opportunity for practical application with pre-service or in-service early educators.

806 Early Childhood Cognition, Language, and Literacy for Diverse Young Learners (3:3:0) Prerequisites: admission to doctoral program or post-master’s status and permission of instructor. Develops an understanding of research and practice related to cognition, language, and literacy in a sociocultural context in the early childhood education of diverse learners, including special education and multicultural/multilingual education.

Earth Observing Systems (EOS) Geography and Geoinformation Sciences

121 Dynamic Atmosphere and Hydrosphere (4:3:3) Prerequisites: none. This natural science lab course is a systematic study of weather, climate, energy, and hydrologic systems viewed from a geospatial and global perspective. We will study the spatial distribution and relationships of the Earth’s climate and hydrologic systems to other Earth systems, as well as the processes driving and changing them, including energy, climate, weather, and water resources.

122 Dynamic Geosphere and Ecosphere (4:3:3) Prerequisites: none. Systematic study of biogeography and soils, viewed from a geographic, or spatial, perspective. We will study the spatial distribution and relationships of Earth’s biomes and soils systems to other Earth systems, and the processes driving them, including energy, climate, nutrients, chemistry, and moisture.

303 GIS Applications for Earth Systems (3:3:0) Prerequisites: 30 hours; and EOS 121, EOS 122 and IT 103, or permission of instructor. An overview of fundamentals in GIS, with emphases on aspects related to Earth systems and global studies. Review the use of GIS in different aspects of the Earth systems at the global and regional scales.

304 Population Dimensions of Global Change (3:3:0) Prerequisite: 30 credits of prior course work. Interdisciplinary course combining knowledge from social sciences and environmental science to develop global understanding of world population condition, issues, and related problems. Applies demographic concepts using GIS and quantitative methods. Satisfies general education syntheses requirement.

305 Global Environmental Hazards (3:3:0) Prerequisites: 30 hours and undergraduate status. Introduces applications of observational and modeling techniques to natural hazards and the threat they pose to the world, as well as a general introduction to global climate change and its effect on regional and local scales. Examples include topics of interest to different countries and regions of the world, such as earthquakes, sand and dust storms, slope failures, volcanoes, land slides, droughts and desertification, floods, hurricanes and typhoons, severe weather, wild fires (U.S., Indonesia, Africa, S. America), sea-level rise, and tsunamis. Covers Earth system science topics related to the above hazards and their coupling with anthropogenic hazards as well as how societies respond to natural disasters and mitigation.

306 Sustainable Development (3:3:0) Prerequisites: 60 hours; EOS 122 and EOS 305, or permission of instructor. Explores the concepts, applications, and tools for analysis and decision making in support of environmentally sustainable development. Case studies and problem-solving exercises will be used to stimulate learning and provide practical experience in addressing sustainable development issues.

310 Severe and Unusual Weather (3:3:0) Prerequisites: 30 hours. Introduce the student to a general survey of the atmosphere and the fundamentals of severe and unusual weather. Designed for students who generally have little physical science background and want to satisfy their intellectual curiosity about severe weather and complete basic science requirements. Mathematics is not emphasized. Appropriate equations are provided in an optional format during the course material for mathematically oriented students.

312 Physical Climatology (3:3:0) Prerequisites: 30 hours; EOS 121 or equivalent, EOS 310 or GEOG 309, PHYS 243–244, or permission of instructor. Quantitative description of nature and theory of the climate system, dynamics of atmosphere-ocean-land surface, internal interactions and response to external forcing, description of the climate record and simple climate models.
320 Air Pollution (3:3:0) Prerequisites: 30 hours. Devoted to air pollution fundamentals and aimed at undergraduates who are beginning to study air pollution problems. The use of Gaussian plume dispersion models is also covered in detail, because it serves as the basis for most computer models used for regularity analysis by the EPA. The course also deals with pollution and atmospheric interactions, and the nature of our climate.

322 Issues in the Global Change (3:3:0) Prerequisites: 30 hours and courses in chemistry, physics, ecology, and advanced mathematics. Provides the basis for evaluating existing and emerging issues in the environmental sciences at the regional and global scale, using interdisciplinary scientific principles. This objective is met by a combination of activities designed to provide an understanding of the following: first principles underlying regional/global issues in the environmental sciences, with attention to links among the disciplines of atmospheric sciences, biology, ecology, hydrology, oceanography, geology, human health, toxicology, and mathematical modeling; concepts of systems control, feedbacks, modeling, and hierarchical scales (spatial and temporal); role of developing a scientifically sound basis for evaluation and analysis; and studies of specific issues of interest on a regional to global scale.

353 Observations of the Earth and Its Climate (3:3:0) Prerequisites: 30 hours. Provides a general introduction to observations of the Earth and its climate, focusing on regional and global aspects. Introduces remote sensing and other Earth-observing techniques, as well as provides a survey of some of the physical and mathematical aspects of remote sensing at a very high level. Concepts and foundations of remote sensing in addition to different approaches and techniques are discussed. The course covers several key Earth system science topics such as El Niño, carbon dioxide increase, climate change including sea rise, ozone depletion, and the energy budget of the Earth.

354 Data Analysis and Global Change Detection Techniques (3:3:0) Prerequisites: Competency in basic programming or tools used in data analysis. Introduces basic time series methods, especially those used in detecting trends and randomness in time series data. Various data related to global changes on different temporal and spatial scales will be identified, and the relevant analysis methods will be used to those data so that students can detect or confirm changing trends or lack of them in data. Other topics such as data formats, data visualization, and data mining may also be included based on the background of the student body.

399 Selected Topics in Global Change (3:3:0) Prerequisites: 30 credits or permission of instructor. Covers selected topics in global change not covered in fixed-content global change courses. Content varies and is determined by instructor. May be repeated.

410 Introduction to Hyperspectral Imaging (3:3:0) Prerequisites: 30 hours PHYS 243–244, 245–246, MATH 113 and 114, EOS 533, or permission of instructor. Provides an introduction to quantitative measurements by remote-sensing methods covering an introduction to quantitative spectroscopy, spectral and thermal signatures, atmospheric physics, and the electromagnetic spectrum. Emphasis will be on the scientific principles involved and the transition of the technology to real-world applications. The requisite materials to begin to understand hyperspectral imaging (HSI) technology and its many civil and military applications are presented. The course covers the needed mathematics used in the analysis of n-dimensional data. Topics such as hyperspectral concepts, data collection systems, data processing techniques, case studies, and U.S. national policy issues will be covered. The data processing techniques will include N-dimensional space, scatterplots, spectral angle mapping, spectral mixture analysis, spectral matching, and other techniques. Applications and case studies will include environmental, medical, agricultural, military, and others. Ground, airborne, and spaceborne hyperspectral systems will be covered.

455 Environmental Impact Assessment (3:3:0) Prerequisites: 60 hours; EOS 120, EOS 305, EVPP 377 and 6 hours of courses in ecology or environmental science, or permission of instructor. Evaluates current methods and practices for conducting and planning environmental assessments to include techniques and requirements for assessing impacts on air, water, natural resources, transportation, water facilities, and industrial and community development.

495 Senior Research (3:0:0) Prerequisites: open only to authorized majors with 90 credits. Applications of research tools and techniques on specific global change topics, in conjunction with faculty instruction and research. Individualized sections taught by arrangement with full-time faculty.

600 Communication Skills for Scientists (1:2:0) Prerequisite: graduate standing. Develops basic set of essential skills for scientific communication of written and oral materials. Oral skills focus on delivery of successful and informative presentations to both peers and the general public. Written communication skills focus on writing of scientific abstracts, manuscripts, and grant proposals. Meets objectives through combination of activities, including practical writing assignments, planned and extemporaneous oral presentations, discussion of grant preparation for extramural competition, and personal advice on developing and delivering oral presentations.

650 Introduction to GIS Algorithms and Programming (3:3:0) Prerequisites: introductory GIS course (GEOG 553). Prepares students to program using object-oriented languages for GIS or in a GIS environment. A comprehensive programming training process, including computer programming, syntax, data types, data structure, control structures, and integrated programming environment (such as Python & JBuilder), will be introduced. Several technical aspects of GIS related to algorithms, such as file reading/writing and topology will be discussed.

656/EVPP 652/GEOG 570 The Hydrosphere (3:3:0) Prerequisite: two semesters of calculus, preferably partial differential equations; or permission of instructor. Components and transfer processes within hydrosphere, which consists of aqueous envelope of Earth, including oceans, lakes, rivers, snow, ice, glaciers, soil moisture, groundwater, and atmospheric water vapor. Offers understanding of various components of hydrosphere, spatial and temporal distributions, physics of transfer processes for redistribution, and appreciation of water’s role in sustaining life and influencing global and regional energy and mass balance.

657/GEOL 601/GEOG 671 The Lithosphere (3:3:0) Prerequisite: graduate standing. Global-scale overview of lithosphere, the solid nonliving Earth, its materials, cycles, plate tectonic and geomorphic processes; and history, includ-
ing interactions with hydrosphere, atmosphere, and biosphere, and methods of analysis. Offers understanding of materials, features, and landforms of solid Earth, and processes by which they formed.

670 Fundamentals of Atmosphere (3:3:0) Prerequisite: permission of instructor. Introduces students to a general survey of the atmosphere and the fundamentals of weather.

680 Environmental Applications of Integrated Geographic Information Technologies (3:3:0) Prerequisites: EOS 753, and GEOG 550 or 585; or permission of instructor. Focuses on how geoinformation technologies, including GIS, RS, and GPS, and spatial analytical techniques can be integrated to address various situations in environmental risk assessment, monitoring, and planning.

684 Select Studies in Geospatial Intelligence (3:3:0) Prerequisites: admission in the geospatial intelligence certificate program or permission of program coordinator. A course for students in the geospatial intelligence certificate (GI) program. It is intended to cover specialized topics relevant to geospatial intelligence. Accordingly, it comprises lectures, reading assignments, and exercises.

685 Capstone Course in Geoinformatics (3:3:0) Prerequisites: 12 credits in the geospatial intelligence certificate program or permission of program coordinator. A course for students completing their geospatial intelligence certificate (GI) program. It is intended to provide a capstone experience by synthesizing the knowledge and experience they acquired in their previous courses to address a complex geospatial intelligence problem. The course requires analytical, collaborative, and communication skills.


721 Biogeography (3:3:0) Prerequisites: courses in ecology, chemistry, and geology. Provides broad understanding of how physical geography and environment influence spatial and temporal distribution of plants and animals on Earth’s surface.

722 Regional and Global Issues in the Earth Sciences (3:3:0) Prerequisites: courses in ecology, chemistry, and physics. Provides basis for evaluating existing and emerging issues in Earth sciences at regional and global scales, utilizing interdisciplinary scientific principles.

725 Advanced Hydrosphere (3:3:0) Prerequisite: two semesters of calculus, preferably partial differential equations; or permission of instructor. Uses mathematical and modeling approaches for in-depth study of different components and transfer processes within hydrosphere. Topics include transfer processes relevant for oceans, lakes, rivers, snow, ice, glaciers, soil moisture, ground water, and atmospheric water vapor.

740 Hyperspectral Imaging Systems (3:3:0) Prerequisite: CSI 660 or equivalent, or permission of instructor. Provides requisite materials to understand hyperspectral imaging technology and its many civilian and military applications. Emphasizes scientific principles involved and technology application to real-world imaging systems. Topics include hyperspectral concepts and system tradeoffs; data collection systems; calibration techniques; data processing techniques and software; classification methods; and case studies. Data processing techniques include N-dimensional space, scatterplots, spectral angle mapping, spectral mixture analysis, spectral matching, and mixture tuned matched filtering. Discusses ground, airborne, and spaceborne hyperspectral remote sensing systems.

747 Satellite Data Reception and Product Generation (3:3:0) Prerequisites: EOS 753, or introductory remote-sensing course; computer programming; or permission of instructor. Provides a practical experience on how to receive, process, and distribute remote-sensing data using an antenna-receiving station. Covers basic orbital mechanics, characteristics of satellite sensors and their limitations, and algorithms used to generate products from the raw measurements. Data mining techniques are presented for the analysis of large volume of data.

753 Observations of the Earth and Its Climate (3:3:0) Prerequisite: CSI 660 or introductory remote sensing course; environmental science, space science, physics, or chemistry undergraduate background; or permission of instructor. Provides requisite material to understand techniques of remote sensing and other observational methods as applicable to Earth science and global change. Surveys methodologies and their applications, including systematic study of how each part of electromagnetic spectrum is used to gather data about Earth. Describes limitations imposed by satellite engineering, sensor limitations on data gathering, and a survey of data reduction specific to remote sensing applications. Also covers current research issues, including examples pertaining to atmosphere, land masses, and oceans. Includes discussions of current efforts by NASA and NOAA to provide integrated data gathering and dissemination systems.

754 Earth Science Data and Advanced Data Analysis (3:3:0) Prerequisite: EOS 753 or permission of instructor. Covers accessing and applying Earth observations and remote-sensing data for Earth system science research and applications. Major topics are data formats, analysis and visualization tools, advanced data analysis methods, and data applications. Also covers combining innovative information technology techniques and Earth science data to set up online data centers for accessing data through the web.

756 Physical Principles of Remote Sensing (3:3:0) Prerequisite: EOS 753 or permission of instructor. Emphasizes fundamental physical and mathematical principles of remote sensing. Also provides overview of the current Earth Observation System as well as the National Polar-Orbiting Operational Environmental Satellite Systems (NPOESS), and NPOESS Preparatory Project missions.

757 Techniques and Algorithms in Earth Observing and Remote Sensing (3:3:0) Prerequisite: EOS 753 or permission of instructor. Covers retrieval, analysis, and application of geophysical parameters derived from remotely sensed data for Earth system research and applications. Includes theory of visible and infrared and microwave remote sensing, heritage sensors, sensor calibration, retrieval algorithms, validation, and error estimates.

758 Earth Image Processing (3:3:0) Prerequisites: EOS 753 and GEOG 380, plus knowledge of a computer language;
or permission of instructor. Intermediate-advanced level course focusing on digital processing of Earth images, with significant coverage of hyperspectral images, mathematical and algorithmic foundations, analysis procedures, and computational implementations. Emphasizes programming projects.

759 Topics in Earth Systems Science (3:3:0) Prerequisite: permission of instructor. Covers selected topics in Earth systems and global changes not covered in fixed-content Earth systems and global changes courses. May be repeated.

760 Advanced Remote Sensing Applications (3:3:0) Prerequisites: EOS 753 or GEOG 580. Focuses on applications of remote sensing in various important areas of Earth systems science, including analysis of surface radiation budget, land cover, inland and coastal waterways, and soil moisture. Details algorithms, techniques, and examples.

771 Algorithms and Modeling in GIS (3:3:0) Prerequisites: prior course or experience in GIS, and knowledge of computer programming language. Examines several fundamental GIS algorithms based upon computational geometry and computer graphics. Also discusses issues in modeling features of different dimensions and surfaces in GIS. Significant programming expected.

772 Distributed Geographic Information Systems (3:3:0) Prerequisites: introductory course in GIS and some programming experience, or permission of instructor. Examines different aspects of science and technology in the context of distributed GIS. Includes general concepts, architecture, component design and development, and system integration as well as other advanced topics, including interoperability and agent-based GIS.

773 Interoperability of Geographic Information Systems (3:3:0) Prerequisites: EOS 754 and GEOG 553, or a course in GIS. Advanced course addressing theories, standards, and implementations of web-based interoperable geographic information systems for online data and information services. Reviews international standards, including OGC, and associated tools for interoperability.

777 Remote Sensing of Natural Hazards (3:3:0) Prerequisite: EOS 753 or GEOG 579 or GEOG 580; or permission of instructor. Provides an overview of major natural hazards, their governing dynamics and remote-sensing applications. Topics include advanced hyperspectral concepts, multisystem tradeoffs, data collection and processing systems, imaging radar systems, laser systems, calibration techniques, data fusion, quantitative remote sensing techniques, data compression techniques, case studies, and U.S. national policy. Applications and case studies include environmental, homeland security, medical, military, disaster mitigation, agricultural, and transportation.

840 Hyperspectral Imaging Applications (3:3:0) Prerequisite: CSI 660 or equivalent, or permission of instructor. Introduces advanced hyperspectral imaging and multisensor concepts with emphasis on real-world civilian and military applications. Topics include advanced hyperspectral concepts, multisystem tradeoffs, data collection and processing systems, imaging radar systems, laser systems, calibration techniques, data fusion, quantitative remote sensing techniques, data compression techniques, case studies, and U.S. national policy. Applications and case studies include environmental, homeland security, medical, military, disaster mitigation, agricultural, and transportation.

854 Air Pollution Meteorology and Dispersion (3:3:0) Prerequisite: CLIM 710 or 711, or permission of instructor. Covers the basic concepts, theories, and models of pollutant dispersal in the atmosphere and the related atmospheric systems affecting dispersal of hazardous atmospheric releases.

855 Introduction to Mesoscale Atmospheric Modeling (3:3:0) Prerequisite: permission of instructor. Introduces physical and numerical modeling issues involved in mesoscale atmospheric flows. These flows involve time and space scales associated with diurnal cycle, atmospheric inertial mode, thermal and mechanical forcing due to mesoscale terrain inhomogeneities, mesoscale precipitation systems, and downslope energy transfer from synoptic scale to mesoscale due to nonlinear flow interactions.

900 Research Colloquium in Earth Systems and Geoinformation Sciences (1:1:0) Prerequisite: graduate standing. Presentations in specific research areas of Earth systems and geoinformation sciences by faculty and staff, Mason faculty in related programs, and professional visitors. May be repeated for credit, but maximum 3 credits may be applied to Earth systems and geoinformation sciences PhD.

998 Dissertation Proposal (1–12:0:0) Prerequisite: permission of instructor. Covers development of research proposal that forms basis for doctoral dissertation, under guidance of dissertation director and doctoral committee. May be repeated, but no more than 12 credits of EOS 998 may satisfy doctoral degree requirements.
999 Doctoral Dissertation (1–12:0:0) Prerequisite: permission of instructor. Doctoral dissertation research under direction of dissertation advisor. May be repeated, but no more than total 24 credits in EOS 998 and 999 may be applied to doctoral degree.

E-Commerce (EC)

The Volgenau School of Information Technology and Engineering

511 E-commerce Basic IT Infrastructure (3:3:0) Discusses basic networking infrastructure used in e-commerce environments and typical multitiered e-commerce architectures of e-commerce sites. Includes ISO OSI reference architecture; functions, main features of IP protocol; functions, main features of TCP protocol including connection establishment, error control, and congestion control; HTTP protocol; and load balancers, web servers, application servers, and database servers in e-commerce site architecture. Discusses software architecture elements such as servlets, transaction processing services, remote method invocation, CGI scripts, and active server pages.

512 E-commerce Software Services (3:3:0) Prerequisite: EC 511. Flow analysis of e-commerce transactions, and role of various software servers, such as web, application, and database servers, in executing e-commerce transactions. Uses various technologies to illustrate typical designs. Covers protocols for authentication and payment in e-commerce; introduction to symmetric and public-key encryption; digital signatures and certificates; and Secure Sockets Layer (SSL) Transport Layer Service (TLS), and secure electronic payment protocols.

521/MBA 603 Managerial Economics and Decisions of the Firm (3:3:0) Prerequisite: admission to MS in e-commerce program. Provides fundamental understanding of how microeconomics concepts are usefully applied to managerial decision making. Explores principles of microeconomic theory, including market supply and demand, production and cost functions, industry structure, and product and resource pricing.

522/MBA 613 Financial Reporting and Decision Making (3:3:0) Prerequisite: admission to MS in e-commerce program. Foundation course focusing on economics and analysis of business transactions and related financial reporting issues. Topics include introduction to accounting framework used in financial reporting, analysis of economic events and impact on financial reports, analysis of impact of accounting method choices on financial reports, and financial statement analysis.


600 Group Project in Electronic Commerce (3–6:3–6:0) Prerequisite: completion of all core courses and at least 9 credits in MS in e-commerce program. Group projects in electronic commerce selected to illustrate special problems and solutions in development, design, and implementation of e-commerce systems.

Economics (ECON)

Economics

Individual courses taken for credit under their former numbers may not be repeated for credit under their present numbers. A grade of C or better in ECON 103 and 104 is prerequisite to upper-division economics courses.

100 Economics for the Citizen (3:3:0) Not available to economics majors. Broad introduction to economic concepts and how they can contribute to a better understanding of the world around us. Applies and develops concepts to current economic and social problems and issues. Less formal modeling than in the 103–104 sequence.

103 Contemporary Microeconomic Principles (3:3:0) Introduces microeconomics in the context of current problems. Explores how market mechanism allocates scarce resources among competing uses; uses supply, demand, production, and distribution theory to analyze problems.


110 Introduction to Economic Science (2:2:0) Registration is controlled; contact instructor for guidelines. Introduces economics as an observational science, covering personal vs. impersonal exchange, strategic interdependence and game theory, group decision making, and market design.

111 Laboratory Methods in Economics (1:0:3) Registration is controlled; contact instructor for guidelines. Enables participation in experimental economics research by recruiting subjects, writing experiment instructions, and monitoring sessions.

306 Intermediate Microeconomics (3:3:0) Prerequisites: ECON 103 and 104, and MATH 108 or 113. Basic factors of price and distribution theory: analysis of demand, costs of production and supply relationships, and price and output determination under various market structures.

309 Economic Problems and Public Policies (3:3:0) Prerequisites: completion or concurrent enrollment in all other general education courses, and ECON 103 and 104, or permission of instructor. Economic problems in light of current and proposed public policies. Topics include environmental issues, international trade policies, and regulatory issues and their historical roots.

310 Money and Banking (3:3:0) Prerequisites: ECON 103 and 104, or permission of instructor. Monetary, commercial, and central banking systems, with particular emphasis on their relationship with American government programs, fiscal policies, and controls.

311 Intermediate Macroeconomics (3:3:0) Prerequisites: ECON 103 and 104, or permission of instructor. Aggregate economic accounts, including measuring national income;
determinants of levels of income and output; and causes and solutions for problems of unemployment, inflation, and economic growth.

316 Economic Growth and Business Cycle (3:3:0)  Prerequisite: ECON 310 or 311, or permission of instructor. Covers factors contributing to sustained economic growth, emphasizing business fluctuations and their measurement.

320 Labor Problems (3:3:0)  Prerequisites: ECON 103 and 104, or permission of instructor. Explores American labor unions and their effect on society, including causes of and proposed solutions to selected problems.

321 Economics of Labor (3:3:0)  Prerequisite: ECON 306. Defines factors that determine levels of wages and employment, and economic consequences. Emphasizes recent developments in unionism, collective bargaining, and industrial technology.

330 Public Finance (3:3:0)  Prerequisite: ECON 306 or permission of instructor. Covers intergovernmental financial relationships; types, incidences, and consequences of taxation; other sources of governmental income; governmental expenditures and their effect; public economic enterprises; public borrowing; and debt management and its economic effect.

335 Environmental Economics (3:3:0)  Prerequisites: ECON 103 and 104. Microeconomic analysis of environmental problems. Topics include externalities and market failure, alternative solutions and policies, problems in monitoring and enforcement, economic analysis of development of legislation and regulation, and applications to current policy issues.

340 Introduction to Mathematical Economics (3:3:0)  Prerequisites: ECON 306 and 311, and MATH 113; or permission of instructor. Mathematical treatment of theory of firm and household behavior, stabilization policy, growth theory, input-output analysis, and linear programming.

345 Introduction to Econometrics (3:3:0)  Prerequisites: ECON 306 and 311, and OM 210 or STAT 250. Modern statistical techniques in estimating economic relations.

350 Regional and Urban Economics (3:3:0)  Prerequisite: ECON 306 or permission of instructor. Regional development and metropolitan growth, including locational decisions of households and firms, and problems associated with high-density urban economic activity.

360 Economics of Developing Areas (3:3:0)  Prerequisites: ECON 103 and 104, or permission of instructor. Economic growth characteristic of developing countries. Economic development, obstacles to development, policies, and planning.

361 Economic Development of Latin America (3:3:0)  Prerequisites: ECON 103 and 104, or permission of instructor. For non-Western credit. Economic development, institutions, and problems of Latin America.

362 African Economic Development (3:3:0)  Prerequisites: ECON 103 and 104. Issues of economic development as applied to Africa. Includes overview of early economic history in Africa and post-independence development, and contemporary development problems.

365 Topics in Economic History (3:3:0)  Prerequisites: ECON 103 and 104. Subject matter varies. Possible topics include ancient, medieval, modern European, and American economic history, using econometric analysis as necessary. May be repeated once for credit with permission of instructor.

370 Economics of Industrial Organization (3:3:0)  Prerequisite: ECON 306, or permission of instructor. Factors influencing industrial structure, and industrial conduct and performance.

372 Economics of E-Commerce (3:3:0)  Prerequisites: ECON 103 or permission of instructor. Examines how institutional rules, transaction costs, and behavior of agents affect performance of electronic marketplaces.

375 Introduction to the Economics of Religion (3:3:0)  Prerequisite: ECON 103. Examines the theory of religious markets as they relate to effects, mainstream religion, new religious movements, religious extremism, and religious trends.

380 Economics in Transition (3:3:0)  Prerequisites: ECON 103 and 104, or permission of instructor. Examines problems and achievements of formerly communist and socialist countries including China, Eastern European countries, and Russia and other countries of the former Soviet Union as they transition to more market-oriented economies. Includes market economics and central planning.

385 International Economic Policy (3:3:0)  May not be taken for credit by students who have completed ECON 390. Introduces economic way of thinking on trade and international finance. Presents historical and current information on consequences of trade and protectionism.

390 International Economics (3:3:0)  Prerequisites: ECON 306 and 311, or permission of instructor. Foreign exchange market, balance of payment, foreign trade policies, and theories of international trade.

403 Austrian Economics (3:3:0)  Prerequisites: ECON 306 and 311. Microeconomic and macroeconomic models and misallocation of resources. Alternative economic tools from noted Austrian economists.

410 Public Choice (3:3:0)  Prerequisite: ECON 306. Applies economic theory, methodology to study nonmarket decision making.

412 Game Theory and Economics of Institutions (3:3:0)  Prerequisite: ECON 306 or permission of instructor. Introduces game theory and its relevance for analyzing framework of rules and institutions within which economic processes occur. Applies game theoretical concepts to comparative analysis of causes and effects of alternative institutional arrangements.

415 Law and Economics (3:3:0)  Prerequisite: ECON 306 or permission of instructor. Economic analysis of the law. Topics include introduction to legal institutions and legal analysis; application of economic concepts to the law of property, contracts and torts, criminal and constitutional law; economic efficiency of common law; and public choice perspective on the evolution of the law.

420 International Money and Finance (3:3:0)  Prerequisite: ECON 306 and 311, or permission of instructor. Examines models of balance of payments, exchange rate behavior, and open economy macroeconomics. Includes international financial system and issues such as globalization and international financial instability.
440 Economic Systems Design: Principles and Experiments (3:3:0) Prerequisite: MATH 213. Introduces design principles to develop systems to allocate resources. Students must participate in experiment demonstrations of different allocation mechanisms. They also are exposed to experimental methods in economics and market design.

441 Economic Systems Design: Case Studies and Analysis (3:3:0) Prerequisite: ECON 440. Requires students to design and develop mechanism to specific allocation problem. Students develop analytical and working engineering models of their mechanism.

442 Economic Systems Design: Implementation (3:3:0) Prerequisite: ECON 441. Involves students in developing experimental design to test proposed allocation solution. Design process includes construction of experimental parameters, treatments, and initial test in laboratory setting.

445 Design and Analysis of Experiments (3:3:0) Prerequisites: STAT 250, 344; and MATH 351 or IT 250; or permission of the instructor. Topics include comparing two or more treatments, and computing and interpreting analysis of variance. Discusses randomized block, Latin square, and factorial designs; and applications to economics experiments.

481 The Development of Economic Thought (3:3:0) Prerequisites: ECON 306 and 311, or permission of instructor. Discusses developments in economic thought from 1500 to the present. Emphasizes historical origins, impact on contemporary economics, and theoretical validity.

490 Senior Seminar on Problems in Economics (3:3:0) Prerequisites: ECON 306 and 311, OM 210, and 90 credits; economics majors only. Applies economic tools to investigate problems in economics.

496 Special Topics in Economics (3:3:0) Prerequisite: varies with topic. Subject matter varies. May be repeated for credit with permission of department.

498 Internship (1-3:0:0) Prerequisite: 6 upper-level credits of economics, junior standing, and permission of instructor. Students find economics-related internship with assistance from Career Services. Pre-internship proposal and final reflections paper required.

499 Independent Study (1-3:0:0) Prerequisites: economics majors with 90 credits, and permission of both department and instructor. Individual study of selected area of economics. Directed research paper required. May be taken for a maximum of 6 credits.

ECON 306 and 311, or equivalent, are prerequisites to all graduate courses except ECON 600 and 602. Undergraduates require special permission to enroll in 600-level courses.

535 Survey of Applied Econometrics (3:3:0) Prerequisites: OM 210, and ECON 306 and 311, or permission of instructor. Introduces multiple regression and problems associated with single equation model-autocorrelation, multicollinearity, and heteroscedasticity.

611 Microeconomic Theory (3:3:0) Prerequisites: admission to doctoral or master’s program, or ECON 306 and 311, and MATH 113; or permission of graduate coordinator. Covers theory of behavior of consumers, firms, and resource suppliers; theories of choice under risk and uncertainty; partial equilibrium analysis of competitive and noncompetitive markets; general equilibrium analysis; and welfare economics. Introduces capital theory.

612 Microeconomic Theory II (3:3:0) Prerequisite: ECON 611. Nature of the firm; theory of supply; and production functions, factor pricing, and supplies. Introduces microeconomic foundations of theories of public finance and public choice.

615 Macroeconomic Theory (3:3:0) Prerequisite: admission to master’s program in economics, or ECON 306 and 311, and MATH 108; or permission of graduate coordinator. Explores survey course covering monetary theory, theories of consumption and saving, budget deficits, economic growth, international finance, and monetary and fiscal policies.

623 American Economic History (3:3:0) Prerequisites: ECON 611 and 613, taken concurrently, or permission of instructor. ECON 637 recommended. Explores development of American economy, and evolution of economic institutions.

630 Mathematical Economics I (3:3:0) Prerequisite: admission to doctoral or master’s program, or ECON 306 and 311, and MATH 113; or permission of instructor. Includes set theory, function, differential calculus, integration, series, and matrix algebra, with special emphasis on economic applications.

632 Economic Systems Design Principles and Experiments (3:3:0) Prerequisites: courses in linear and nonlinear optimization, and linear algebra. Introduces analytical and engineering principles to develop exchange systems. Students must become familiar with literature on applied mechanism design; and understand behavioral aspects of auction systems, matching, assignment and transportation problems, and information markets. Also introduces methods for testbedding systems using experimental economics and statistical design.

633 Economic Systems Design Case Studies and Analysis (3:3:0) Prerequisite: ECON 632. Students begin process of doing research in design economic exchange system. Design process includes electronic instructions, and design of information structures. Students responsible for research into economic issues, and practical design issues.

634 Economic Systems Design Implementation (3:3:0) Prerequisite: ECON 633. Students do original research in economic systems design by constructing engineering model of solution to allocation problem. Research includes experimental and statistical design, and complete description of hypothesis related to construction of experimental parameters and treatments to test mechanism. Requires initial test of mechanism in laboratory setting.

637 Econometrics I (3:3:0) Prerequisite: acceptance to PhD program, OM 210, or permission of instructor. Techniques of estimating relationships between economic variables. Introduces multiple regression and problems associated with single equation model-autocorrelation, multicollinearity, and heteroscedasticity.

675 Economics of Religion I (3:3:0) Prerequisite: ECON 611, 612, 615, 630, 637. Explores the application of economics methods and insights to the exploration of the relationship between religious and socioeconomic behavior, beliefs, and institutions.
676 Comparative Economic Systems (3:3:0) Capitalism, socialism, and corporatism historical perspective. Includes examination of economies of representative contemporary countries.

715 Macroeconomic Theory I (3:3:0) Prerequisite: admission to doctoral program, or permission of graduate coordinator. Covers classical, neoclassical, Keynesian, and post-Keynesian theories of income and employment determination; theories of inflation and growth; and demand for money and implications for effectiveness of monetary vs. fiscal policy.

811 Microeconomic Theory I (3:3:0) Prerequisite: admission to doctoral program, or permission of graduate coordinator. Theory and applications of behavior of consumers, firms, and resource suppliers. Partial equilibrium analysis of various market structures and introduction to intertemporal choice and capital theory. Review and analysis of classic works in microeconomic theory.

812 Microeconomic Theory II (3:3:0) Prerequisite: ECON 811. Examines nature of firm; theory of supply; and production functions, factor pricing, and supplies. Introduces microeconomic foundations of theories of public finance and public choice.

816 Macroeconomic Theory II (3:3:0) Prerequisites: ECON 611 and 715, or permission of instructor. Aggregate economic activity and price levels with emphasis on dynamic models. Topics vary.

817 Monetary Theory and Policy (3:3:0) Prerequisites: ECON 615 and 637, or permission of instructor. Theory of mechanisms through which central banking affects economic activity and prices. Analyzes demand for money and its relationship to economic activity. Develops monetary theory with emphasis on current theories and controversies in the field.

820 History of Economic Thought (3:3:0) Explores major figures in history of economic thought and tools of analysis they created. Emphasizes classical, neoclassical, and Keynesian theories.

821 History of Economic Thought II (3:3:0) Covers development of economic analysis from marginal revolution of 1877 to present. Emphasizes development of neoclassical economic theory.

823 Topics in Economic History (3:3:0) Prerequisites: ECON 611 and 615. Offers economic analysis of various historical epochs including Industrial Revolution, evolution of political reform, rise of unions, and growth of government.

825 Political Economy and Public Policy I (3:3:0) Prerequisite: ECON 611, or permission of instructor. Covers economic process of public policy formulation and implementation; and economic behavior of principals in policy making and execution.

826 Political Economy and Public Policy II (3:3:0) Prerequisites: ECON 611, 615, and 825; or permission of instructor. Specific issues related to political economy of public policy, including privatization, political economy of deficit spending, regulation and deregulation, and economics of rent seeking.

827 Economic Philosophy (3:3:0) Prerequisite: ECON 611, or permission of instructor. Analyzes philosophical organization, including interrelations between economics and legal and political institutions; philosophical presuppositions of capitalist economy under constitutional democracy; alternative presuppositions for noncapitalist economies; and critical evaluation of history of ideas in social and moral philosophy.

828 Constitutional Economics (3:3:0) Prerequisite: ECON 611, or permission of instructor. Analyzes existing and proposed elements of economic constitution. Emphasizes fiscal, monetary, transfer, and regulatory powers of government and constitutional limits on such powers, especially in the United States. Includes analysis of proposed changes in limits.

829 Economics of Institutions (3:3:0) Prerequisite: ECON 611, or permission of instructor. Analyzes framework of rules and institutions for economic activities and transactions. Includes emergence and working properties of different institutions, and classical and contemporary approaches to economic theory of institutions.

831 Mathematical Economics II (3:3:0) Prerequisite: ECON 630 or permission of instructor. Covers mathematical treatment of economic theories. Includes static and dynamic analysis of macromodels; input-output analysis; and optimization techniques such as Lagrangian multipliers, linear programming, nonlinear programming, and game theory.

838 Econometrics II (3:3:0) Prerequisite: ECON 637 or permission of instructor. Explores econometric models and simultaneous equation systems. Includes identifying parameters and least squares bias, alternative estimation methods, and block recursive systems.

840 Law and Economics I (3:3:0) Prerequisites ECON 611, 630, 637. Uses economics to analyze U.S. common-law system, evaluating efficiency and logic of evolution. No prior knowledge of law required.

841 Law and Economics II (3:3:0) Prerequisite: ECON 640. Explores empirical analyses of law of property, torts, crime, and family. Also looks at law’s effects on freedom and economic growth.

842 Labor Economics (3:3:0) Prerequisites: ECON 611 and 615, or permission of instructor. ECON 637 recommended. Formal models of labor demand, supply, utilization, and wage determination; determination of factor shares in open economy; theory of collective bargaining, and impact of trade unions on wage rates and resource allocation; measurement, types, and causes of unemployment; and benefit-cost analysis of labor training and development projects.

844 Industrial Organization and Public Policy I (3:3:0) Prerequisite: ECON 611 or permission of instructor. Structure of American industry and underlying determinants. Includes structure and conduct on industrial performance in light of theory and empirical evidence; and rational antitrust policy and analysis of impact on structure and performance.

849 Public Finance (3:3:0) Prerequisite: ECON 611 or permission of instructor. Theoretical and institutional analysis of government expenditure, taxation, debt management, and intergovernmental fiscal relations. Includes allocative and distributional effects of alternative tax and subsidy techniques, principles of benefit cost, and cost-effectiveness analysis for government decisions.

852 Public Choice I (3:3:0) Prerequisite: ECON 611 or permission of instructor. Applies economic theory and methodology to study of nonmarket decision-making.

854 Public Choice II (3:3:0) Prerequisite: ECON 611 or permission of instructor. Applies public choice approach to study such topics as causes and consequences of governmental growth, behavior of public bureaucracies, and economic reasoning behind constitutional limitations on size and growth of government.

856 Urban and Regional Economics (3:3:0) Prerequisite: ECON 611 or permission of instructor. Regional development and metropolitan growth economics including locational decisions of households and firms, and problems associated with high-density urban economic activity.

861 Economics of the Environment (3:3:0) Analyzes economic models of ecosystems and pollutant discharges into environment. Includes methods of improving economic efficiency, and review of public policies.

866 Economic Development (3:3:0) Prerequisites: ECON 611 and 615, or permission of instructor. Explores forces contributing to or retarding economic progress in developing countries. Includes role of foreign trade, economic integration, foreign investment, multinational corporations, and technological transfers.

869 International Trade and Policy (3:3:0) Prerequisite: ECON 611 or permission of instructor. Studies classical, neoclassical, and modern theories of international trade; theory and practice of world trade models such as project LINK; foreign investment and economic growth, tariffs and non tariff barriers, and economic integration; and recent developments, with emphasis on natural resources.

871 International Monetary Economics (3:3:0) Prerequisite: ECON 615 or permission of instructor. Examines international adjustment mechanism, price and income effects, controls, and monetarist approach; development of international monetary system; demand for international reserves; capital movements; and role of International Monetary Fund.

875 Economics of Religion (3:3:0) Prerequisites: ECON 611, 630, 637, 812. Studies the relationship between religion and economies as it addresses a wide range of empirical questions concerning the causes and consequences of religious commitment. Issues addressed include the relationship between religious and political conservatism, correlates of socioeconomic factors and religious outcomes, and the contributions of religion to development, political liberty, and civil rights.

880 Austrian Theory of the Market Process I (3:3:0) Prerequisite: ECON 611. Examines theory developed by Menger, Mises, Hayek, and others of the Austrian School; and compares with other popular theories.

881 Austrian Theory of Market Process II (3:3:0) Prerequisites: ECON 611 and 615; ECON 880 recommended. Continuation of ECON 880. Topics vary and include market-process approach to analyzing capital accumulation and growth; money and credit institutions; inflation and unemployment; and industrial fluctuations.

885 Experimental Economics (3:3:0) Prerequisites: ECON 611 or permission of instructor. Designed for graduate students to learn how experimental methods can be used to inform economic research and practice. Students expected to have working understanding of basic economic concepts and multivariate calculus.

886 Experimental Economics II (3:3:0) Prerequisites: ECON 885 or permission of instructor. Research in experimental design. Topics represent basic tools to build, test, and implement exchange mechanisms in an applied setting.

918 Seminar in Monetary Theory and Policy (3:3:0) Prerequisite: ECON 817. Selected topics of current interest.

950 Seminar in Public Finance (3:3:0) Prerequisites: ECON 611 and 849. Important public finance issues treated in seminar format.

975 Workshop in Religion and Economics (3:3:0) Prerequisites: ECON 675, 875. Topics vary according to interests of instructor. Emphasizes new areas of discipline. May be repeated for credit as topics vary.

985 Workshop in Experimental Economics (3:3:0) Prerequisites: ECON 885, 886. Designed for graduate students who have taken Experimental Economics and Economic Systems Design and are applying experimental methods to their own or collaborative research projects.

998 Doctoral Dissertation Proposal Research. Research on prospective dissertation topic. For students who have completed course work but have not yet advanced to candidacy. Graded S/NC.

999 Doctoral Dissertation Research (variable credit) Prerequisites: admission to PhD economics program, and permission of dissertation advisor. Research on approved dissertation topic under direction of dissertation committee. May be repeated; 24 credits may be applied to doctoral degree requirement. Graded S/NC.

Education (EDUC)

Graduate School of Education

203 Human Disabilities in American Culture (3:3:0) Provides a perspective in human disabilities in American culture through awareness, historical and political implications, and technological applications. Demonstrations, discussions, and explorations of this culture by age groups, professions, and life domains will be included.

300 Introduction to Teaching (3:3:0) Introduction to educational issues; not applicable in graduate-level teacher education programs. Examines roles of teacher, nature of American schools, and potential contributions of students. Requires school-based field experience during course.
301 Educationally Diverse Populations: Handicapped, Gifted, Multicultural (3:3:0) Introduction to educational issues; not applicable in graduate-level teacher education programs. Introduces psychological, sociological, educational, and physical aspects of diverse populations in today’s schools for early and middle education. Emphasizes litigation and legislation pertaining to education of diverse populations. Requires school-based field experience during course.

302 Human Growth and Development (3:3:0) Introduction to educational issues; not applicable in graduate-level teacher education programs. Examines human development through life span with special emphasis on cognitive, language, physical, social, and emotional development of children. Emphasizes contemporary theories of human development and their relevance to educational practice. Requires school-based field experience during course.

303 Politics of American Education (3:3:0) Focus on the study of the American political system. Designed for students studying the American political system and students interested in careers in education. Explores how interactions between various levels and branches of government affect education.

372 Human Development, Learning, and Teaching (3:3:0) Explores processes that influence intellectual, social, emotional, moral, ethical, and physical development of middle and high school students. Examines research and theories for understanding learning process. School-based field experience required.

400 In-Service Educational Development (1–6:1-6:0) Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

415 Student Teaching in Physical Education (12:0:12) See PHED 415.

418 Student Teaching in Music Education (6:0:6:0) Prerequisite: completion of requirements for admission to music education concentration. Provides intensive, supervised clinical experience in approved Virginia schools, and supplemental course work appropriate to student’s area of concentration (vocal and choral or instrumental). Experiences are in elementary or secondary school settings.


500 In-Service Educational Development (1–6:1-6:0) Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

511 Introduction to Education in International Schools (3:3:0) Explores structure and variations of international schools. Includes analysis of human growth and development, overview of educational psychology, and introduction to using technology across curriculum.

512 Teaching Elementary Social Studies in International Schools (3:3:0) Focuses on translation of knowledge and data-gathering processes from social sciences into appropriate and meaningful K–8 social studies experiences. Develops understanding of aims and methodologies of history, geography, government and political science, sociology, anthropology, and psychology.

513 Teaching Elementary Math in International Schools (3:3:0) Presents topics in school mathematics with particular emphasis on developing common K–8 strands for application in international schools. Focuses on exploring, verifying, and explaining concepts using concrete materials.

514 Teaching Elementary Science in International Schools (3:3:0) Covers theory and practices of effective teaching of K–8 science in international schools. Uses laboratory and discovery techniques to design essential science components and integrate them with other disciplines. Introduces design and implementation of activities for developing concepts, solving problems, and strengthening thinking skills in K–8 science.

516 Language Across the Elementary International School Curriculum (3:3:0) Introduces current methods of teaching integrated language arts in elementary and middle school settings (K–8). Includes language and literacy development, second language acquisition, reading and writing in content areas, and children’s literature. International focus considers needs of second-language learners in regular classroom settings.

520 Elementary Curriculum, Instruction, and Assessment in International Schools (3:3:0) Addresses interrelationship of instruction, curriculum, and assessment in international schools. Includes review of research and effective practice.


539 Human Development and Learning PK–12 (3:3:0) Provides practicing teachers with foundations of psychological, theoretical, research, and professional practice relating to development and learning in inclusive PK–12 classroom settings. School-based field experience required.

542 Foundations of Education (3:3:0) Prerequisites: admission into elementary education graduate program; must be taken in programmatic sequence. Examines the historical, philosophical, and sociological foundations of education as they relate to elementary schools, with a particular emphasis on teaching a culturally diverse population.
Students will develop an understanding of the relationship between society and education.

543 Children, Family, Culture, and Schools, 4–12 Year Olds (3:3:0) Prerequisite: admission to elementary education licensure program. Examines child and family development and ways children, families, schools, and communities interrelate. Links children’s developing physical, social, emotional, and cognitive abilities to planning curriculum and developing instructional strategies. Requires school-based field experience.

546 Integrating Technology in Elementary Classrooms: Literacy (1:1:0) Prerequisite: admission into elementary education graduate program; corequisite: EDCI 556. Studies the development and integration of technology in the Elementary Education Literacy curriculum.

547 Integrating Technology in Elementary Classrooms: Mathematics (1:1:0) Prerequisite: admission into elementary education graduate program; corequisite: EDCI 552. Studies the development and integration of technology in the Elementary Education Mathematics curriculum.

548 Integrating Technology in Elementary Classrooms: Social Studies and Fine Arts (1:1:0) Prerequisite: admission into elementary education graduate program; corequisite: EDCI 554. Studies the development and integration of technology in the Elementary Education Social Studies and Fine Arts curriculum.

559 Research and Assessment in Elementary Education (3:3:0) Prerequisites: admission into elementary education graduate program; capstone course for degree must be taken last in programmatic sequence. Provides teacher candidates understanding of research paradigms using systematic evidence to improve practice and further skills at assessment of learning outcomes. Emphasizes linking research and practice, making instructional decisions based on systematically collected data.

597 Special Topics in Education (1–6:1–6:0) Prerequisite: admission to program in Graduate School of Education. Provides advanced study on selected topic or emerging issue in American or international education. May be repeated for credit with GSED permission.

598 Directed Reading, Research, and Individual Projects (1–6:1–6:0) Prerequisites: admission to degree program, and permission of dean. Presents various subjects and projects, principally by directed study, discussion, research, and participation under supervision of graduate faculty member. May be repeated for up to 12 credits.

599 Thesis (6:6:0) Prerequisite: EDRS 590. Study of problem of significant interest to student using accepted research methods and under supervision of graduate faculty member.

600 Workshop in Education (1–6:1–6:0) Offers full-time workshops and weekend seminars on selected topics in education and education tour seminars. May be repeated for credit.

606 Education and Culture (3:3:0) Uses cultural inquiry process (CIP) and web site to acquire cultural, social, and language-related perspectives on educational processes; and teaches skills to analyze educational settings and expand strategies to address puzzles in students’ own practice.

611 Cultural Issues in Second Language Acquisition (3:3:0) Prerequisite: admission to TESL or bilingual or multicultural education program, doctoral status, or permission of instructor. Explores impact of linguistic and cultural diversity among students in teaching of second language across curriculum. Draws on theoretical foundations in second language acquisition, cross-cultural communication, socio- and psycholinguistics, and educational anthropology.

612 Inquiry into Practice (2:2:0) Provides experience using research skills to foster systematic and thoughtful inquiry into classroom practice. Explores relevant classroom practice issues through critical writing, action, and research. Emphasizes cultural diversity and gender issues in research.

613 How Students Learn (3:3:0) Advanced course in study of learning based on research and theory from different disciplines. Focuses on increasing students’ learning through study of different learning systems, and understanding each learner in context of learning process itself.

614 Designing and Assessing Teaching and Learning (2:2:0) Explores design and development of curricular, pedagogical, and assessment strategies responsive to needs and interests of students. Investigates factors that affect teaching and learning, and examines multiple ways of knowing that teachers bring to classrooms.

615 Educational Change (2:2:0) Explores influences on educational change at classroom, school, community, state, and national levels. Investigates implications of factors and influences that affect educational change. Analyzes influences and factors, and involves students in reflecting on their own experiences.

621 Teaching and Learning in the International Baccalaureate Primary Years Program (3:3:0) Prerequisites: admission to GSE, enrollment in FAST TRAIN initial licensure program or permission of instructor. Focuses on principles and practices of Primary Years Program (PYP) of the International Baccalaureate (IBO), organized around four areas of inquiry: curriculum processes, teaching and learning, assessment, and professional learning. Final course in preparation for IBO Practitioner Award.

622 Curriculum Development across IB Programs (3:3:0) Prerequisites: admission to GSE, enrollment in FASTTRAIN IB certificate program, and completion of EDUC 621, or permission of the instructor. Explores the development of practical knowledge about the design and structure of the IB programs’ curricula. Provides a foundation for understanding how the programs are implemented and how student learning developed within them is assessed.

623 Models and Strategies for Teaching and Learning in IB Schools (3:3:0) Prerequisites: admission to GSE, enrollment in FAST TRAIN IB certificate program, and completion of EDUC 621, or permission of the instructor. Focuses on the development of the capacity of teachers in IB schools to adopt appropriate teaching strategies and techniques instrumental in ensuring program learning outcomes are achieved. Furthermore, participants develop a deep understanding of the critical relationship between teaching and learning.

624 Assessment and Learning in IB Schools (3:3:0) Prerequisites: admission to GSE, enrollment in FAST TRAIN IB certificate program, and completion of EDUC 621, or permission of instructor. Explores the essential role of assessment in teaching IB learners. Addresses formative and summative assessment practices as an integral part of the IB
626 Inquiry into Action: IB Teachers, Learners, and Schools (3:3:0) Prerequisites: admission to GSE, enrollment in FAST TRAIN IB certificate program, and completion of EDUC 621, or permission of the instructor. Uses the action research and qualitative process to help educational practitioners plan and complete an action research study related to IB learners, teachers, or schools. Furthermore, the course examines the social, cultural, and ethical issues of conducting research with students.

627 Contemporary Issues and Trends in IB (3:3:0) Prerequisites: admission to GSE, enrollment in FAST TRAIN IB certificate program, and completion of EDUC 621, or permission of the instructor. Focuses on current IB research, trends, and issues as well as international, national, and state/provincial legislation concerning schools and the potential impact on IB schools. Participants are prepared as leaders and advocates for IB programs and their students.

634 The Role of the School Library Media Specialist (3:3:0) Introduces basic concepts of library science, and professional responsibilities and ethical standards of library media specialist. Addresses this role as instructional partner and resource for students and staff.

640 Selection and Utilization of Library Media Materials and Equipment, Including Technology (3:3:0) Introduces prospective library-media specialists to various uses of technology in library setting, and elements involved in media collection development.

641 Reference and Bibliography (3:3:0) Covers library reference process, and bibliographic tools to meet needs of library patrons seeking information.

642 Organization and Technical Processing of Materials (3:3:0) Emphasizes application of basic cataloging principles in bibliographic description of print and nonprint materials. Students develop procedures for organizing, cataloguing, and maintaining media collection using technological support.

643 Organization Administration and Evaluation of the School Library Media Center (3:3:0) Develops skills to implement effective school library media program. Focuses on management principles, interpersonal skills, and lifelong learning skills in relation to evaluating services, collection development, and public relations for school libraries.

644 Production of Media and Instructional Materials (3:3:0) Provides guidance and practice with available audio-visual and computer-based technology to plan, produce, and present instructional materials.

645 Literature for Young Adults (3:3:0) Provides in-depth knowledge of young adult literature, and ability to relate that knowledge to library programs. Requires extensive reading of young adult literature.

646 Literature for Children (3:3:0) Develop critical abilities to select and use literature for children. Focuses on selecting materials to support curriculum and promote reading.

670 The Culture of Teaching (3:3:0) Prerequisite: admission to secondary education program; corequisite: initial methods course. Explores roles, responsibilities, and realities of teaching in secondary schools. Examines teaching in context of contemporary educational issues, legal matters, diverse and exceptional learners, classroom management, and professional practices.

671 Schools and Culture (3:3:0) Prerequisites: initial methods course and EDUC 670. Focuses on relationship between schools and communities they serve. Examines historical roots of contemporary educational practice, and examines important directions defined by contemporary school-reform efforts.

672 Human Development and Learning: Secondary Education (3:3:0) Explores developmental issues associated with middle and high school students, and theories that provide basis for understanding learning process. Addresses implications for designing instruction and curriculum.

674 Assessing Learning and Teaching in the Secondary School Classroom (3:3:0) Supports beginning teachers' development and design of assessment practices for promoting student learning. Focuses on individual differences and classroom, teacher, school, and cultural factors that impact assessment; different types and purposes of assessment; and relationship of assessment to national and state standards.

675 Research in Secondary Education (3:3:0) This capstone class of the MEd program should be taken last. The portfolio is submitted during the semester the candidate is enrolled in EDUC 675. Helps beginning teachers become more effective by critiquing various research paradigms, reviewing the research literature, and systematically collecting and interpreting evidence to improve practice. Emphasizes linking evidence of student learning to make informed instructional decisions.

695/ENGL 695 Northern Virginia Writing Project-Service Program (1–3:1–3:0) Prerequisite: admission to graduate program, or permission of dean. Offered at request of school division or other educational agency. Content varies. May be repeated with permission of department, but no more than 6 credits in EDUC 695, 695, or 699 may be applied toward master’s degree.

697/ENGL 697 Theory of Composition (3:3:0) Prerequisites: ENGL 615 and 685, or equivalent. Acquaints classroom teachers with current theory relating to writing and teaching composition. Focuses on making explicit participants' theories, reading works of leading theorists, and developing statement describing implications of theoretical consistency in teaching writing.

751 Mentoring/Supervising Intern Teachers and Mentor Teacher Career Development (3:3:0) Examines multiple roles of teachers as they mentor and supervise intern teachers in schools. Covers career development, leadership, and instructional roles and strategies. Designed to assist intern teachers in their first year, and provide quality career and staff development to their mentors.

797 Advanced Topics in Education (1–6:1–6:0) Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with GSED approval.

800 Ways of Knowing (3:3:0) Prerequisite: admission to PhD program. Provides understanding of characteristic ways of knowing in various liberal arts disciplines while examining subject matter, scope, key concepts, principles, methods, and theories. Analyzes philosophical traditions underlying
802 Leadership Seminar (3:3:0) Prerequisite: admission to PhD program. Intensive study of leadership, emphasizing decision and change processes, and assessment and development of leadership skills. Required course during first semester of study in the program.

805 Doctoral Seminar in Education (1:1:0) Prerequisite: admission to PhD program. Covers selected topics in education. Students, faculty members, and scholars discuss current research interests and ideas.

850 The Study of Teaching (3:3:0) Prerequisite: EDRS 810. Explores the history and development of the search for teaching effectiveness. The course will trace the various definitions of effectiveness and the methods created to assess effectiveness.

851 Research on Teacher Education (3:3:0) Prerequisite: EDRS 810. Explores the history and development of the search for effectiveness in the preparation of preservice teachers and the continuing professional development of practicing teachers. The students will examine the substance and gaps in the study of the education of educators.

853 World Perspectives of Teacher Education (3:3:0) Prerequisite: admission to the doctoral program. Focuses on the cross-cultural analysis of current U.S. and internationally based teacher preparation and continuing professional development pedagogical models, policy reforms, and their historical contexts.

870 Education Policy: Process, Context, and Politics (3:3:0) Prerequisite: admission to PhD in education program, or permission of instructor. Examines public policy decision-making in education at local, state, and national levels, and its impact on education institutions, students, and public. Focuses on government entities’ authority over education decision-making, and resolution of competing policy arguments in political arena.

871 Advanced Policy Issues in Education (3:3:0) Prerequisite: EDUC 870 or equivalent. In-depth analysis of selected education policy issues. Focuses on issue interactions and education-related policy actions by different levels of government.

872 Social Science Research and Education Policy (3:3:0) Prerequisites: admission to PhD program, and EDUC 870 and 871; or equivalent doctoral-level policy course work. Focuses on research base used to support education policy actions. Focuses on analyzing strength of this research.

873 Education Policy: Comparative and International Perspectives (3:3:0) Prerequisites or corequisites: EDUC 870 and admission to PhD program. Using interdisciplinary approach, addresses education policy issues that transcend national boundaries and have implications for educators in fostering social justice and global awareness.

874 The Achievement Gap (3:3:0) Prerequisite or corequisite: admission to PhD program or permission of instructor. Focuses on achievement gap in schools. Students research and analyze gaps in student achievement related to race and ethnicity, limited English proficiency, family background, gender, poverty, and ableism, and practices designed to close the gap.

875 Contemporary and Emerging Issues in Education Policy (3:3:0) Prerequisites or corequisites: EDUC 870 and admission to PhD program. Focuses on identifying and analyzing factors that promote new initiatives in education policy agenda. Attention given to nontraditional sources of education policy initiatives.

876 Teacher Development and Education Policy (3:3:0) Prerequisite: EDUC 870 or permission of instructor. Focuses on the impact of policy actions at the local, state, and national levels on teacher preparation and continuing professional development.

880 Introduction to International Education (3:3:0) Prerequisite or corequisite: admission to PhD in education program or permission of instructor. Examines educational systems throughout the world and relationship to social justice; equity; conflict; culture; economic, political, and social development; leadership and governance; language policy; and institutional development.

881 Seminar in Bilingual Education: Policy (3:3:0) Prerequisite: admission to PhD program. Examines historical development of education for language minority students in United States, including federal and state legislation and court decisions. Explores policy issues regarding administrative program models, instructional approaches, curricular reform, and assessment policies for language minority students developed in response to legal mandates, legislative decisions, and school reform movement.

882 Seminar in Bilingualism and Second Language Acquisition: Theory and Research (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Examines theoretical foundations of bilingual and ESL education through focus on linguistics, anthropology, sociology, psychology, and education research addressing language minority students.

890 Doctoral Internship in Education (1–6: 1–6:0) Prerequisites: admission to PhD program, and prior approval of advisor and PhD director. Requires 100 hours of on-site internship completed over at least a five-week period. Interns work with appropriate staff member in cooperating school, school system, or other educational institution, agency, or setting. Up to 6 credits of EDUC 890 may be applied toward PhD degree requirements.

892 Social Justice and Equity in International Education (3:3:0) Prerequisite or corequisite: EDUC 895. Examines ideological, cultural, and systemic structural inequities in various educational settings at national and international levels. Focuses on educational practices that promote equity and social change throughout the world.

893 Seminar in Educational Anthropology (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Examines theories and research from educational anthropology and educational sociology to clarify and address contemporary educational issues and concerns. Focuses on U.S. public schools, with comparative materials from other educational settings and societies.

894 Seminar in Multicultural Education (3:3:0) Examines knowledge base, policy issues, and curricular and instructional features of multicultural education in United States and other countries.

895 Seminar in Emerging Issues of Education (3:3:0) Prerequisite: successful completion of EDUC 800. Study of...
selected emerging issues or problems in education. Students engage in research, study, discussion, and writing. May be repeated for credit. Up to 6 hours of 895 course work may be applied to PhD requirements.

897 Independent Study for the Doctor of Philosophy in Education (1–6:1–6:0) Prerequisites: admission to PhD program and prior approval of advisor and PhD director. Structured learning experience to extend and develop skills and knowledge relative to field of professional expertise.

994 Advanced Internship in Education (3:3:0) Prerequisites: admission to PhD program, and prior approval of advisor and PhD director. Internship in setting related to student’s major area of study. Requires minimum of 100 hours completed over at least a five-week period. Each intern works with appropriate staff member in cooperating school, school system, or other educational institution or agency. Internship must be in setting that differs from regular employment.

998 Doctoral Dissertation Proposal (1–3:1–3:0) Prerequisites: admission to candidacy in PhD program, successful completion of doctoral qualifying exam; and EDRS 810, 811, and 812 or their equivalents.

999 Doctoral Dissertation Research (1–9:1–9:0) Prerequisites: admission to candidacy in PhD program and faculty approval of dissertation proposal. Provides continued faculty assistance on individual basis to complete dissertation planned in EDUC 998 and initiate new projects. May be repeated for credit. No more than 11 credits of EDUC 998 and 999 may be applied toward minimum PhD degree requirements.

Education Leadership (EDLE)

Graduate School of Education

412 Schools and the Law (3:3:0) Prerequisite: EDUC 300. Provides an extensive overview of legal and ethical issues in schools. In the course, students will review and analyze key legal and ethical principles, read court decisions, and examine federal and state statutes.

420 Organization and Management of Schools (3:3:0) Prerequisite: EDUC 300. Studies basic issues in leadership, organization, and governance of schools. Explores theories and models of leadership how leaders conceptualize school organization, with an emphasis on distributed leadership in professional environments, systems thinking, and organizational change.

500 In-Service Educational Development (1–6:1–6:0) Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

597 Special Topics in Education (1–6:1–6:0) Prerequisite: admission to program in GSE. Provides advanced study on selected topic or emerging issue in American or international education. May be repeated for credit with GSE permission.

598 Directed Reading, Research, and Individual Projects (1–6:1–6:0) Prerequisites: admission to degree program and permission of dean. Presents various subjects and projects, principally by directed study, discussion, research, and participation under supervision of graduate faculty member. May be repeated for up to 12 credits.

600 Workshop in Education (1–6:1–6:0) Offers full-time workshops and weekend seminars on selected topics in education and education tour seminars. May be repeated for credit.

610 Leading Schools and Communities (3:3:0) Prerequisites: admission to the EDLE program, EDLE 620, 690, 612, 614, 616, and 618; corequisite: EDLE 791. Examines critical functions of leadership and management, complex decision making of school ejecutives, and constructive relationships between schools and communities. Studies historical, philosophical, and sociological foundations of American education, and impact of organizational structure on reform and student achievement. Emphasizes leadership skill development.

612 Education Law (3:3:0) Prerequisites: admission to the EDLE program, EDLE 620 and 690; corequisite: EDLE 791. Provides legal foundations of U.S. public schools. Examines general principles of statutory and case law, and applies judicial decisions to educational environments. Examines legal responsibilities, constraints, and opportunities of public school officials. Includes component of special education law.

614 Managing Financial and Human Resources (3:3:0) Prerequisites: admission to the EDLE program, EDLE 620, 690, and 612; Corequisite: EDLE 791. Explores basic functions in financial and human resource management. Examines legalities, ethics, and politics of resource procurement and allocation. Provides experiences to help students better understand tasks typically performed by school leaders.

616 Curriculum Development and Evaluation (3:3:0) Prerequisites: admission to the EDLE program, EDLE 620, 690, 612, and 614; corequisite: EDLE 791. Examines relationship of written, taught, and tested curriculum, and identifies critical leadership decisions that can positively impact student achievement. Identifies components of effective curriculum guides, and constructs guide for personal use.

618 Supervision and Evaluation of Instruction (3:3:0) Prerequisites: admission to the EDLE program, EDLE 620, 690, 612, 614, and 616; corequisite: EDLE 791. Provides theoretical and practical overviews of supervision and evaluation of instruction. Introduces supervision and inquiry into current issues, and best practices in supervision. Uses practical, interactive exercises to develop skills in clinical process and developmental approach to supervision.

620 Organizational Theory and Leadership (3:3:0) Studies basic organizational theories and models of leadership and management. Emphasizes shared leadership in professional environments, communication skills, systems thinking, and personal and organizational change. Bridges theory to practical applications in educational settings.

634 Contemporary Issues in Education Leadership (3:3:0) Prerequisite: admission to program. Examines current and emerging issues and trends impacting education. Includes demographic shifts; globalization; technology; data-based decision making; inclusion of diverse learners in American schools; and recent research on student achievement when influenced by race, gender, and poverty.

636 Adult Motivation and Conflict Management in Education Settings: A Case Study Approach (3:3:0) Prerequisite: admission to program. Uses case studies and
simulations to examine conflict mediation and resolution skills, and safety and security issues. Focuses on character and ethics education in schools, coaching and mentoring, and adult motivation to support positive behaviors in work settings.

690 Using Research to Lead School Improvement (3:3:0)  
Prerequisite: admission to education leadership program. Develops skills, insights, and understanding of how leaders use research to improve schools, with emphasis on the use of assessment and research data to identify school improvement needs and design school improvement projects.

791 Internship in Educational Leadership (3:3:0)  
Prerequisites: admission to the EDLE program and EDLE 620; corequisite: EDLE 690. Course must be taken in second term of program. Offers wide range of practical experiences and professional challenges in authentic educational settings. Activities emphasize strategic, instructional, organizational, political, and community leadership.

797 Advanced Topics in Education (1–9:1–9:0) Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with CEHD approval.

801 Foundations of Education Leadership: History and Leadership (3:3:0) Prerequisites: admission to PhD in education program. May be taken as corequisite with EDLE 802. First in three-course sequence. Emphasizes historical foundations of U.S. education and evolution of school, district, and state leadership. Students begin work on analytical literature review.

802 Foundations of Education Leadership: Ethics, Philosophy, and Law (3:3:0) Prerequisites: EDLE 801. May be taken as corequisite with EDLE 801. Second in three-course sequence. Emphasizes ethical, philosophical, and legal foundations of U.S. education; and the evolution of school, district, and state leadership. Students continue work on analytical literature review.


815 Conceptual Frameworks in Education Leadership (3:3:0) Prerequisite or corequisite: admission to PhD in education program, or permission of instructor. Introduces three different disciplinary perspectives on education leadership, and helps identify and articulate different conceptual frameworks. Major focus is designing a conceptual framework that informs research questions.

895 Emerging Issues in Administration and Supervision (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Covers selected emerging issues in educational leadership. Students engage in research, study, discussion, and writing about various topics selected for study.
qualitative data collection and analysis procedures in educational research, including ethnographic and other field-based methods, and unobtrusive measures. Emphases vary depending on student interests and needs.

820 Evaluation Methods for Educational Programs and Curricula (3:3:0) Prerequisite: successful completion of EDRS 810, or permission of instructor. Prior completion of EDRS 811 and 812 helpful but not required. Explores development and types of current systems and models for evaluating educational programs and curricula. Emphasizes evaluation needs and problems of public and private elementary and secondary schools, and colleges and universities. Also considers needs of government agencies, industry, and health-related organizations.

821 Advanced Applications of Quantitative Methods (3:3:0) Prerequisites: EDRS 810 and 811. Advanced study of applications of quantitative methods in educational research, reinforcing and building on concepts and skills acquired in EDRS 811. Uses modular approach, and provides advanced study of techniques appropriate to survey research, group-experimental and quasiexperimental research, selected multivariate procedures and factor analysis, and quantitative synthesis (meta-analysis) of research. Combines text reading assignments, critiques, and discussion of relevant journal articles; and application activities.

822 Advanced Applications of Qualitative Methods (3:3:0) Prerequisites: EDRS 810 and 812. Advanced seminar devoted to study of current topics in qualitative research. Deals with cutting-edge information on selected advanced topics in qualitative research, and provides opportunities to apply new skills and knowledge to projects related to students’ interests.

823 Advanced Research Methods in Single Subject/Case Design (3:3:0) Prerequisites: EDRS 810, 811, and 812. Prepares students to conduct research using single subject design and single case study design. Provides understanding of salient features as well as advantages, disadvantages of these research methodologies. Students critique and analyze published research using these methodologies. Provides opportunities to apply these methodologies to research questions related to student interests.

Educational Psychology (EDEP)

Graduate School of Education

401 Introduction to Multimedia/Hypermedia (3:3:0) Provides an overview of the principles and tools used within the fields of e-Learning, instructional design and multimedia/hypermedia technologies. Students apply knowledge and skills learned by creating an e-Learning module.

402 Brain, Behavior, and Neuroimaging in Children (3:3:0) Prerequisite: at least junior standing or sophomore honors/university scholar candidate. Focus on research regarding the development of cognitive processes in children, their neurobiological substrates, and the imaging technology used to explore the functioning brain.

550 Theories of Learning and Cognition (3:3:0) Explores theoretical perspectives on learning and cognition, and relation of these theories to construction of learning environments, student motivation, classroom management, assessment, and technology to support teaching and learning.

551 Principles of Learner Motivation (3:3:0) Focuses on theories and concepts of human motivation; and examines strategies, techniques, and interventions that promote and sustain learner motivation.

601 Creativity and Cognition in the Arts and Media (3:3:0) Focuses on research on cognition, development, learning, and creativity in the visual arts and media in formal and informal educational settings.

650 High-Stakes Assessment and Accountability Systems (3:3:0) Focuses on school effectiveness, assessment tools, and accountability models on state and national levels. Explores issues and methods relevant to educational policy, standardized testing, and classroom assessment.

651 Test Design and Interpretation (3:3:0) Focuses on test design and interpretation including issues regarding test development, administration, interpretation, and communication of results. Addresses issues in educational policy, philosophy, and ethics pertaining to assessment and testing.

652 Process of Learning and Development (3:3:0) Prerequisite: EDEP 550. Explores different theoretical perspectives on learning and development. Focuses on historical and contemporary theories of learning and cognitive development, and examines current research and its application in educational settings.

653 Culture and Intelligence (3:3:0) Explores different theoretical perspectives on intelligence as they relate to individual and cultural differences. Examines issues related to heritability and measures of intelligence, and intelligence in the cultural context.

654 Learning, Motivation, and Self-Regulation (3:3:0) Prerequisite: EDUC 800, 805; EDLE 802, and EDRS 810. Focuses on foundational educational psychology theories including cognitive, social, and constructivist themes and their implications for improving instructional practices and learning at all developmental levels and content areas.

820 Teaching, Learning, and Cognition (3:3:0). Prerequisites: EDUC 800, 805; EDLE 802, and EDRS 810. Examines processes by which social, cultural, and linguistic variables influence human behavior. Focuses on differences within and between cultural groups related to student’s learning and achievement in educational settings.


823 Research Project in Educational Psychology: Sequence I (3:3:0). Prerequisites: EDEP 820, 821, 822. Focuses on development and implementation of research studies in educational psychology. Students acquire skills regarding developing research questions and a sound methodological approach for their study. First in two-course sequence.
824 Research Project in Educational Psychology: Sequence II (3:3:0). Prerequisites: EDEP 823. Focuses on development and implementation of research studies in educational psychology. Students acquire skills regarding collecting, analyzing, and interpreting data. Second in two-course sequence.

Electrical and Computer Engineering (ECE)

101 Information Technology for Electrical Engineers (3:3:1) Introduces fundamental concepts in information technology that provide technical underpinning for state-of-the-art applications. Presents fundamental engineering skills and perspective on range of information technology through lectures and hands-on experiments. Discusses ethics, professionalism, historical development, and social implications of IT.

201 Introduction to Signal Analysis (3:3:1) Prerequisite: grade of C or better in MATH 113. Provides technically more rigorous introduction to problems and tools commonly encountered by electrical engineers. Introduces mathematical modeling of engineering problems and their solutions. Introduces standard software packages for electrical engineering as tools to simulate engineering problems on computer. Mathematical and computer models are related to physical reality provided by hands-on experiments. f,s

220 Signals and Systems I (3:3:1) Prerequisite: C or better in ECE 201 or equivalent; corequisites: MATH 203, 214. First of two-semester sequence of courses providing mathematical background for many ECE courses taken in junior, senior years. Introduces methods of representing continuous-time signals and systems, and interaction between signals and systems. Covers analysis of signals and systems via differential equations and transform methods; Laplace and Fourier transforms as convenient analysis tools; frequency response of systems; and stability of systems in time and frequency domains. Presents application examples from communications, circuits, control, and signal processing. f,s,sum

280 Electric Circuit Analysis (5:4:2) Prerequisite: grade of C or better in PHYS 260 and 261; corequisite: ECE 220 must be taken concurrently or before ECE 280. Builds on simple circuit concepts introduced in PHYS 260. Includes circuit analysis using superposition, equivalent circuits, and transient and steady state analysis of RL, RC, and RLC circuits; applications of Laplace transform in circuit analysis; sinusoidal excitations and phasors; resonance; filters; AC steady-state analysis; coupled coils; and three-phase circuits. Includes lab demonstrating and investigating circuit analysis concepts. f,s,sum

301 Digital Electronics (3:2:2) Not intended for those majoring in electrical or computer engineering. Introduces digital systems, circuits, and computers. Topics include binary systems and codes; digital logic gates and circuits; encoding and multiplexing; shift registers, counters, and elementary computer architecture/MIPS computer organization; and assembly language, including instruction format, data definition, load/store/arithemtic instructions, and addressing. Includes laboratory. f,s

305 Electromagnetic Theory (3:3:0) Prerequisites: grade of C or better in PHYS 260 and MATH 214. Static and time varying electric and magnetic fields, dielectrics, magnetization, Maxwell’s Equations, and introduction to transmission lines. Course uses vector calculus and algebra of complex numbers. f,s

320 Signals and Systems II (3:3:1) Prerequisite: grade of C or better in ECE 220 and MATH 203. Second of two-semester sequence providing mathematical background for many ECE courses taken in junior, senior years. Provides methods of representing and analyzing discrete-time signals and systems. Studies effects of converting from continuous-time to discrete time, and presents Z-transform as convenient analysis tool. Emphasizes powerful concept of frequency response of systems developed in first semester. Studies random signals in continuous and discrete time. Presents application examples from communications, circuits, control, and signal processing. f,s,sum

331 Digital System Design (3:3:0) Corequisites: ECE 280 and 332. ECE 332 should be taken concurrently with ECE 331. Credit may not be received for ECE 301 and 331. Covers principles of digital logic and digital system design and implementation in VHDL. Topics include number systems; Boolean algebra; analysis, design, and minimization of combinational logic circuits; analysis and design of synchronous and asynchronous finite state machines; and introduction to VHDL and behavioral modeling of combinational and sequential circuits. f,s

332 Digital Electronics and Logic Design Lab (1:0:3) Prerequisite: PHYS 261 or 265, or permission of instructor; corequisite: ECE 331. Lab associated with ECE 331. f,s,sum

333 Linear Electronics I (3:3:0) Prerequisite: grade of C or better in ECE 280. ECE 334 is usually taken concurrently with ECE 333. Principles of operation and application of electron devices and linear circuits. Topics include semiconductor properties, diodes, bipolar and field effect transistors, biasing, amplifiers, frequency response, operational amplifiers, and analog design. f,s,sum

334 Linear Electronics Lab I (1:0:3) Prerequisite: PHYS 261 or 265, or permission of instructor; corequisite: ECE 333. Lab associated with ECE 333. f,s,sum

410 Principles of Discrete-Time Signal Processing (3:3:0) Prerequisite: ECE 320 with grade of C or better. Introduces fundamental concepts of digital signal processing. Emphasis on the theoretical and numerical tools used for frequency domain analysis of sampled signals. Topics covered include sampling, the discrete Fourier transform, fast transform algorithms, spectral analysis, and digital filtering.

421/SYST 421 Classical Systems and Control Theory (3:3:0) Prerequisite: grade of C or better in ECE 220, or permission of instructor. Introduces analysis and synthesis of feedback systems, including functional description of linear and nonlinear systems, block diagrams and signal flow graphs; state-space representation of dynamical systems,
frequency response methods, Root Locus, Nyquist, and other stability criteria; performance indices and error criteria; and applications to mechanical and electromechanical control systems.

422 Digital Control Systems (3:3:0) Prerequisite: grade of C or better in ECE 320 and 421. Introduces analysis, design of digital control systems, Z-transform, discrete linear systems, frequency domain, and state variable techniques. Discusses use of microcomputers in control systems.

429 Control Systems Lab (1:0:3) Prerequisite: grade of C or better in ECE 421. Laboratory experiments for topics in control systems analysis, design, and implementation with emphasis on using microcomputers.

430 Principles of Semiconductor Devices (3:3:0) Prerequisites: MATH 214, ECE 305, and a grade of C or better in ECE 333; or permission of instructor. Introduces solid state physics and its application to semiconductors and semiconductor devices. Topics include band theory, doping, p-n junctions, diffusion theory, low-frequency circuits, devices including bipolar transistor, MOSFET, CMOS, and photo transistors.

431 Digital Circuit Design (3:3:0) Prerequisites: grade of C or better in ECE 331 and 333. Analysis and design of discrete and integrated switching circuits. Topics include transient characteristics of diodes, bipolar, and field-effect transistors; MOS and bipolar inverters; nonregenerative and regenerative circuits; TTL, ECL, IIL, NMOS, and CMOS technologies; semiconductor memories; VLSI design principles; and SPICE circuit analysis.

433 Linear Electronics II (3:3:0) Prerequisite: grade of C or better in ECE 333. Second course in linear electronics. Covers differential amplifiers, feedback circuits, power amplifiers, feedback amplifier frequency response, analog integrated circuits, operational amplifier systems, oscillators, wide band and microwave amplifiers, and computer-aided design.

434 Linear Electronics II Laboratory (1:0:3) Prerequisite: ECE 334; corequisite: ECE 433. Second lab course in linear electronics involving analysis and design of topics listed in ECE 433.

435 Digital Circuit Design Laboratory (1:0:3) Prerequisite: ECE 334; corequisite: ECE 431. Lab experiments for topics covered in ECE 431.

437 Principles of Microelectronic Device Fabrication (3:2:3) Prerequisites: ECE 333 or 430, or permission of instructor. Introduces fundamentals of microelectronic semiconductor device fabrication technology. Processing steps include photolithography, oxidation, diffusion, ion-implantation, chemical vapor deposition, ohmic contact metallization, interconnects, packaging, MOS process integration, and bipolar process integration. Laboratory project integral to course.

442 Digital Computer Design and Interfacing (3:3:0) Prerequisite: grade of C or better in ECE 445. Overview of digital computer development. Examines computer design principles, design of processors, instruction sets, memory systems, cache, interface, RISC principles, principles of pipelining and pipeline hazards, instruction-level parallelism, and superscalar and superpipelined systems. Presents overview of modern RISC-type systems.

445 Computer Organization (3:3:0) Prerequisite: grade of C or better in ECE 331. General overview of operating a digital computer. Topics include computer arithmetic, arithmetic unit, hardwired and microprogrammed control, memory, register-to-register, input-output operations, and behavioral modeling of computer organization using VHDL.

447 Single-Chip Microcomputers (4:3:3) Prerequisites: grade of C or better in CS 211 and ECE 332 and 445; and 90 credits toward electrical or computer engineering degree. Explores designing with single-chip microcomputers and microcomputer interfacing. Topics include role of microcomputers compared to microprocessors and other computers, microcomputer architecture and organization, real-time control issues, assembly language programming for control, design of control software, input/output methods, design tools, and available single-chip microcomputers. Students select project and design, and construct system including single-chip microcomputer and ancillary hardware to implement control system. Completing course with C or better satisfies university’s general education synthesis requirement.

448 FPGA and ASIC Design with VHDL (4:3:3) Prerequisite: grade of C or better in ECE 445. Practical introduction to modeling of digital systems with VHDL for logic synthesis. Overview and comprehensive analysis of design flow and tools for FPGAs and standard-cell ASICs. Discusses verification of digital systems using testbenches, prototyping boards and modern testing equipment; and illustrates VHDL-based design methodology with multiple examples from communications, control, DSP, and cryptography. Laboratory experiments create link between simulation and actual hardware implementation based on FPGA boards.

449 Computer Design Lab (1:0:3) Prerequisites: ECE 332 and 445. Laboratory course providing experience in design and fabrication of digital computer using field programmable arrays (FPGA) or other VLSI-integrated circuits. Includes specification of simple computer using VHDL; and simulation and fabrication of computer in programmable logic devices such as FPGA, PLA, and PAL. Compares simulation and hardware implementation.

450 Introduction to Robotics (3:3:0) Prerequisites: CS 112, ECE 280 and ECE 331 and either ECE 332 or ECE 303, all with grade of C or better. Introduces mobile robotic systems. Topics include overview of power systems, motors, behavior-based programming, sensors, and sensor integration. Design projects conceived, developed, implemented, and presented.

460 Communication and Information Theory (3:3:0) Prerequisites: grade of C or better in ECE 220 and STAT 346. Introduction to analog and digital communications. Topics include review of important concepts from signals and systems theory and probability theory; Gaussian processes and power spectral density; digital transmission through additive white Gaussian channels; sampling and pulse code modulation; analog signal transmission and reception using amplitude, frequency and phase modulation; and affects of noise on analog communication systems.

461 Communication Engineering Laboratory (1:0:3) Prerequisites: ECE 460 and 334. Lab experiments in analog and digital communication areas covered in ECE 460.
462 Data and Computer Communications (3:3:0) Prerequisites: STAT 344 or 346, and ECE 220, and ECE 331 or 303, all with a grade of C or better. Introduces modern data communications and computer networks. Topics include point-to-point communication links and transmission of digital information, modems, and codecs; packet switching, multiplexing, and concentrator design; multiaccess and broadcasting; local area and wide area networks; architectures and protocols for computer networks; OSI reference model and seven layers; physical interfaces and protocols; and data link control layer and network layer. Provides examples of data networks. f

463 Digital Communications Systems (3:3:0) Prerequisite: ECE 460. Introduces digital transmission systems. Topics include quantization, digital coding of analog waveforms, PCM, DPCM, DM, baseband transmission, digital modulation schemes, ASK, FSK, PSK, MSK, QAM, pulse shaping, intersymbol interference, partial response, voice-band and wideband modems, digital cable systems, regenerative repeaters, clock recovery and jitter, multipath fading, digital radio design, optimal receiver design, MAP receiver, and probability of error. f

464 Modern Filter Design (3:3:0) Prerequisite: ECE 320. Offers solution to filtering approximation problem via Butterworth, Chebyshev, Elliptic, and Bessel approaches. Covers transfer function scaling and type transformations, review of Z-transform, time and frequency domain effects of A/D and D/A conversion, and digital filter design and implementation. s

465 Computer Networking Protocols (3:3:0) Prerequisites: STAT 344 or 346, and CS 112, both with a grade of C or better. Introduces computer networking protocols and concepts, emphasizing Internet and Internet Protocol Suite. Covers computer networking protocols at application, transport, and network layers, including multimedia networking protocols, and network security and management. s

467 Network Implementation Laboratory (1:0:3) Prerequisite: ECE 462. Corequisite: ECE 463. Hands-on experience in implementing, configuring, and operating local and wide area networks in live laboratory environment equipped with modern local and wide area network devices and technologies. Students exposed to real-world computer networking scenarios including local area network implementation, asynchronous communication setup, and wide area network implementation using various protocols and technologies covering all layers of computer network protocol stack.

469 Microwave Circuit Laboratory (1:1:2) Prerequisites: ECE 205 and 334, or permission of instructor. Introduces microwave engineering laboratory techniques and measurements; and the design, fabrication, and test of microwave microstrip circuits.

491 Engineering Seminar (1:1:0) Prerequisites: 90 credits applicable to electrical engineering or computer engineering program, and COMM 100. Engineering ethics, professionalism, role of engineer in society, current topics, and employment opportunities. f,s

492 Senior Advanced Design Project I (1:1:0) Prerequisites: senior status in electrical engineering or computer engineering program, and COMM 100 and ENGL 302. Conception of senior design project and determination of feasibility of proposed project. Work includes developing preliminary design and implementation plan. f,s

493 Senior Advanced Design Project II (2:2:0) Prerequisite: ECE 492, preferably in preceding semester. Implementation of project for which preliminary work was done in ECE 492. Project includes designing and constructing hardware, writing required software, conducting experiments or studies, and testing complete system. Requires oral and written reports during project and at completion. Completing this course with a C or better satisfies university’s general education synthesis requirement. f,s

498 Independent Study in Electrical and Computer Engineering (1–3:0:0) Directed self-study of special topics of current interest in ECE. Topic must be arranged with an instructor and approved by department chair before registering. Maximum 3 credits. f,s

499 Special Topics in Electrical Engineering (1–3:0:0) Prerequisites: permission of instructor; specific prerequisite varies with nature of topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics substantially differ. f,s

511 Microprocessors (3:3:0) Prerequisite: ECE 445 or equivalent. Introduces microprocessor software and hardware architecture. Includes fundamentals of microprocessor system integration, instruction set design, programming memory interfacing, input/output, direct memory access, interrupt interfacing, and microprocessor architecture evolution. Studies Intel family of microprocessors, and reviews other microprocessor families and design trends. f

513 Applied Electromagnetic Theory (3:3:0) Prerequisite: ECE 365 or equivalent. Maxwell’s Equations, electromagnetic wave propagation, wave guides, transmission lines, radiation, and antennas. f

520 Applications of Analog and Digital Integrated Circuits (3:3:0) Prerequisites: ECE 433 and 431, or permission of instructor. Studies analog and digital integrated circuits mainly from communications applications point of view. Covers analog, digital, and mixed (analog/digital) building block circuits used in system design including operational amplifiers, comparators, voltage regulators, video amplifiers, oscillators, modulators, phase-locked loops, multiplexers, active filters, A/D and D/A converters, and optoelectronic circuits.

521 Modern Systems Theory (3:3:0) Prerequisite: ECE 320 or equivalent. Introduces linear systems theory and design of linear feedback control systems. Reviews linear algebra, state variables, state space description of dynamic systems, analysis of continuous-time and discrete-time linear systems, controllability and observability of linear systems, and stability theory. f,s

528 Introduction to Random Processes in Electrical and Computer Engineering (3:3:0) Prerequisites: ECE 220 and STAT 346, or permission of instructor. Probability and random processes are fundamental to communications, control, signal processing, and computer networks. Provides basic theory and important applications. Topics include probability concepts and axioms; stationarity and ergodicity; random variables and their functions; vectors; expectation and variance; conditional expectation; moment generating and characteristic functions; random processes such as white noise and Gaussian; autocorrelation and power spectral
535 Digital Signal Processing (3:3:0) Prerequisites: ECE 320 and 328, or permission of instructor. Representation analysis and design of digital signals and systems. Covers sampling and quantization, Z-transform and Discrete Fourier Transform, digital filter realizations, design techniques for recursive and nonrecursive filters, Fast Fourier Transform algorithms, and spectrum analysis. Additional topics may include adaptive filtering, homomorphic digital signal processing, digital interpolation and decimation, and VLSI signal processors.

537 Introduction to Digital Image Processing (DIP) (3:3:0) Prerequisite: graduate standing. First course in digital-image processing; introduces scanning systems, focal plane array detectors, data acquisition methods, display hardware, image preprocessing algorithms, feature extraction, and basic image processing methods. Semester-long image processing project includes utilizing modern image processing system prototyping software.

540/TCOM 500 Modern Telecommunications (3:3:0) Prerequisite: graduate standing. For students outside of the program. Cannot be applied toward degrees in electrical or computer engineering. Comprehensive overview of telecommunications including current status and future directions. Topics include review of evolution of telecommunications; voice and data services; basics of signals and noise, digital transmission, network architecture, and protocols; local area, metropolitan, and wide area networks and narrowband ISDN; asynchronous transfer mode and broadband ISDN; and satellite systems, optical communications, cellular radio, personal communication systems, and multimedia services. Uses examples of real-life networks to illustrate concepts and gain insight.

541 Computer Architectures - A Survey (3:3:0) Prerequisite: IT 212 or permission of Instructor. Survey of computer architectures. Covers basic concepts, definitions, single and multiple processor machines, data flow, computation, high-level language architecture, and current trends in computer architectures. Course designed for MS AIT students. Cannot be used for credit in MSCpE or MSEE.

542 Computer Network Architectures and Protocols (3:3:0) Prerequisites: STAT 344 or equivalent, and graduate standing in IT&E. Introduction to architectures and protocols of computer networks and concept of packet switching. Topics include ISO standard layer model, physical interfaces and protocols, data link control, multi-access techniques, packet switching, routing and flow control, network topology, data communication subsystems, error control coding, local area network, satellite packet broadcasting, packet radio, interconnection of packet-switching networks, network security and privacy, and various examples of computer networks.

545 Digital System Design with VHDL (3:3:0) Prerequisite: graduate standing. Introduction to the design of complex digital systems using hardware description languages. Emphasizes the design methodology based on the partitioning of a digital system into a datapath and control unit. Introduces a clear sequence of steps leading from specification to synthesizable, register transfer level (RTL), and fully verified HDL code. Covers VHDL for digital circuit design, including dataflow, structural, and behavioral coding styles. Introduces and illustrates the concepts of VHDL simulation, verification, synthesis, mapping, placing, routing, timing analysis and performance optimization. Requires semester-long project devoted to the design of a complex digital system using VHDL as a hardware description language and FPGA as an implementation platform.

548 Sequential Machine Theory (3:3:0) Prerequisite: ECE 331, or permission of instructor. Theoretical study of sequential machines. Topics include sets, relations and lattices, switching algebra, functional decomposition, iterative networks, representation, minimization and transformation of sequential machines, state identification, state recognizers, and linear and stochastic sequential machines.


563 Introduction to Microwave Engineering (3:3:0) Prerequisite: ECE 305, or permission of instructor. Studies propagation, storage of microwave signals. Examines transmission lines, waveguides, resonators, scattering parameters, Smith charts, measurement techniques, instrumentation, and microwave striplines and microstrips.

565 Introduction to Optical Electronics (3:3:0) Prerequisites: ECE 305 and 333. Introduces optoelectronic devices for generation, detection, and modulation of light. Topics include electro-optic modulators, gas, solid state and semiconductor lasers, photodetectors, and detector arrays.

567 Optical Fiber Communications (3:3:0) Prerequisite: ECE 565 or permission of instructor. Studies components and integration of fiber-optic transmission systems. Topics include optical fibers, signal degradation, optical sources, power launching and coupling, photodetectors, receiver circuits, link analysis, and optical measurements.

584 Semiconductor Device Fundamentals (3:3:0) Prerequisite: ECE 430 or permission of instructor. Studies principles of operation of semiconductor devices based on solid state physics. Topics include band theory of solids, intrinsic and extrinsic semiconductor properties, pn junction diode, bipolar junction transistor, Schottky diode, metal insulator semiconductor junctions, field-effect transistors, and heterostructures.

586 Digital Integrated Circuits (3:3:0) Prerequisites: ECE 331 and 430, or permission of instructor. Studies design and analysis of digital integrated circuits, emphasizing CMOS technology. Reviews MOSFET operation and SPICE modeling. Covers analysis and design of basic inverter circuits, structure and operation of combinatorial and sequential logic gates, dynamic logic circuits, chip I/O circuits, and brief introduction to VLSI methodologies.

587 Design of Analog Integrated Circuits (3:3:0) Prerequisites: ECE 333 and 430, or permission of instructor. Studies design methodologies of CMOS-based analog integrated circuits. Topics include differential amplifiers, current sources, output stages, operational amplifiers, comparators, frequency response, noise, and computer-aided design.
590 Selected Topics in Engineering (3:3:0) Prerequisite: graduate standing or permission of department. Selected topics from recent developments, and applications in various engineering disciplines. Designed to help professional engineering community keep abreast of current developments.

611 Advanced Microprocessors (3:3:0) Prerequisite: ECE 511 or permission of instructor. Covers principles of advanced 32-bit and 64-bit microprocessors. Includes microprocessor structure and architecture, pipeline hazards, instruction-level parallelism, superscalar and superpipelined execution, thread-level parallelism; and RISC principles and advantages. Offers examples of RISC-type microprocessors. Studies in detail Intel IA-32, Intel and HP IA-64, and Motorola M68000 families.

612 Real-Time Embedded Systems (3:3:0) Prerequisite: ECE 511 or permission of instructor. Study of real-time operating systems and device drivers for embedded computers. Emphasizes microprocessor systems and associated input device sampling strategies, including interrupt driven and polled I/O. Covers basic input/output operations, analog to digital conversion methods, I/O programming techniques and process, and communication control methodologies. Involves design project.

620 Optimal Control Theory (3:3:0) Prerequisite: ECE 521 or permission of instructor. Detailed treatment of optimal control theory and its applications. Topics include system dynamics and performance criteria, calculus of variations and Pontryagin’s minimum principle, computational methods in optimal control, and applications of optimal control.


624 Control Systems (3:3:0) Prerequisites: ECE 421 and 521, or permission of instructor. Analysis, design, and implementation of digital feedback control systems. Topics include discrete-time models, pole-placement, controller design methods, MIMO system decoupling, and observer design. Course may include simulation and design project.

630 Statistical Communication Theory (3:3:0) Prerequisite: ECE 528. Introduces optimum receiver design in the additive white Gaussian noise environment. Topics include efficient signal set design, modulation techniques, matched filter, correlation detector, coherent and noncoherent detections, fading and diversity channels, random amplitude and phase, diversity techniques, performance bounds of communications, and waveform communications.

633 Coding Theory (3:3:0) Prerequisite: ECE 528 or permission of instructor. Mathematics of coding groups, rings, and fields; polynomial algebra. Topics include linear block codes, generator and parity check matrices; error syndromes, binary cyclic and convolutional codes; and implementation of encoders and decoders.

635 Adaptive Signal Processing (3:3:0) Prerequisite: ECE 528. Introduces adaptive systems and adaptive signal processing. Topics include correlation functions and matrices; performance functions; search of minimum; steepest descent and Newton algorithms; least mean squares algorithm; noise perturbed search and misadjustment; sequential regression algorithm and convergence issues; recursive least squares algorithm and forgetting factor; frequency domain algorithms; adaptive equalization; pseudorandom binary sequences and system identification; adaptive interference cancellation; and adaptive beam forming and arrays. Simulates adaptive algorithms.

638/IT 838 Fast Algorithms and Architectures for Digital Signal Processing (3:3:0) Prerequisite: ECE 535 or permission of instructor. Studies recent advances in development of signal processing algorithms and relevant computational architectures. Topics include fast polynomial transforms, Winograd’s algorithms, multirate processing of digital signals, spectral estimation, adaptive filtering, and wavelet transforms.

641 Computer System Architecture (3:3:0) Prerequisite: ECE 511 or permission of instructor. Advanced course in computer architecture. Covers definitions, multiple processors, VLSI architecture, data flow, computation, semantic gap, high-level language architecture, object-oriented design, RISC architecture, and current trends in computer architecture.

642 Design and Analysis of Computer Communication Networks (3:3:0) Prerequisites: ECE 542 and 528, or equivalent. Introduces queuing theory. Other topics include concentrator design, multiplexing, capacity assignments, random access schemes, polling and probing techniques, topology design, flow control and routing, packet radio, protocol specification, and validation.

643 Communication Switching Systems (3:3:0) Prerequisites: ECE 528 and 542. Basic concepts of switching with application to digital telecommunication networks. Topics include circuit switched networks, space-division and time-division switching, digital switching system architecture, stored-program control, traffic theory, numbering concepts, signaling networks, intelligent networks, and fast-packet switching.

644 Architectures and Algorithms for Image Processing (3:3:0) Prerequisite: ECE 511 and 537, or equivalent. Architectures and algorithms to analyze and process pictorial information. Topics include systems and techniques for digital representation of images; image scanning methods and their applications; picture processing languages; image data structures; feature detection, extraction, and reconstruction; detection of symmetries; systems and methods for regular decomposition; image desegmentation; object thinning; real-time orthogonal transformations; and applications. Includes design project.

645 Computer Arithmetic (3:3:0) Prerequisite: ECE 545 or permission of instructor. Covers computer arithmetic as applied to the design of general-purpose microprocessors and application-specific integrated circuits for cryptography, coding, and digital signal processing. Focuses on efficient implementations of all basic arithmetic operations in three major domains: integers, real numbers, and elements of Galois Fields GF(2n). Illustrates tradeoffs among various hardware algorithms and architectures depending on primary optimization criteria, such as speed, area, and power consumption. Demonstrates the use of software implementations as a source of test vectors for verification of hardware.
646 Cryptography and Computer Network Security (3:3:0) Prerequisites: ECE 542 or permission of instructor. Topics include need for security services in computer networks, basic concepts of cryptology, historical ciphers, modern symmetrical ciphers, public key cryptography (RSA, elliptic curve cryptosystems), efficient hardware and software implementations of cryptographic primitives, requirements for implementation of cryptographic modules, data integrity and authentication, digital signature schemes, key exchange and key management, standard protocols for secure mail, www and electronic payments, security aspects of mobile communications, key escrow schemes, zero-knowledge identification schemes, Smart cards, quantum cryptography, and quantum computing.

650 Robotics (3:3:0) Prerequisite: ECE 521 or permission of instructor. Introduces robotics and advanced automation from electrical engineering standpoint. Topics include hardware overview; coordinate systems and manipulator kinematics; differential motion and inverse Jacobian; manipulator path control and motion planning; design and control of articulated hands; sensory feedback; machine vision; and applications to industrial automation.

662 Microwave Devices (3:3:0) Prerequisites: ECE 563 or permission of instructor. Studies generation of microwave signals. Topics include solid-state microwave devices and high-power microwave devices and microwave applications.

665 Fourier Optics and Holography (3:3:0) Prerequisite: ECE 565. Studies optical systems for processing temporal signals as well as images. Topics include use of coherent optical systems for image processing and pattern recognition, principles of holography, and acousto-optic systems for radar-signal-processing optical computers.

670 Principles of C4I (3:3:0) Provides broad introduction to fundamental principles of command, control, communication, computing, and intelligence (C4I). Applies principles, techniques to wide range of civilian and military situations. Discusses modeling, simulation of combat operations; studies sensing, fusion, and situation assessment processes. Derives optimal decision-making rules. Discusses concepts of C4I architectures and tools to evaluate and design systems such as queuing theory.

672/SYST 619 Introduction to Architecture-Based Systems Engineering (3:3:0) Prerequisite: SYST 510 or 520, or ECE 521; or permission of instructor. Explores lifecycles in systems engineering; and human, organizational, process, and technological basis for systems integration and architecting. Includes societal and cultural basis; conceptual frameworks; structure, function, and purpose; risk management; user requirements and functional specifications; bid and proposal process; System of Systems issues; systems management; increasing returns to scale, network effects, and path dependency issues; and evolutionary systems. Considered “out of department” course for MSEE and MS CpE programs.

673/SYST 620 Discrete Event Systems (3:3:0) Prerequisites: ECE 521 or SYST 611, or equivalent. Introduces modeling and analysis of discrete event dynamical systems. Covers elements of discrete mathematics, and focuses on Petri Net Models and their basic properties: locality and concurrency, condition and event systems, place and transition nets, Colored Petri Nets, reachability graphs (occurrence nets), and invariant analysis. Includes issues in Petri Nets and temporal logic; stochastic Petri Nets; relation to other discrete event models of dynamical systems; and applications of the theory to modeling and simulation and systems engineering problems, especially in systems architecting.

674/SYST 621 Systems Architecture Design (3:3:0) Prerequisites: SYST 619/ECE 672 and SYST 620/ECE 673. Intensive study of relationships of different types of architecture representations and methodologies to obtain them. Uses approaches based on systems engineering constructs, such as structured analysis and software engineering constructs, including object orientation, to develop architecture representations and derive executable model of information architecture. Executable model is then used for behavior analysis and performance evaluation. Discusses roles of systems architect and engineer. Uses examples from current practice including C4ISR architectures. Considered “out of department” course for MSEE and MS CpE programs.


678/SYST 631 Systems Engineering of Information Architectures (3:3:0) Prerequisites: SYST 520 and SYST 619/ECE 672. An intensive study of the relationships between different types of architecture representations and the methodologies used to obtain them. Approaches based on systems and software engineering constructs, such as object orientation and structured analysis are used to develop architecture representations or views. The roles of the systems architect and the systems engineer are discussed. The function of an executable model of the information architecture in deriving requirements is presented. Examples from current practice including C4ISR architectures are included. This course does not meet the requirements for the MS SE or MS EE degrees.

679/SYST 632 System Integration and Architecture Evaluation (3:3:0) Prerequisites: SYST 631/ECE 678. The System Integration Problem – human, organizational, societal, cultural, and technological aspects. The role of architectures in systems integration. Integration in a System of Systems and a Federation of Systems. Measures of performance and effectiveness. Analysis of Alternatives. This course does not meet the requirements for the MS SE or MS EE degrees.

680 Physical VLSI Design (3:3:0) Prerequisite: ECE 586 or permission of instructor. Introduces NMOS, CMOS, and BiCMOS integrated circuit technology and fabrication. Reviews MOS and BiCMOS inverter structures and operation, MOS and BiCMOS circuit design processes, MOS layers, stick diagrams, design rules, and layout. Covers subsystem design and layout illustration of design process; includes design of 4bit arithmetic processor and its parts, adder, multiplier, register, and memory cells; and aspects of
system timing, test and testability. Reviews currently available VLSI CAD tools.

681 VLSI Design Automation (3:3:0) Prerequisites: ECE 543 and 586, or permission of instructor. Broad introduction to basic concepts, techniques and algorithms used by modern VLSI design automation software. Covers hardware description languages, logic synthesis, simulation, static timing analysis, formal verification, test generation/fault simulation, and physical design including floor planning, placement, routing, and design rule checking.

684 MOS Device Electronics (3:3:0) Prerequisite: ECE 584 or permission of instructor. Study of MetalOxide Semiconductor (MOS) based device theory, characteristics, models, and limitations. Topics include MOS capacitor, MOSFETs, CMOS, charge coupled devices, scaling, hot carrier effects, latchup, radiation effects, and isolation techniques.

689 VLSI Processing (3:3:0) Prerequisite: ECE 584 or permission of instructor. In-depth study of various steps in silicon VLSI circuit processing. Includes thermal oxidation, diffusion, ion implantation, epitaxial growth, polysilicon, metal and insulator layer deposition, photolithography, and MOS processing integration. Involves hands-on laboratory projects and using process simulator SUPREM.

698 Independent Reading and Research (3:3:0) Prerequisites: graduate standing, completion of at least two core courses, and permission of instructor. Studies selected area in electrical engineering under supervision of faculty member. Requires written report. May be taken no more than twice for graduate credit.

699 Advanced Topics in Electrical and Computer Engineering (3:3:0) Prerequisite: permission of instructor. Advanced topics of current interest in electrical and computer engineering. Topics chosen so they do not duplicate other courses in department. Active participation encouraged in form of writing and presenting papers in research areas.

720/IT 843 Multivariable and Robust Control (3:3:0) Prerequisite: ECE 620 or permission of instructor. Covers Eigenstructure assignment for multivariable systems, Smith-McMillan form, internal stability, modeling system uncertainty, performance specifications and principal gains, parametrization of controllers, loop shaping and loop transfer recovery, and H methodology.

721/IT 846 Nonlinear Systems (3:3:0) Prerequisite: ECE 521. Includes motivating examples; analysis techniques include basic fixed point theory, implicit function theorem, and dependence of trajectories on initial data and parameters. Also covers computational simulation techniques; stability theory including Lyapunov’s direct method; nonlinear control systems of input-output and absolute stability; strong positive real transfer functions; feedback linearization of nonlinear systems; nonlinear canonical forms; nonlinear decoupling; sliding control; and applications to adaptive control, neural networks, and robotics.

722/IT 841 Kalman Filtering with Applications (3:3:0) Prerequisites: ECE 521 and 528 or equivalent, or permission of instructor. Detailed treatment of Kalman Filtering Theory and its applications, including some aspects of stochastic control theory. Topics include state-space models with random inputs, optimum state estimation, filtering, prediction and smoothing of random signals with noisy measurements, all within the framework of Kalman filtering. Additional topics are nonlinear filtering problems, computational methods, and various applications such as Global Positioning System, tracking, system control, and others. Stochastic control problems include linear-quadratic-Gaussian problem and minimum-variance control.

728 Random Processes in Electrical and Computer Engineering (3:3:0) Prerequisite: ECE 528 or permission of instructor. Recommended for advanced master’s and doctoral students. Provides background in random processes needed for pursuing graduate studies and research in statistical signal processing, communications, control, and computer networks. Covers probability spaces, random variables, Lebesque integration, conditional mean on a sigma field, convergence of random variables, limit and ergotic theorems, Markov processes, and Martingales.

731 Digital Communications (3:3:0) Prerequisite: ECE 630 or equivalent. Digital transmission of voice, video, and data signals. Covers signal digitization, pulse code modulation, delta modulation, low bit-rate coding, multiplexing, synchronization, intersymbol interference, adaptive equalization, frequency spreading, encryption, transmission codes, digital transmission using band-width compression techniques, and satellite communications.

732 Mobile Communication Systems (3:3:0) Prerequisites: ECE 542 and 630. Topics include modeling of mobile communication channel, signal set and receiver design for mobile communication channel, access and mobility control, mobile network architectures, connection to fixed network, and signaling protocols for mobile communication systems. Examples of mobile communication systems are presented, including pan-European GSM, North American D-AMPS, and personal communication systems.

733 Advanced Coding Theory (3:3:0) Prerequisites: ECE 630 and 633. Theory and practice of advanced error-control coding techniques. Topics include trellis and multidimensional codes, Leech lattice, rotationally invariant codes, and spectral analysis and transform coding. Presents applications of contemporary coding theory in mobile communications, magnetic and optical recording, high-speed modem, and high-density data storage design.

734/IT 830 Detection and Estimation Theory (3:3:0) Prerequisite: ECE 528. Introduces detection and estimation theory with communication and radar and sonar applications. Topics include classical detection and estimation theory, detection of known signals in Gaussian noise, signal parameter and linear waveform estimation, and Wiener and Kalman filters.

735/IT 832 Data Compression (3:3:1) Prerequisite: ECE 528 or permission of instructor. In-depth study of lossy data compression techniques based on vector quantization with application to speech, image, and video signals. Covers vector quantization of signal’s waveform and commonly used parametric statistical models such as the autoregressive model. Topics include scalar and predictive quantization, transform and entropy coding, and variations on basic vector quantization such as constrained vector and variable rate vector quantization.

737/IT 932 Spread Spectrum Communications (3:3:0) Prerequisite: ECE 630. Introduces spread spectrum communications. Topics include pseudo noise spread spectrum systems, feedback shift registers, jamming strategy, code acquisition, synchronization, tracking, gold codes, burst-
communication systems, time-hopping, frequency hopping, and multiple access communications.

738 Advanced Digital Signal Processing (3:3:0) Prerequisite: ECE 638. Theory and practice of advanced digital signal processing techniques. Topics include computationally efficient high-speed algorithms for convolution, correlation, orthogonal transforms, multi-rate processing of digital signals, filter banks, multiresolution time frequency and time-scale analysis of one- and two-dimensional signals, and parallel signal processing.

739/IT 833 Satellite Communications (3:3:0) Prerequisite: ECE 630 or permission of instructor. Introduces theory and applications of modern satellite communications. Topics include satellite channel characterization, channel impairments and transmission degradation, link calculations, modulation, coding, multiple access, broadcasting, random access schemes, demand assignment, synchronization, satellite switching and onboard processing, integrated service digital satellite networks, and satellite transponder, ground stations, packet switching, and optical satellite communications.

741 Wireless Networks (3:3:0) Prerequisite: ECE 642 or equivalent. Theoretical foundation and practice in design of wireless networks. Emphasizes mobility and teletraffic modeling aspects, and networking issues and state-of-the-art performance evaluation methods of radio and system infrastructure applicable to wireless cellular and local networks. Topics include analysis of mobility, handoff, control traffic loading, resource allocation techniques, multiaccess protocols, admission policy and call control, network infrastructure and multilayer configuration, wireless LANs, and packet data systems.

742/IT 834 High-Speed Networks (3:3:0) Prerequisite: ECE 528 and 642, or permission of instructor. Theories for design, analysis and evaluation of high-speed networks including scalability, performance, and issues related to local area, metropolitan, and wide area networks. Includes architecture, protocols, and applications of high-speed networks; performance modeling of high-speed networks; flow control and routing; design issues for high-speed switches, interfaces, and controllers; all optical networks and their architectures; examples of high-speed computer networks and internetworking; video, imaging, and multimedia applications; software issues, robustness, and applications; and selected topics in current research areas in high-speed computer networks.

743/IT 848 Multimedia Networking and Communications Software (3:3:0) Prerequisite: ECE 642 or equivalent. Advanced modern networks and services increasingly rely on communication protocols and their implementation in software. Course provides principle methodologies, constraints, and technologies for advanced store-and-forward or packet-switched communications nodes, networks and protocols, and emerging software-based applications. Specific examples include next-generation integrated Internet and Intranet, underlying transport infrastructure over wired and wireless media, switching and routing, multipoint and real-time multimedia and web-based services, and quality of services aspects.

744 Computer Vision and Expert Systems (3:3:0) Prerequisite: ECE 644 or permission of instructor. Brief review of image analysis. Includes vision system architectures such as human and computer visual systems; vision system operations such as focus and zooming; picture recognition languages; knowledge-based systems; learning algorithmic schemes; and applications to text processing and analysis as expert systems. Students conceive, simulate, and test design projects.

745 ULSI Microelectronics (3:3:0) Prerequisite: ECE 684. Studies UltraLargeScaleIntegration (more than a million devices in a single chip) by considering limits of packing density, modeling of devices, and circuit topology. Semiconductor material and device physics imposed “second order effects” and limitations on deep submicron CMOS performance. Reliability studied through analytical (compact) modeling and numerical simulations. Presents and evaluates new ULSI technologies such as SOI CMOS.

746 Advanced Applied Cryptography (3:3:0) Prerequisites: ECE 646 or permission of instructor. Discusses complex cryptographic algorithms and their implementations in software and hardware. Provides mathematical background necessary to understand, implement, and break modern cryptographic systems. Covers implementations of cryptosystems using smart cards, network processors, and other platforms. Discusses side channel attacks against implementations of cryptography, including timing attacks, power analysis, fault analysis, cache attacks, etc. Introduces advanced topics, such as random and pseudorandom number generators, secret sharing, zero-knowledge, and quantum cryptography. Requires a semester long project devoted to implementation of selected algorithms or protocols in software or hardware, and/or comparative analysis of various algorithms, protocols, or implementations.

749/IT 844 Neural Networks for Control (3:3:0) Prerequisites: ECE 549 and 620. General neural network principles for control applications and supervised control, direct inverse control, neural adaptive control, backpropagation trout time (BTT), adaptive critic, sensory-motor principles. Topics include applications to adaptive control and system identification, neural networks for motion control and path planning in robotics, neural network process control, aerospace control problems and neural network autopilot, neural network control of aircraft flare and touchdown, and neural network control of autonomous vehicles.

750/CS 685/SYST 672/IT 840 Intelligent Systems for Robots (3:3:0) Prerequisite: SYST 611, ECE 650, or CS 580; or SYST 555 or equivalent. Reviews recent developments in intelligent autonomous systems. Studies applications of artificial intelligence, control theory, operations research, decision sciences, computer vision, and machine learning to robotics as well as correspondences between various fields. Topics include analysis and design of methods, algorithms and architecture for planning, navigation, sensory data understanding, visual inspection, spatial reasoning, motion control, learning, self-organization, and adaptation to environment.

751/IT 886 Information Theory (3:3:0) Prerequisite: ECE 528 or permission of instructor. Introduces information theory, which is mathematical theory of communication systems. Topics include measures of information such as entropy, relative entropy, and mutual information; Shannon-McMillian-Breiman theorem and applications to data compression; entropy rate and source coding theorem; Huffman, arithmetic and Lempel-Ziv codes; method of types, channel capacity, and channel-coding theorem; joint source-channel
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coding theorem; differential entropy; Gaussian channel; rate distortion theory; and vector quantization.

752/IT 885 Spectral Estimation (3:3:0) Prerequisite: ECE 528 or STAT 652, or permission of instructor. In-depth study of spectral analysis and application to statistical signal processing. Topics include classical Fourier analysis of deterministic signals and Wiener theory of spectral analysis for random processes; spectral estimation using Periodogram and window approaches; maximum entropy spectral estimation and relation to autoregression modeling; signal subspace approaches for frequency estimation; and wavelet transform and elation to short-time Fourier transform.

753/IT 888 Distributed Estimation and Multisensor Tracking and Fusion (3:3:0) Prerequisite: ECE 734 or SYST 611. Centralized and distributed estimation theory, hierarchical estimation, tracking and data association, multisensor multitarget tracking and fusion, distributed tracking in distributed sensor networks, track-to-track association and fusion, and Bayesian networks for fusion.


755/IT 937 Optimum Array Processing II (3:3:0) Prerequisite: IT 837. Adaptive beamformers, SMI and RLS estimators, spatial smoothing and FB averaging, QR decomposition, LMS algorithm, optimum detection and parameter estimation, UML and CML estimation, Cramer-Rao bounds, IQML, weighted subspace fitting, subspace algorithms such as MUSIC and ESPRIT, root versions, beam-space algorithms, sensitivity, robustness, and calibration.

758/CS 758 Networked Virtual Environments (3:3:0) Theory and practice of advanced distributed simulation via networks using highly realistic graphic environments. Networked virtual environment principles, networking technology for distributed simulation, networked multimedia concepts, virtual simulation concepts, efficiency/ performance issues, and online conferencing/virtual classrooms. Term project required.

780/IT 845 High-Frequency Electronics (3:3:0) Prerequisite: ECE 563 and 684, or permission of instructor. Studies devices and circuits in high-speed communications systems. Topics include microwave bipolar transistors and high-speed integrated circuits, and designing linear and power amplifiers using Sparameter techniques and computer simulation.

798 Research Project (3:0:0) Prerequisite: 9 graduate credits. Research project to be chosen and completed under guidance of graduate faculty member that results in acceptable technical report.

799 Master’s Thesis (1–6:0:0) Prerequisite: 9 graduate credits, and permission of instructor. Research project chosen and completed under guidance of graduate faculty member that results in technical report and oral defense acceptable to thesis committee of three faculty members.

836/IT 836 Special Topics in Detection and Estimation Theory (3:3:0) Prerequisite: ECE 734. Advanced topics in detection, estimation, and signal processing in areas of current research interest. Topics may include spectral estimation, speech recognition, array processing, SAR, underwater acoustics, or higher order spectra.

847/IT 847 Topics in Photonics (3:3:0) Prerequisite: ECE 565 or permission of instructor. In-depth discussion of specific topics in photonics. Includes optical storage (disks, holographic, 3D), digital optical computing, integrated optics, photonic switching networks, and optoelectronic devices. May be repeated with different topics.

945/IT 945 Advanced Topics in Microelectronics (3:3:0) Prerequisite: IT 845. Current topics of advanced research in microelectronics. Includes very high speed integrated circuits, monolithic microwave integrated circuits, optoelectronic integrated circuits, novel device structures, and advances in semiconductor device technology. May be repeated with change in topic.

998 Doctoral Dissertation Proposal (1–12:0:0) Work on research proposal that forms basis for doctoral dissertation. May be repeated. No more than 24 credits of ECE 998 and 999 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1–12) Prerequisite: admission to candidacy. Formal record of commitment to doctoral dissertation research under direction of ECE faculty member. May be repeated as needed. Students must complete minimum 12 credits of doctoral proposal (ECE 998) and doctoral dissertation research (ECE 999) Maximum of 24 credits of ECE 998 and 999 may be applied to degree. Students who choose to take less than 24 credits of ECE 998 and 999 may earn remaining credits from approved course work. Students cannot enroll in ECE 999 before research proposal accepted and approved by dissertation committee.

Elementary/Secondary Education (EDCI)

Graduate School of Education

370 Young Adult Literature in Multicultural Settings (3:3:0) Examines literary works written for and about young adults, introduces critical issues surrounding teaching of young adult literature in multiculturally diverse schools, and requires reading and review of young adult literature. Significant online work is required.

473 Teaching Science in the Secondary School (3:3:0) Builds fundamental knowledge of science teaching and learning including standards-based curriculum design and research-based teaching strategies. School-based field experience required for those seeking initial teacher licensure.

479 Advanced Methods of Teaching English in the Secondary School (3:3:0) Guides students in working effectively with national and local standards for teaching secondary English. Continuation course in methods from EDCI 469.

483 Advanced Methods of Teaching Science in Secondary School (3:3:0) Prerequisite: EDCI 473. Provides advanced study of teaching and curriculum development based on research and current issues. Emphasizes integrating science and technology, adapting instruction to needs of diverse learners, and promoting safety.

490 Student Teaching in Education (6:6:0) Prerequisite or corequisite: completion of licensure and all endorsement
500 In-Service Educational Development (1–6:1–6:0)
Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

510 Linguistics for PreK–12 ESOL Teachers (3:3:0)
Examines language as a system, with particular focus on teaching English as a second language (ESOL) to students in public schools, grades PreK–12. Considers teaching implications of phonology, morphology, syntax, semantics, and pragmatics.

511 Developing Curriculum and Designing Instruction in Early Childhood Education (3:3:0)
Covers procedures, materials, and organization of environments for young children. Field experiences required for students without previous teaching or administrative experience in early childhood settings.

516 Bilingualism and Language Acquisition Research (3:3:0)
Examines research in first and second language acquisition, including interaction of bilingual person’s two languages, with applications for classroom. School-based field experience required.

519 Methods of Teaching Multilingual Students (3:3:0)
Prerequisite: EDCI 516. Examines approaches, methods, and techniques for teaching English as second language (ESL) in bilingual and ESL classrooms, as well as resources available in field. Participants critically analyze and demonstrate teaching approaches based on second language acquisition research, including teaching language through content. Field experience in public schools required.

520 Assessment of Language Learners (3:3:0)
Prerequisites: EDCI 516 and 519. Examines innovative approaches to assessing language minority students and English language learners. Topics include identification, placement, monitoring of student progress, development of authentic performance-based measures, design of portfolios, application of measurement concepts, analysis of assessment instruments, and linking assessment to instruction.

521 Curriculum Development for Language Learners (3:3:0) Prerequisites: EDCI 516 and 519. Examines current approaches to curriculum development for second language learners and language minority students. Participants review, evaluate, and develop curricular materials, with emphasis on learner-centered activities, cooperative learning, interdisciplinary and thematic approaches, authentic and problem-based learning, integration of language and content, and linking assessment and instruction.

544 Curriculum and Methods of Teaching in Elementary Education (3:3:0) Prerequisites: admission into elementary education graduate program; must be taken in programmatic sequence. Introduction to general methods of teaching in elementary schools focusing on planning, teaching strategies, management, assessment, and differentiation.

545 Assessment and Differentiation (3:3:0) Prerequisites: admission into elementary education graduate program; must be taken in programmatic sequence. Provides a research-based introduction to differentiated instruction for children in grades PK–6. Emphasis on the assessment of learners and differentiation of instruction to meet the needs of all learners.

546 Integrating Technology in Elementary Classrooms: Literacy (1:1:0)
Prerequisite: admission into elementary education graduate program; corequisite: EDCI 556. Studies the development and integration of technology in the elementary education literacy curriculum.

547 Integrating Technology in Elementary Classrooms: Mathematics (1:1:0)
Prerequisite: admission into elementary education graduate program; corequisite: EDCI 552. Studies the development and integration of technology in the elementary education mathematics curriculum.

548 Integrating Technology in Elementary Classrooms: Social Studies and Fine Arts (1:1:0)
Prerequisite: admission into elementary education graduate program; corequisite: EDCI 554. Studies the development and integration in the elementary education social studies and fine arts curriculum.

549 Foreign Language Immersion in the Elementary School (3:3:0)
Covers theories and methods of teaching foreign language through elementary school curriculum; and curriculum development, assessment, and community relations in foreign language immersion classes.

552 Mathematics Methods for the Elementary Classroom (1–3:1–3:0)
Prerequisite: admission to elementary education licensure program. Introduces methods for teaching all children topics in arithmetic, geometry, algebra, probability, and statistics in elementary grades. Focuses on using manipulatives and technologies to explore mathematics and solve problems. Requires field experience in public schools.

553 Science Methods for the Elementary Classroom (1–3:1–3:0)
Prerequisite: admission to elementary education licensure program. Develops skills and abilities in science teaching methods, applications of technology, safety practices, and creation of integrated science curricula. Examines science teaching based on contemporary theory, practice, and standards. Requires field experience in public schools.

554 Methods of Teaching Social Studies and Integrating Fine Arts in the Elementary Classroom (3:3:0) Prerequisite: admission into elementary education graduate program; must be taken in programmatic sequence. Focuses on the design and delivery of standards-based integrated curriculum centered on the social sciences. Includes integration of fine arts and examines the central role of the arts in learning. Field experience is required.

555 Literacy Teaching and Learning in Diverse Elementary Classrooms I (3:3:0) Prerequisite: admission to elementary education licensure program. Provides research-based introduction to literacy teaching and learning for younger children. Emphasizes language development; reading and writing processes; emergent literacy; culture, families, and literacy; and literacy integration in the curriculum. School-based field experience required.

556 Literacy Teaching and Learning in Diverse Elementary Classrooms II (1–3:1–3:0) Prerequisite: admission to elementary education licensure program. Provides research-based introduction to literacy teaching and learning for older children. Emphasizes literacy and language processes and development; connections among cultures, families, and literacy; and literacy integration in curriculum. School-based field experience required.
557 Integrating Technology in the Elementary Curriculum (3:3:0) Prerequisite: admission to elementary education licensure program. Examines development and implementation of curriculum and instruction in elementary classroom. Emphasizes integrating technology in curriculum, and inclusion of special needs and culturally diverse students. School-based field experience required.

558 Integrating Fine Arts and Movement in Elementary Education (3:3:0) Prerequisite: admission to PDS or Partnership Elementary Licensure Program. Includes art, drama, music, and movement. Examines central role of arts in children’s learning. Focuses on integration and interdisciplinary learning experiences. Includes developmental theory, addressing diverse learners through multiple intelligences, and movement for physical health. School-based field experience required.

559 Research and Assessment in Elementary Education (3:3:0) Prerequisite: admission into elementary education graduate program; capstone course for degree must be taken last in programmatic sequence. Provides teacher candidates an understanding of research paradigms utilizing systematic evidence to improve practice, and further skills in assessment of learning outcomes. Emphasizes linking research and practice, making instructional decisions based on systematically collected data.

560 Methods of Teaching in Foreign/World Languages (3:3:0) Prerequisite: EDCI 516, or current teaching position. Covers approaches, theories, and methods of teaching foreign and second languages, with practical application to classroom. Students demonstrate teaching strategies, develop lesson and unit-planning skills, and evaluate curricula and materials. Requires field experience in schools.


570 Teaching Young Adult Literacy in a Multicultural Setting (3:3:0) Examines literary works written for and about young adults. Introduces critical issues surrounding teaching young adult literature in multicultural diverse public schools and requires reading and reviewing young adult literature from several genres.


577 Curriculum and Methods of Teaching, PK–12 (3:3:0) Blends theory and practice by providing instruction in curriculum and planning, theoretical concepts, application of research, models of learning and teaching, and practical experiences. Examines educational standards, assessment, and classroom management in PK–12 schools.

597 Special Topics in Education (1–6:1–6:0) Prerequisite: admission to program in GSE. Provides advanced study on selected topic or emerging issue in American or international education. May be repeated for credit with GSE permission.

600 Workshop in Education (1–6:1–6:0) Offers full-time workshops and weekend seminars on selected topics in education and education tour seminars. May be repeated for credit.

601 Applied Study of Communicative Competence and Classroom Discourse (3:3:0) Analyzes young children’s language development and design of individual and group language experiences.

602 Technology Applications in Early Childhood Education (3:3:0) Prerequisite: admission to GSED. Examines criteria and methods for integrating technology into all areas of early childhood curriculum. Emphasizes use of instructional technology to facilitate cognitive and social growth.

603 Trends, Issues, and Research in Early Childhood Education (3:3:0) Prerequisites: admission to GSED, and EDRS 590. Examines trends, issues, research findings, and resulting program development.

613 Curriculum and Assessment in Early Childhood Education I (3:3:0) First of two-course sequence addressing current thinking about curriculum and assessment in programs for preschool through third grade. Gives overview of effective ways to plan and implement integrated curriculum; special focus on content, subject matter.

614 Curriculum and Assessment in Early Childhood Education II (3:3:0) Second of two-course sequence focusing on planning and assessing children’s knowledge of content and subject matter. Emphasizes action research.

615 Advanced Human Development (3:3:0) Advanced course in development and learning across lifespan. Critically reviews contemporary research and theories of human development and learning, and relevance to educational practice and family contexts as they relate to children under 8.

616 The Creative Arts and Play in Early Childhood Education (3:3:0) Advanced course using creative arts and play as central approaches to teaching and learning. Focuses on an integrated approach to what arts-based curriculum looks like and how it functions.

621 Introduction to Gifted and Talented Learners (3:3:0) Examines nature and needs of gifted and talented learners. Participants become knowledgeable about characteristics of gifted and talented students, and examine role of culture in manifestation of gifts and talents as well as gifted behaviors in special populations.

622 Curriculum Differentiation for Diverse Learners (3:3:0) Develops personal and professional rationale for differentiating instruction in mixed-ability classrooms, as well as skills and knowledge of strategies to utilize presessment data and plan for and implement differentiated instruction.

623 Models and Strategies for Teaching Gifted Learners (3:3:0) Provides framework to examine and apply curriculum
models and instructional strategies advocated for use with gifted students according to national and state standards that reflect best practices in gifted education.


625 Contemporary Issues and Trends in Gifted Education (3:3:0) Prerequisites: EDCI 621, 622, 623, 624. Focuses on research, trends, issues, legislation, and litigation concerning gifted and talented children. Provides professionals in gifted education and related fields with knowledge and skills to serve as advocates for gifted child education.

626 Action Research in Gifted Education (3:3:0) Opportunity to identify and investigate school-based problem and apply inquiry, writing, and research skills to relevant issue or concern in gifted education.

627 Advanced Practicum in Gifted Education (3:3:0) Prerequisites: EDCI 621, 622, 623, 624. Intensive supervised clinical experiences for one semester in accredited elementary or secondary school. Students supervised in setting that includes scheduled observations and seminar experiences.

631 Research in Elementary Education (3:3:0) Prerequisite: completion of elementary education (PK–6) licensure. Helps beginning teachers understand various research paradigms to use research literature and systemic evidence to improve practice. Emphasizes linking research and practice, and making data-based instructional decisions.

632 Advanced Social Studies Methods for the Elementary Classroom (3:3:0) Prerequisites: completion of elementary education (PK–6) licensure, and EDCI 631. Provides advanced study of teaching social studies in elementary education. Uses inquiry, research, and reflection to improve teaching. Emphasizes design and delivery of integrated social studies curriculum centered on knowledge, skills, and dispositions from history, geography, civics and economics, arts and humanities, and multicultural education. Covers student assessment and using student data in instructional decision-making and improvement. Requires extensive field experience in public schools.


634 Advanced Science Methods for the Elementary Classroom (3:3:0) Prerequisites: completion of elementary education (PK–6) licensure, and EDCI 631. Emphasizes inquiry and extensions of theoretical understanding of how children learn. Develops expertise in teaching and assessment, and incorporates technology, safety, and issues of culture and gender into day-to-day teaching activities.

635 Applied Research in Elementary Education (3:3:0) Prerequisites: completion of elementary education (PK–6) licensure, and EDCI 631, 632, 633, and 634. Helps beginning teachers plan and complete action research project related to teaching assignment. Students apply research methods explored during prerequisite series of courses.

645 Curriculum Development in Mathematics Education (3:3:0) Prerequisite: admission to mathematics education leadership master's degree program, or permission of instructor. Yearlong seminar for master's level students in mathematics education leadership cohort program. Analysis, design, and evaluation of school mathematics curricula.

646 Mathematics Education Leadership for School Change (1–3:1–3:0) Prerequisite: admission to mathematics education leadership master's degree program, or permission of instructor. Yearlong seminar for master's level students in mathematics education leadership cohort program. Surveys current literature and large-scale studies in mathematics education. Engages students in research, study, and discussion of factors that affect teaching and learning of mathematics in school settings.

663 Research in Science Technology (3:3:0) Prerequisite: course in teaching science in elementary school, or permission of instructor. Provides advanced study of methodology and materials in teaching biological, physical, and earth sciences.

666 Research in Mathematics Teaching (3:3:0) Explores curricula, current issues, and research literature in elementary school mathematics. Emphasizes development of different styles of teaching.

667 Advanced Methods of Teaching Social Sciences in the Secondary School (3:3:0) Prerequisite: EDCI 567. Emphasizes interdisciplinary curriculum and instruction, implementing national state standards, authentic assessment, and adaptations for diverse populations. School-based field experience required.

669 Advanced Methods of Teaching English in the Secondary School (3:3:0) Prerequisites: EDUC 522 and EDCI 569. Continuation course in methods (See EDCI 569). Guides students in working effectively with national and local standards for teaching secondary English.


673 Advanced Methods of Teaching Science in the Secondary School (3:3:0) Prerequisites: EDCI 573. Provides advanced study of teaching and curriculum development based on research and current issues. Emphasizes integrating science and technology, and adapting instruction to the needs of diverse learners. School-based field experience required.
677 Advanced Curriculum and Methods of Teaching, Secondary (3:3:0) Prerequisite: EDCI 577. Extends principles of teaching and learning introduced in EDCI 577. Includes application of skills in discipline-specific methodology, communication, classroom management, and evaluation of student performance appropriate to elementary level.

678 Advanced Curriculum and Methods of Teaching, Elementary (3:3:0) Prerequisite or corequisite: EDCI 577. Extends principles of teaching and learning introduced in EDUC 577. Includes application of skills in discipline-specific methodology, communication, classroom management, and evaluation of student performance appropriate to elementary level.

683 Curriculum Development and Evaluation in Science Education (3:3:0) Prerequisites: EDCI 663, or permission of instructor. Advanced course in science curriculum design and development. Emphasizes instructional materials and assessment.

684 Advanced Methods of Teaching Foreign/Second Languages in PK–12 Schools (3:3:0) Prerequisite: EDCI 516, or current teaching position. Blends theoretical knowledge and practical application. Provides advanced study of second language pedagogy and teaching trends. Topics include multiple learning styles, alternative forms and assessment, and teaching diverse populations. Requires field experience.

693 Leadership and Organizational Issues in Science Education (3:3:0) Prerequisites: EDCI 663 and 683, or permission of instructor. Advanced course in current issues for leadership in science education. Emphasizes technology, safety, professional development, and related organizational change issues.

705/EDIT 705 Instructional Design (3:3:0) Prerequisite: teaching experience. Helps students analyze, apply, and evaluate principles of instructional design to develop education and training materials spanning a wide range of knowledge domains and instructional technologies. Focuses on variety of instructional design models, with emphasis on recent contributions from cognitive science and related fields.

710 Technology and the Culture of Schools (3:3:0) Corequisite: EDIT 711. Explores relationship of human inventions and social, political, cultural, and epistemological constructions. Examines history of technology, relationship of technology and human behavior, and theories of social change and technology. Focuses on how technological and social changes influence and shape goals and outcomes of K–12 educational process. Considers links between technology and educational reform, how technology is associated with educational reform movement, and ways educators can take leadership roles in facilitating intersection of educational reform and technology.

712 Technology and Learning (3:3:0) Corequisite: EDIT 713. Explores ways of knowing and theories of learning as reflected in and influenced by technology. Analyzes, applies, and evaluates current theories such as constructivism, multiple intelligences, role of symbolization in human cognition, development of problem-solving and critical thinking strategies, and learning conditions. Covers relationship of technological forms and nature and structure of human cognition, especially as it influences K–12 educational practice. Explores technology and nature of individual learner attributes, learners in context, special-needs learners, access, equity, and values.

714 Methods of Integration (3:3:0) Corequisite: EDIT 715. Considers curriculum design strategies that facilitate technology integration. Includes examples of curriculum design strategies, readings, discussions, and design of lessons or units appropriate to various contents. First course in sequence focuses on disciplinary standards, role of technology applications to support standards, and strategies for curriculum design such as learning cycle, thematic design, interdisciplinary and transdisciplinary approaches, and writing across the curriculum.

716 Principles of Integration (3:3:0) Corequisite: EDIT 717. Continued consideration of curriculum design strategies appropriate for technology integration. Includes examples of curriculum design strategies, readings, discussions, and design of lessons or units. Second course in sequence builds on previous student learning, and focuses on technology’s role in problem-based learning, problem-centered curriculum design, authentic instruction, and rationales and processes for implementing authentic assessment strategies.

725 National and International Leadership Issues in Mathematics Education (3:3:0) Prerequisite: admission to mathematics education leadership PhD program. Yearlong seminar for PhD students in the mathematics education leadership cohort program. Students study research on mathematics teaching and learning, including current issues and trends in mathematics education leadership at national and international levels.

726 State and Local Leadership Issues in Mathematics Education (3:3:0) Prerequisite: admission to mathematics education leadership PhD program. Yearlong seminar for PhD students in the mathematics education leadership cohort program. Students study research on mathematics teaching and learning, including current trends in mathematics school reform at state, district, and individual school levels.

777 Research to Practice (3:3:0) Prerequisites: all other program courses except EDRS 590 and elective, or permission of instructor. Provides culminating experience that synthesizes and applies essential elements of second language teaching and learning. Emphasizes teacher as change agent through critical inquiry into practice. Promotes collaboration between ESL and grade-level teachers to advance achievement of English language learners and language minority students.

784 Capstone Seminar in Early Childhood Education (3:3:0) Prerequisite: EDIT 715. Intensive, supervised clinical experience for full semester in accredited school. Students must register for appropriate section.

795 Science Education Research (3:3:0) Prerequisite: EDCI 891. Explores science education research, theory, and practice, including sources and methods of study. Students review and report on research literature and teaching practices on topics of interest.
796 Science Education Curriculum (3:3:0) Prerequisite: EDCI 891. Explores science education curriculum from preschool through high school, including identifying and evaluating curriculum materials and resources. Emphasizes research-based exemplary materials and use of technology.

797 Advanced Topics in Education (1–6:1–6:0) Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with CEHD approval.

855 Mathematics Education Research on Teaching and Learning (3:3:0) Prerequisite: admission to mathematics education leadership PhD program. Yearlong seminar for PhD students in the mathematics education leadership cohort program. Students survey most current research literature in mathematics education and engage in research, study, and discussion of mathematics education research on teaching and learning in school settings.

856 Mathematics Education Curriculum Design and Evaluation (3:3:0) Prerequisite: admission to mathematics education leadership PhD program. Yearlong seminar for PhD students in the mathematics education leadership cohort program. Students engage in research, analysis, design, and evaluate school mathematics curricula.

857 Preparation and Professional Development of Mathematics Teachers (3:3:0) Prerequisite: admission to mathematics education leadership PhD program. Yearlong seminar for PhD students in the mathematics education leadership cohort program. Students study attributes of effective professional development in mathematics education, develop expertise in designing and teaching mathematics methods courses, and learn to create and teach professional development experiences for practicing teachers.

858 Mathematics Education Research Design and Evaluation (3:3:0) Prerequisite: admission to mathematics education leadership PhD program. Yearlong seminar for PhD students in the mathematics education leadership cohort program. Students review methods of research appropriate for mathematics education settings and develop theoretical framework and action plan for conducting research project.

891 Science Teaching and Learning (3:3:0) Explores research, theory, and practice for effective science teaching and learning. Focuses on science education standards at local, state, national, and international levels. Students review common core of research literature and topics of individual interest.

892 Science Education History and Research (3:3:0) Prerequisite: EDCI 891. Explores history of science education research, theory, and practice, including research on general teaching strategies in science instruction. Reviews common historical core of research literature; students conduct exploratory research of individual interest.

893 Science Education Staff Development (3:3:0) Prerequisite: EDCI 891. Explores staff development in science education with emphasis on planning and conducting professional development on key topics in science teaching and learning. Reviews common core of research literature; students conduct research of individual interest.

894 Science Education Leadership and Policy (3:3:0) Prerequisite: EDCI 891. Focuses on leadership and policy issues at local, state, and national levels that affect science education. Emphasizes understanding decision-making structure and process; current issues; and trends. Students participate in leadership and policy events.

895 Emerging Issues in Curriculum and Instruction (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Covers issues in curriculum and instruction through individual and group research, discussion, writing, and presentations by experts. Students conduct critical analysis of specific field.

Engineering (ENGR)
The Volgenau School of Information Technology and Engineering

107 Introduction to Engineering (2:2:0) Corequisite: MATH 105, or Math Placement Test score qualifying student for MATH 113. Introduces engineering profession fundamentals and problem-solving. Topics include description of engineering disciplines, functions of the engineer, professionalism, ethics and registration, problem-solving, representation of technical information, estimation and approximations, and analysis and design. f,s

183 Engineering Computer Graphics (3:2:3) Fundamentals of engineering drawing, graphic communication, descriptive geometry, multiview projection, and graphical analysis. Introduces computer-aided drafting, visualization, pictorial views, and reading of engineering drawings. f,s

210 Statics and Dynamics (3:3:0) Prerequisites: PHYS 160 and MATH 114. Covers general principles and fundamental concepts, including units of measurement; force vectors and their use, including vector operations; equilibrium of a particle; resultants of a system of forces; equilibrium of a rigid body; dry friction; center of gravity and centroids; moments of inertia, including parallel axis theorem and radius of gyration; kinematics of a particle; and work and energy. f,s

307 Engineering Thermodynamics (3:3:0) Prerequisites: MATH 213 and PHYS 260. Classical concepts of energy and temperature, first and second laws and their application to closed and open thermodynamic systems. Covers properties of pure substances, equation of state, and analysis of thermodynamic processes and systems. Presents application to engineering systems. s

310 Mechanics of Materials (3:3:0) Prerequisite: ENGR 210. Concepts of stress, strain, elasticity, and plasticity. Stress and strain analysis, including the use of Mohr’s circle. Pure torsion. Theory of pure bending and members under transverse loading, including normal and shear stress analysis. Theory of elastic buckling. Distribution of internal forces in statically determinate systems, including beams, frames, and arches. f, s

400 Principles of Professional Practice in Engineering (3:3:0) Prerequisite: engineering majors within 30 hours of graduation. Does not satisfy requirements for CEIE technical elective. Overview of all engineering disciplines focusing on engineering ethics and professionalism, need for lifelong learning, and professional licensure. Topic areas also include engineering science and mechanics, material science, electric...
circuitry, chemistry and thermodynamics, engineering economics, and other fundamentals of engineering.

490 Human Practice of Engineering Design (3:3:0) Prerequisites: senior standing with at least 90 credits in IT&E degree program; one of SYST 301, ECE 331, or CS 421; and permission of instructor. Study of engineering design and innovation emphasizing human aspects. Students directly involved in project with client for whom they must produce measurable innovation supported by engineering system. Students prepare through extensive readings and exercises, from which they will learn how to identify and listen for human concerns, action, breakdowns, and coordination.

498 Independent Study in Engineering (1–3:3:0) Prerequisites: 60 credits; must be arranged with instructor and approved by department chair before registering. Directed self-study of special topics of current interest in ENGR. May be repeated for maximum 6 credits if topics substantially different.

499 Special Topics in Engineering (3:3:0) Prerequisites: 60 credits and permission of instructor; specific prerequisites vary with nature of topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics substantially different.

English (ENGL)

Prerequisite to all 200-level and above: 3 credits of 100-level English. Prerequisite to all English courses numbered above 302 unless otherwise noted: 3 credits of 100-level English and 3 credits of general education literature. Nonnative speakers of English with limited language proficiency are encouraged to take ENGL 100 instead of ENGL 101. Students may not receive credit for both ENGL 100 and 101.

100 Composition for Non-native Speakers of English (4:4:0) For non-native English speakers with limited language proficiency. Students must attain minimum grade of C to fulfill degree requirements. Intensive practice in drafting, revising, and editing expository essays of some length and complexity. Studies logical, rhetorical, and linguistic structure of expository prose, with attention to particularly difficult aspects of the language for non-native speakers. Methods and conventions of preparing research papers.

101 Composition (3:3:0) Intensive practice in drafting, revising, and editing expository essays of some length and complexity. Studies logical, rhetorical, and linguistic structure of expository prose. Methods and conventions of preparing research papers. Students must attain minimum grade of C to fulfill degree requirements.

201 Reading and Writing about Texts (3:3:0) Close analysis of literary texts, including but not limited to poetry, fiction, and drama. Emphasizes reading and writing exercises to develop basic interpretive skills. Examines figurative language, central ideas, relationship between structure and meaning, narrative point of view.

202 Texts and Contexts (3:3:0) Studies literary texts within the framework of culture. Examines texts within such categories as history, gender, sexuality, religion, race, class, and nation. Builds on reading and writing skills taught in ENGL 201.

203, 204 Western Literary Traditions (3:3:0), (3:3:0) Major works of Western literature in historical progression. ENGL 203 focuses on writers such as Homer, Sophocles, Euripides, Dante, Cervantes, Machiavelli, and Montaigne. ENGL 204 covers writers such as Moliere, Mme. de Lafayette, Goethe, Ibsen, Flaubert, Dostoyevsky, Tolstoy, Mann, Kafka, Borges, and Soyinka. All readings are in modern English. Courses build on reading and writing skills taught in ENGL 201.

302 Advanced Composition (3:3:0) Prerequisites: completion of 45 credits including general education composition and general education literature, requires a grade of C or better. Intensive practice in writing and analyzing expository forms such as essay, article, proposal, and technical or scientific reports with emphasis on research related to student’s major field. Schedule of Classes designates particular sections of ENGL 302 in business, humanities, natural sciences and technology, and social sciences.

309 Introduction to Nonfiction Writing (3:3:0) Not to be taken concurrently with ENGL 399 or 489, and not to be taken by students who have taken ENGL 489. Not a remedial course. Advanced practice in analyzing and writing nonfiction forms such as essay, profile, article, and technical or scientific report, depending on student’s interests.

311 Writing Ethnography (3:3:0) Study and practice of ethnographic writing. Students conduct ethnographic investigations and practice journal keeping, field note recording, interviewing, transcription, and interpretation. Includes introduction to current issues in ethnographic writing.


325 Dimensions of Writing and Literature (6:6:0) Open to all students. Required of those majoring or minoring in English, who should take ENGL 325 before taking other 300- or 400-level literature courses, and who must obtain a minimum grade of C to satisfy degree requirements in English major or minor. Examines English as discipline, and develops interpretive skills for further study in the major. All sections cover issues such as form, genre, point of view, figurative language, conventions of close reading and literary interpretation, and how culture shapes texts. Regular class meetings; weekly lectures, performances, or readings.

326 General Linguistics (3:3:0) See LING 326.

327 Introduction to Cultural Studies (3:3:0) Introduces interpretive practices associated with cultural studies.

330 Introduction to Literary Theory (3:3:0) Introduces contemporary theories informing literary and cultural study such as deconstruction, poststructuralism, new historicism, feminism, psychoanalysis, and contemporary cultural studies.

331 Introduction to Documentary (3:3:0) This introduction to the study of documentary considers fundamental concepts of form, style, and subject matter, ethical considerations, and theories of documentary, and includes close analysis of a series of representative film and television texts.

332 Introduction to Film (3:3:0) Introduces film medium as an art form.
333 Folklore of the Americas (3:3:0) Topics include folktales, personal narratives, legends, proverbs, jokes, folk songs, folk art and craft, and folk architecture. Considers ethnicity, community, family, festival, folklore in literature, and oral history. Discusses traditions in students’ own lives.

334 Literary Approaches to Popular Culture (3:3:0) Emphasizes popular fiction and adaptation of popular prose genres to media that have strong verbal and visual elements. Relationship between verbal and nonverbal elements of media such as film, comics, and radio.

335, 336 Shakespeare (3:3:0) Twenty selected plays. ENGL 335 emphasizes histories and comedies; ENGL 336, tragedies and romances.

337 Special Topics in Myth and Literature (3:3:0) Studies how traditional mythologies are reflected in English and American literature and other texts as themes, motifs, and patterns. May be repeated once for credit when course content differs.

338 Cultural Constructions of Sexualities (3:3:0) Introductory survey of cultural, literary, and theoretical constructions of sexuality that seek to complicate traditionally fixed categories of identity. Examines various representations of human sexuality, with particular attention to intersections with gender, race, ethnicity, nationality, and class.

342 Web Authoring and Design (3:3:0) Provides a rhetorical foundation for web authoring and design in professional settings. Students will learn basic principles of writing for the web, information architecture, coding for accessibility, and usability testing. The production-oriented component of the course provides instruction in writing valid code and practice with web- and graphic-editing software tools.

343 Textual Media (3:3:0) Critical reading of new media texts and creation of technology-enriched texts in variety of rhetorical genres. Instructs students in rhetoric of new media, whether produced as hypertext, multimedia, or interactive digital productions. Technology-enriched activities present complex textuality of words, images, word-as-image, and kinetic text.

344 Introduction to Digital Writing in the Genres (3:3:0) Prerequisites: ENGL 396, or permission of instructor. Combined workshop and studio course in technological and aesthetic issues of reading and writing hypermedia texts with emphasis on poetry, fiction, creative nonfiction, mixed genre, drama, or performance. Explores how genre meets hypertext and hypermedia in original creative work. Includes techniques in authoring interactive hypermedia projects using digital media tools. May include reading assignments in hypertext and hypermedia theory.

345 Special Topics: Literary Surveys (3:3:0) Advanced introduction to major movements and representative figures of two or more centuries or periods of American, British, European, or world literature. May be repeated once for credit when course content is different.

349 Global Voices (3:3:0) Prerequisite: 45 credits. Studies two cultures other than contemporary British or American culture through exploration of several textual forms such as written literature, oral literature, film, folklore, or popular culture. Specific cultures vary, but at least one is non-Western.

350 The Idea of a World Literature (3:3:0) Prerequisite: 45 credits. Examines history and current status of conceptions of world literature, considering such topics as non-European influences on Western literature, shifting horizons of comparative literature, rise of postcolonial literature, place of translation, and role of international institutions such as UNESCO and the Nobel Prize. Focuses on degree to which these initiatives have been successful in promoting global understanding of literary production.

360, 363 Special Topics in Literature (3:3:0) Studies literature by topics, such as women in literature, science fiction, and literature of the avant garde. Topic changes each time course is offered. May be repeated when course content differs.

368 Beginnings of African American Literature Through 1865 (3:3:0) Concentrating on such poets as Phillis Wheatley, Jupiter Hammon, Lucy Terry, and George Moses Horton, examines significant African American literary, social, and political texts produced through 1865. Special attention to narrative accounts of enslavement and freedom by Frederick Douglass, Harriet Jacobs, and Olaudah Equiano; political writings and orations of David Walker and Sojourner Truth; fiction of Harriet Wilson and William Wells Brown; and nonwritten cultural artifacts such as slave songs and spirituals.

369 Women and Literature (3:3:0) Explores experiences of women as both authors and subjects of imaginative literature. May be repeated for credit when subtitle is different.


371 African American Literature Through 1946 (3:3:0) Focusing on fiction, poetry, drama, and autobiography, explores evolution of African American literature and aesthetics and major social, cultural, and historical movements such as the Harlem Renaissance of the 1920s and emergence of black naturalism, realism, and modernism in the 1930s–40s. Major authors include Zora Neale Hurston, Langston Hughes, Jessie Fauset, James Weldon Johnson, Jean Toomer, Nella Larsen, Margaret Walker, Chester Himes, Richard Wright, and Ann Petry.

372 Contemporary African American Literature (3:3:0) Encompassing array of genres and forms, examines black writing from mid-20th century to present. Engages textual, critical, political, and theoretical issues related to cardinal literary movements, such as Black Arts Movement of 1960s and Third Renaissance of 1980s–90s. Examines how musical forms such as blues, jazz, and rap shaped literary production. Major authors include Ralph Ellison, Gwendolyn Brooks, James Baldwin, Lorraine Hansberry, Amiri Baraka, Alice Walker, Ernest Gaines, Gloria Naylor, August Wilson, and Toni Morrison.

375 Ethnic American Literature (3:0:3) Prerequisite: 3 credits of general education literature. Studies particular
ethnic American literatures. Focuses on literatures such as Asian American, Native American, Latino/a, Arab American, or Jewish American. May be repeated once for credit when subtitle and course content are different.

380 Recent American Fiction (3:3:0) American short story writers and novelists from World War II to present, including Mailer, Barth, Cheever, Oates, Gass, Beattie, Updike, and Morrison.


392 Editing for Audience, Style, and Voice (3:3:0) Introduces editing as a textual and rhetorical practice. Addresses copyediting, stylistics, and design; revisions based on audience, purpose, and genre; multimedia editing; interactions between editors and authors. (Not a remedial course in fixing sentence errors.)

396 Introduction to Creative Writing (3:3:0) Assignments include writing exercises and original works of poetry and fiction. May also include drama or creative nonfiction. Includes reading assignments in covered genres, and may include oral presentations or in-class performance. Original student work read and discussed in class and conference with instructor.

397 Poetry Writing (3:3:0) Prerequisite: ENGL 396, or permission of instructor. Workshop in reading, writing poetry. Original student work read and discussed in class and conferences with instructor. Technical exercises in craft of poetry; may include reading assignments.

398 Fiction Writing (3:3:0) Prerequisite: ENGL 396, or permission of instructor. Workshop course in reading and writing fiction. Original student work read and discussed in class and conferences with instructor. Includes technical exercises in craft of fiction; may include reading assignments.

399 Creative Nonfiction Writing (3:3:0) Prerequisite: ENGL 309 or 396, or permission of instructor. Workshop in reading and writing of nonfiction that makes use of literary techniques normally thought of in context of fiction, such as evoking senses and use of dialogue. Original student work read and discussed in class and conferences with instructor. Includes technical exercises in artful creating of nonfiction; may include reading assignments.

400 Literature of the Middle Ages (3:3:0) Selected English narrative, dramatic, and homiletic literature written between 1300 and 1500, exclusive of Chaucer.


402 English Poetry and Prose of the 17th Century (3:3:0) English poetry and prose from 1603 to 1688, excluding Milton.

404 The Augustan Age (3:3:0) English literature from late 17th century to mid-18th century. Includes Dryden, Rochester, Behn, Defoe, Swift, Pope, and Montagu.

405 The Age of Sensibility (3:3:0) English literature of later 18th century, time of American and French Revolutions, including new developments in novel, drama, biography, and poetry. Includes Johnson, Boswell, Blake, Goldsmith, Sterne, Gray, Cowper, Burney, Godwin, and Wollstonecraft.


407 Prose and Poetry of the Victorian Period (3:3:0) Poetry and nonfiction prose by such authors as Carlyle, Arnold, Tennyson, Elizabeth Barrett Browning, Robert Browning, Ruskin, Mill, and Wilde.

408 Special Topics: British Literary Periods (3:3:0) In-depth study of selected period of British literature. In addition to literary examples, materials may be chosen from art, philosophy, or popular culture of the time. When subtitle is different, may be repeated once for credit with permission of department.

410 Professional and Technical Writing (3:3:0) Prerequisite: ENGL 302. Intensive study and practice in various forms of professional and technical writing, including proposals, reports, instructions, news releases, white papers, and correspondence. Emphasizes writing for variety of audiences, both lay and informed, and writing within various professional and organizational contexts.

414 Honors Seminar (3:3:0) Prerequisite: permission of department. Emphasizes growth in awareness of literary scholarship as a discipline, providing opportunity for advanced study in literary and cultural criticism. Covers variety of topics, including consideration of a literary period, genre, author, work, theme, discourse, or critical theory. May be repeated for credit.

415 Honors Thesis Writing Seminar (3:3:0) Prerequisites: permission of department and ENGL 414 or 416. Gives students who wish to write an English honors thesis guidance in research methods, while offering opportunity to share and critique works in progress in workshop format. Students may take thesis seminar concurrently and in coordination with another approved course offered by English Department. In this case, the thesis of about 30 pages explores area covered by second course, and instructor in that course serves as thesis reader and advisor. Students receive credit for thesis seminar and second course; however, thesis work may substitute for some assigned work in second course by arrangement of instructors of thesis seminar and second course.

416 Honors Independent Study (1–3:0:0) Prerequisites: admission to honors program in English, and permission of instructor. Intensive writing course. Honors students concentrating in nonfiction writing and editing may use English 416 to replace English 414 as first course in Honors program. Honors students concentrating in creative writing may use English 416 to replace 415 as second course in Honors program.

421 Topics in Film History (3:3:0) Advanced studies of development of film language, both as cultural practice and medium for formal innovation. Topics might include studies of national cinemas, historical periods, genres, or individual directors. May be repeated once for credit when topic is distinctly different.

422 Topics in Film Theory (3:3:0) Advanced studies of theories about various aspects of production, distribution, and reception of film-mediated experiences. Topics may include theories of spectator, semiotics, feminist film theory,
theories of narrativity, structuralist film theory, or deconstruction. May be repeated once for credit when topic distinctly different.

423 Colonial and Federalist American Literature (3:3:0) Works of first 200 years of American literature, including Edwards, Franklin, Irving, Cooper, and Bryant.


429 Special Topics: American Literary Periods (3:3:0) In-depth study of selected period of American literature. In addition to literary examples, materials may be chosen from art, philosophy, or popular culture of time. May be repeated once for credit when subtitle is different, with permission of department.

431/HIST 431/FRLN 431 Medieval Intellectual Topics (3:3:0) May be taken for credit by English or history majors. Examines selected topic in intellectual history of Middle Ages. Specific topic may vary. Primary emphasis is literary or historical, depending on discipline of instructor. May consider relevant material from philosophy, theology, and art.


437 Twentieth-Century Continental Novels in Translation (3:3:0) Offered in cooperation with the Department of Modern and Classical Languages. Focuses on continental novel from beginning of 20th century to present. Includes Proust, Mann, Gide, Kafka, Yor yecvar, Beauvoir, Calvino, and Garcia Marquez. Attention to influence of this literature on novel in English.

439 Literature in English Other Than British and American (3:3:0) Study of selected topics, periods, genres, or authors in literature written in English, originating in Canada, Australia, New Zealand, South Asia, or Africa, for example. May be repeated once for credit when subject is different, with permission of department.

440 English Renaissance Drama (3:3:0) Major dramas and dramatists of English Renaissance, such as Lyly, Marlowe, Jonson, Middleton, Webster, and Ford.

443 Restoration and Eighteenth-Century Drama (3:3:0) Restoration comedy of manners, sentimental comedy, and neoclassical and bourgeois tragedy. Theories of drama and conventions of staging. Includes writers such as Wycherley, Behn, Congreve, and Cowley.

445 English and Irish Drama of the Twentieth Century (3:3:0) English or Irish drama from Yeats to the present. Plays by authors such as Yeats, Synge, O’Casey, Osborne, Wesker, Pinter, Friel, Churchill, and Gems.

447 American Drama of the Twentieth Century (3:3:0) American drama of 20th century, with special attention to playwrights such as Glaspell, O’Neill, Miller, Williams, Fornes, and Albee.

448 Modern Drama (3:3:0) Representative plays of most influential European and American dramatists, with emphasis on dramatic styles such as realism, expressionism, epic, and existentialism. Studies Chekhov, Ibsen, Strindberg, Brecht, and Beckett.

449 Special Topics in Drama (3:3:0) Studies selected topics, periods, or playwrights. May be repeated once for credit when subtitle is different, with permission of department.


452 Development of the American Novel to 1914 (3:3:0) Major American novels of the pre-World War I period with emphasis on Brown, Cooper, Hawthorne, Melville, Twain, Howells, James, Crane, Dreiser, Norris, and others.

453 English Novel of the 19th Century (3:3:0) Works by Dickens, Thackeray, the Brontes, Eliot, Trollope, and Hardy.


456 English Novel of the Twentieth Century (3:3:0) Works by Conrad, Forster, Lawrence, Joyce, Woolf, Greene, Lessing, Spark, and Fowles.

458 Advanced Fiction Writing Workshop (3:3:0) Prerequisites: ENGL 398 and manuscript review. Submit 8–10 pages of fiction to instructor. Enrollment is controlled. Workshop; intensive practice in creative writing and study of creative process. Intended for students already writing original creative work. With permission of instructor may be taken a second time for credit.

459 Special Topics in Fiction (3:3:0) Study of selected topics, periods, or authors. May be repeated once for credit when subtitle is different, with permission of department.

460 Critical Study of Children’s Literature (3:3:0) Examines the history and criticism of children’s literature and the strategies used by authors of children’s literature to address their audience. Selected readings range from Puritan to contemporary writing for children, as well as influential works in educational philosophy, such as those by Locke and Rousseau.

462 English Poetry of the Twentieth Century (3:3:0) Emphasizes work of Hardy, Yeats, Lawrence, Graves, Auden, Thomas, and Hughes. Work of fiction employing poetic techniques, such as Joyce’s Ulysses, may also be studied.

463 American Poetry of the Twentieth Century (3:3:0) Emphasizes work of Robinson, Frost, Stevens, Williams, Pound, Crane, Eliot, and Lowell. May include work of fiction employing poetic techniques, such as Faulkner’s The Sound and the Fury.

464 Advanced Poetry Writing Workshop (3:3:0) Prerequisites: ENGL 397 and manuscript review. Submit 8–10 pages of poetry to instructor. Enrollment is controlled. Intensive practice in the craft of poetry and study of the imagination in creative process. Intended for students already writing original poetry. At discretion of instructor, technical exercises and assigned reading may be required. With permission of instructor, may be taken a second time for credit.
468 Special Topics in Poetry (3:3:0) Study of selected topics, periods, or poets. May be repeated once for credit when subtitle is different, with permission of department.

471 Chaucer (3:3:0) Major works of Chaucer, with emphasis on The Canterbury Tales.

472 Spenser (3:3:0) Poetry of Edmund Spenser, with central emphasis on The Faerie Queene.

473 Special Studies in Shakespeare (3:3:0) Study of one aspect of Shakespeare’s art or critical issues surrounding his work. May be repeated once for credit when subtitle is different, with permission of department.

474 Milton (3:3:0) Milton’s major poetic works, with emphasis on Paradise Lost.

477 Special Topics: British Authors (3:3:0) Study of one or two major figures in British literature. May be repeated once for credit when subtitle is different, with permission of department.

478 Special Topics: American Authors (3:3:0) Study of one or two major figures in American literature. May be repeated once for credit when subtitle is different, with permission of department.

479 Ethnicity and Immigration in Folklore (3:3:0) Explores U.S. immigration trends and the historical basis for the concepts of ethnicity, identity, and immigration in folklore scholarship, literature, film, and popular media. The course explores at least three of the following ethnic groups: Latino, Asian, Jewish, European, Arab, or African.

480 Advanced Nonfiction Writing (3:3:0) Prerequisite: ENGL 309 or 399, or permission of instructor. Workshop course. Intensive practice in advanced nonfiction writing; emphasizes writing for publication. Occasional special topics sections in such forms as autobiography and scientific writing.

492 Science Fiction (3:3:0) Major works of science fiction in terms of mode, themes, and narrative techniques, especially role of hypothesis in science fiction. Focuses on novels, short stories from early 19th century to present.

493 Special Topics in Popular Literature (3:3:0) Studies specific topic or theme in popular literature. May be repeated once for credit when subtitle is different, with permission of department.

494 Special Topics in Criticism (3:3:0) Studies selected approach to literary criticism, as announced, with exercises in critical analysis. Includes new criticism, structuralism, psychoanalysis, and Marxism. May be repeated with permission of department.

495 Literary Modes (3:3:0) Theory and practice of such modes as tragedy, comedy, tragicallyomedy, romance, and satire, considered in separate semesters and drawn from variety of periods ranging from biblical times to present, with examples from drama, poetry, and fiction. May be repeated with permission of department.

496 Topics in Rhetoric and Writing (3:3:0) Advanced studies in rhetoric and writing. Introduces key rhetorical terminology and examines how texts construct meaning and how those meanings are determined within social contexts. Topics may include the relationship between rhetorics and poetries, rhetoric and new media, histories of rhetoric, global rhetorics, argument theory, discourse analysis, theories of technical communication, or advanced theories of composition and pedagogy. May be repeated once for credit when subtitle is different, with permission of department.

497 Special Topics in Creative Writing (3:3:0) Prerequisite: ENGL 396 or equivalent, and permission of instructor. Students must submit typed manuscript at least one week before registration. Workshop course. Intensive practice in creative writing and study of creative process. Concentrates on specialized literary type other than short story or poetry, such as playwriting, screenwriting, children’s literature, travel literature, autobiography, gothic novel, and translation. Concentration announced in department’s Course Description Booklet before preregistration. Intended for students already writing original creative work. May be taken second time for credit.

498 Internship: Special Topics (1–3:0:0) Prerequisites: 60 credits including 3 credits of 100-level English course; 6 credits of 200-level English courses; and 3 credits of English 302. English majors need 6 additional credits of upper-level English courses. Non-English majors need 3 additional credits of upper-level English courses, and 3 credits of upper-level courses in the major. Unpaid, approved work-study positions at specific sites. Under supervision of faculty advisor, students work as intern with site supervisor in agency of student’s choosing, with advisor’s permission. For 3 credits, students work 120 hours on site and write 3,500 words, or the equivalent, given contract with advisor. Contact the English Department one semester prior to enrollment. No more than 3 credits can be counted in concentration or English minor. May be repeated for credit once with permission of department.

499 Independent Study (1–3:0:0) Prerequisites: permission of department and instructor. Individualized section form required. Intensive study of particular author, genre, period, or critical or theoretical problem in literature or linguistics, to be conducted by student in close consultation with instructor. Student produces at least one substantial piece of written work during semester on research findings. With permission of department, course may be taken twice for maximum 6 credits.

With permission of department, qualified undergraduates may enroll in 500-level courses for either undergraduate or reserved graduate credit.

501 Introduction to Professional Writing and Rhetoric (3:3:0) Provides historical and theoretical background in professional writing and editing, including editing in literary tradition and organizational settings. Explores professional writing’s emergence as field of scholarship and practice in seminar and practicum format.

502 Research Methods in Rhetoric and Professional Writing (3:3:0) Introduces theory, methods, and ethics of
conducting research in rhetoric and professional writing. Students learn to conduct and evaluate research that may include rhetorical analysis, discourse analysis, historical methods, ethnography, user-centered design, document and usability testing, and others.

503 Theory and Practice of Editing (3:3:0) Prerequisite: 6 credits of English courses numbered above 300, including one of 309, 311, 396, 397, 398, 410, 458, 464, 489, or 497; or permission of department. Instruction in revising, editing, and preparing specialized writing for printing. Emphasizes methods of achieving clarity, accuracy, and completeness. Lecture and discussion on editing and printing techniques; practical exercise in revision, layout, and production.

504 Internship in Writing and Editing (3:0:0) Open to senior English majors, and graduate students pursuing MA in English or MFA. Contact English Department one semester before enrolling. Variable credit and prerequisites. Approved work-study positions in writing or editing established by department with specific employers.

505 Computer-Assisted Publications Writing and Design (3:3:0) Theory and practice of using computer programs to design and produce publications including brochures, fliers, newsletters, and small magazines. Includes readings, writing papers, and producing and editing copy and original publications.

506 Research for Narrative Writing (3:3:0) Prerequisite: ENGL 565 or 566, or permission of instructor. Combines study of basic research tools with field work and writing workshop experience. Helps students develop techniques and skills necessary for writing a research-dependent project of sufficient complexity to be of book or long essay length. Emphasis on finding story behind facts, using material from numerous sources.

507 Field Work in Applied Linguistics (3:0:0) See LING 507.

508 Digital Rhetoric and Design (3:3:0) Provides an examination of major works on digital rhetoric and digital media framed by contemporary rhetorical theories that inform the emergent field of digital rhetoric. Course work includes projects that engage in the design, analysis, and assessment of digital media.

511 Styles and Modes in Literary History (3:3:0) Prerequisites: 15 credits of advanced undergraduate English courses and permission of department; or baccalaureate degree. Historical consideration of principal styles, modes, and intellectual paradigms in literary and cultural texts.

512/PHIL 512 Issues in Literature and Philosophy (3:3:1) Prerequisites: graduate or senior standing, 6 credits of upper-level English, 6 credits of philosophy, and permission of instructor. Interdisciplinary seminar offering opportunity to arrive at a personal synthesis of work previously done in philosophy and literature. Topic changes yearly, but focuses on themes or methodologies common to both disciplines.

513 Advanced Special Topics in English (3:3:0) Prerequisites: 15 credits of advanced undergraduate English courses and permission of department; or baccalaureate degree. Intensive study of topics involving literary or other texts such as film, television, opera, and folklore. May be repeated for credit with permission of department.

514/CL 514 Theories of Comparative Literature (3:3:0) Prerequisite: CL 300 and senior standing, or baccalaureate degree; or permission of instructor. Intensive study of major theories of comparative literature with special emphasis on development and redefinition of comparative outlook, from Great Books and Western Canon to transnationalism, multiculturalism, and intercultural studies.

520 Descriptive Linguistics (3:3:0) See LING 520.


522 Modern English Grammar (3:3:0) See LING 522.


526 Special Topics in the History and Criticism of Children's Literature (3:3:0) Focuses on the history and criticism of children’s literature, by concentrating on selected historical periods and literary modes such as “Golden Age” children’s literature, contemporary fantastic and children’s literature, or Romantic and Victorian children’s literature. May be repeated once for credit with permission of instructor.

551 Literary Criticism (3:3:0) Studies in selected critical theories pertinent to textual and cultural analysis.

555 Introduction to Cinema Studies (3:3:0) Students who have taken ENGL 332 may not take this course for credit. Advanced introduction to film study, including overview of approaches to study of cinema, methods of close analysis, basic concepts of film form and style, and contemporary theories of film.

564 Form of Poetry (3:3:0) Prerequisites: ENGL 464 or equivalent, and permission of instructor, except for MFA students in the concentration. Students seeking permission must submit typed manuscript of original poetry. Intensive study of and practice in formal elements of poetry through analyzing models and weekly or biweekly writing assignments. Intended for students already writing original poetry. Covers rhyme, meter, rhythm, lineation, stanza pattern, traditional and experimental forms, free verse and open-form composition, lyric, narrative, and dramatic modes.

565 Forms of Nonfiction (3:3:0) Prerequisites: ENGL 489 or equivalent, and permission of instructor, except for MA and MFA candidates in English. Intensive study of and practice in various forms of nonfiction writing through analyzing models and weekly writing assignments. Includes biographies, documentaries, editorials, interviews, reports, reviews, and essays.

566 Forms of Fiction (3:3:0) Prerequisites: ENGL 458 or equivalent, and permission of instructor, except for MFA students in concentration. Students seeking permission must submit typed manuscript of original fiction. Intensive practice in formal elements of fiction through analyzing models and weekly or biweekly writing assignments. Intended for students already writing original fiction. Covers description, narration, plot, dialogue, voice, point of view, style, epiphany, and antifiction techniques.

581 Psycholinguistics (3:3:0) See LING 581.

582 Second Language Acquisition (3:3:0) See LING 582.

591 Special Topics in Folklore (3:3:0) Explores various aspects of folklore and folklife such as narrative and story-
Courses

Non-MFA students seeking permission must submit manu-
or 489, and permission of instructor for non-MFA students.

608 Craft Seminars (3:3:0) semester prior to enrollment.

contract with advisor. Contact English Department one
May	be	taken	concurrently	with	ENGL	564,	565,	566.

discussions. Assignments vary with genre and specific topic.
mixed with reading followed by careful analytical and craft
focusing in different ways on the practices and the craft
sections offer work in fiction, poetry, and nonfiction, each
or developmental reading.

not satisfy Virginia certification requirement in diagnostic
response to literature, with some classroom practice. Does
methods of literary analysis, and ways of developing student

610 Proseminar in Teaching the Reading of Literature
(3:3:0) Methods of teaching literature. Includes study of
sections offer work in fiction, poetry, and nonfiction, each
focusing in different ways on the practices and the craft
development of writers. Numerous writing assignments
mixed with reading followed by careful analytical and craft
discussions. Assignments vary with genre and specific topic.
May be taken concurrently with ENGL 564, 565, 566.

619 Special Topics in Writing (3:3:0) Prerequisite: Two
graduate writing courses or permission of instructor, except
for MFA students in concentration. Intensive practice in
craft of writing and study of creative process. Intended for students already familiar with tradi-
tional and contemporary poetic modes and already writing
original poetry. At discretion of instructor, reading may be
required. May be repeated for credit with permission of
department.

625 British Medieval (3:3:0) Selected literary authors,
works, or movements from 1300 to 1500, studied in Middle
English. Content varies. May be repeated twice for credit
with permission of department.

630 Early Modern (3:3:0) Selected literary authors, works,
or movements of English Renaissance. Content varies.
May be repeated three times for credit with permission of
department.

635 Eighteenth-Century British (3:3:0) Selected English
literary authors, works, or movements of 18th century.
Content varies. May be repeated twice for credit with permis-
sion of department.

640 Nineteenth-Century British (3:3:0) Selected English
literary authors, works, or movements of 19th century.
Content varies. May be repeated twice for credit with permis-
sion of department.

645 Twentieth-Century British (3:3:0) Selected English
literary authors, works, or movements of 20th century.
Content varies. May be repeated twice for credit with permis-
sion of department.

652 British Medieval (3:3:0) Selected literary authors,
works, or movements from 1300 to 1500, studied in Middle
English. Content varies. May be repeated twice for credit
with permission of department.

661 Early Modern (3:3:0) Selected literary authors, works,
or movements of English Renaissance. Content varies.
May be repeated three times for credit with permission of
department.
650 Seventeenth-Century American (3:3:0) Selected literary authors, works, or movements of the “new world” before 1800. Content varies. May be repeated once for credit with permission of department.

655 Nineteenth-Century American (3:3:0) Selected American literary authors, works, or movements of 19th century. Content varies. May be repeated twice for credit with permission of department.

660 Twentieth-Century American (3:3:0) Selected American literary authors, works, or movements of the 20th century. Content varies. May be repeated for credit with permission of department.

661 Advanced Survey in African American Literature (3:3:0) Intensive study of period in African-American literature between 1800 and present, with focus to be determined by instructor. Several genres will be considered, including autobiography; fiction; drama; poetry; essays; and oral artifacts such as slave songs, spirituals, and hip-hop. May be repeated for credit with departmental permission.

665 Texts in Global Contexts (3:3:0) Examines various cultural texts such as literature, drama, film, and folklore in terms of transnational circulation or production and reception in locations around the world other than Britain and United States. Engages with issues arising from globalization of English and interplay of global cultures. Texts studied in English or English translation. May be repeated once for credit with permission of department.

670 Visual Culture: Theories and Histories (3:3:0) Prerequisite: Introductory film course, or permission of instructor. Advanced study in histories of visual representation including film, television, and video, and in theories of production and circulation of meanings in visual culture. May be repeated once for credit with permission of department.


676 Introduction to Cultural Studies (3:3:0) Advanced introduction to theoretical practice known as cultural studies, with attention to role in textual studies. Part of interdisciplinary cultural studies PhD and MA in English programs.

684 Proseminar in Poetry (3:3:0) For students working on independent reading and research in poetry. Designed for students preparing to take the MFA reading exam in poetry but open to others with comparable reading projects in poetry.

685 Selected Topics, Movements, or Genres of Literature in English (3:3:0) Content varies. May be repeated for credit with permission of department.

686 Special Topics in Linguistics (3:3:0) See LING 686.

690 Generative Phonology (3:3:0) See LING 690.

691 Theories of Language (3:3:0) See LING 691.

692 Phonology II (3:3:0) See LING 692.

695/EDUC 695 Northern Virginia Writing Project Inservice Program (1,2,3:0:0) Prerequisite: admission to graduate program, or permission of department. Offered at request of school division or other education agency to assist teachers in improving student writing and use of writing to learn. Content varies. May be repeated once for credit with permission of department.

696/EDUC 696 Northern Virginia Writing Project Teacher/Research Seminar (3:0:0) Prerequisite: ENGL 695/EDUC 695 or NWWP Summer Institute. Acquaints classroom teachers with findings related to composing process and methods of studying writing in school setting. Focuses on developing proposal investigating some aspect of composing process. Teachers who developed proposal before enrolling conduct research during course.

697/EDUC 697 Composition Theory (3:3:0) Acquaints classroom teachers with theory relating to writing and teaching composition. Focuses on explaining theories of participants, reading works of leading theorists, and developing statement describing implications of theoretical consistency in teaching writing.

699 Workshop in English (1–3:0:0) Prerequisite: admission to graduate program, or permission of department. Concentrated workshops, educational tours, independent studies, and special seminars dealing with selected topics in writing, linguistics, film, electronic media, and literature written in English. All tours are optional, and may be replaced by specified work conducted on campus. May be repeated for credit with permission of department, but no more than 6 credits of ENGL 699 may be applied to master’s degree in English. No more than 3 credits of 699 may be applied to literature requirement for MFA degree.

701 Research in English Studies (3:3:0) Introduces research in English studies, including practice in library methods, writing critical bibliography, evaluating issues and problems, and surveying scholarly activities in department.

705 Literary Theory and Criticism (3:3:0) Major theories of literature and methods of analyzing and evaluating literary works. Content varies. May be repeated once for credit with permission of department.

740 Seminar in English/Cultural Studies (3:3:0) Prerequisites: 9 credits of graduate English courses including 701, or permission of department. Analyzes historical shifts in literary and cultural discourse or of relationships between literary and nonliterary elements of culture within specific historical moment. Major research paper required. Specific topics vary. May be repeated once for credit with permission of department.

750 Advanced Workshop in Poetry Writing (3:3:0) Open to MFA students only. Intensive practice in craft of poetry for experienced writers. May be repeated for credit with permission of department.

751 Advanced Workshop in Fiction Writing (1–6:1–6:0) Open to MFA students only. Intensive practice in craft of fiction for experienced writers. May be repeated for credit with permission.

752 Advanced Workshop in Nonfiction Writing (1–6:1–6:0) Open to MFA students only. Intensive practice in craft of nonfiction for experienced writers. May be repeated for credit with permission.

785 Semantics and Pragmatics (3:3:0) See LING 785.

786 Syntax I (3:3:0) See LING 786.

787 Syntax II (3:3:0) See LING 787.
780 Directed Reading and Research (1–3:0:0) Prerequisite: open only to degree students who have preregistered and have completed 15 credits, including ENGL 701. Reading, research, and writing on specific project under direction of department member. Oral or written report required. MA students may repeat once for credit with permission of department. MFA students may present up to 12 credits of ENGL 780 for graduation, but no more than 3 may count toward completing literature requirement.

797 Projects in Professional Writing and Rhetoric (3:3:0) Prerequisites: ENGL 501, ENGL 502, and 6 credits of professional writing and rhetoric courses. Students complete a capstone project guided by instructor and a faculty consultant. Reflecting on theories and methods learned in previous course work and applying them to a concrete rhetorical situation, students produce a professional-quality project for a primary audience located in the professional workplace or the discipline of rhetoric and professional writing. Graded S/NC.

799 Thesis (1–6:0:0) Students who take ENGL 798 to develop thesis topic and then elect thesis option receive 3 credits for ENGL 799 on completion of thesis. Students who do not take ENGL 798, or who take it to work on project unrelated to thesis, receive up to 6 credits for ENGL 799 on completion of thesis. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study in English. Program of studies designed by discipline director and approved by doctoral committee that prepares student for research and writing in area of interest of discipline director. Enrollment may be repeated.

801 New Developments in English (3:3:0) Designed for students in doctor of arts in community college education program. Focuses on major original texts that have influenced discipline of English in late 20th century. Readings are from literary studies, composition and writing theory, and linguistics.

Enterprise Engineering and Policy (EEP)

School of Public Policy

601 Introduction to Enterprise Engineering: Engineering and Policy (3:3:0) Provides overview of extended enterprise integration using modern standard software solutions and tools. Focuses on integration and management aspects of extended enterprise solutions. Topics include enterprise resource planning and e-business extensions. Students must demonstrate complete proficiency in modern implementation methodology and supporting tools.

602 Decision Support for Enterprise Integration (3:3:0) Prerequisite: EEP 601. Lectures focus on using “business intelligence” to enhance competitive advantage, developing information-driven set of controls to improve profitability, and creating balanced business with aligned corporate direction and strategic intent. Examines solutions within enterprise resource planning systems.

603 Supply Chain Integration and Management (Business-to-Business Electronic Commerce) (3:3:0) Prerequisite: EEP 601. Focuses on two issues: supply chain integration from information technology perspective, and supply chain management from decision support perspective. Course motivation is merging of enterprise computing with operations research, primarily through customer and supply chain management systems. Topics include enterprise resource planning and web integration, advanced planning and scheduling, and CPFR.

604 E-Commerce Architectures (Business-to-Consumer Electronic Commerce) (3:3:0) Prerequisite: EEP 601. Introduces network and system architectures that support high-volume, business-to-consumer web sites and portals. Provides insight into structure of modern web-enabled storefront. Critical business and technology issues include storage area networks, server clustering, load balancing techniques at server and network levels, fault tolerance, and recovery of database and application servers.

605 Economics of Electronic Commerce (3:3:0) Prerequisite: EEP 601. Focuses on gaining competitive advantage through electronic commerce implementation; identification and growing of new market opportunities and electronic enabling of existing business relationships; business-to-consumer relationships and economics of strategic procurement; enterprise resource planning hosting; customer relationship management; catalog hosting; portal operations; and supplier management.

606 Customer Relationship Management (3:3:0) Prerequisite: EEP 601. Modern world of e-commerce extends intraenterprise integration, as implemented in enterprise resource planning systems, to include external constituents such as customers, partners, and suppliers. Course focuses on modern system support for demand chain, and value-creation process that results from integrating “front office” and “back office” systems.

607 Critical Information Technology Infrastructures (3:3:0) Prerequisite: EEP 604. Focuses on design and implementation of high-speed network and application services in support of modern enterprise resource planning (ERP) systems. Critical technologies include high-speed data communication, switched vs. routed data flow, workflow engines, business rule and web application servers, and load-balancing technologies. Large-scale, web-enabled ERP system architecture examined in detail.

608 Optimization of Supply Chains (3:3:0) Prerequisites: MATH 203 and 213, and graduate standing. Focuses on supply chain optimization from enterprise-wide perspective, and supply chain optimization from business-to-business e-commerce perspective. Explores optimizing value of goods and services and assuring reasonable return on such sales. Describes heuristic and exact algorithms for scheduling, production, inventory management, logistics, and distribution. Presents new software that enables such optimization, and new techniques to handle risk, quality of data, and robustness of solutions. Outlines manufacturing and service examples from public and private sectors. Students perform case studies using state-of-art software.

609 Special Topics in Enterprise Engineering and Policy (1–3:1–3:0) Topics not covered in regular EEP course offerings; content varies each semester.

610 Project in Enterprise Engineering and Policy (3:3:0) Focuses on completing capstone project in enterprise engineering and policy. Designed as two-semester project, with student closely guided by faculty advisor. Topic selected by mutual agreement with faculty advisor.
Environmental Science and Public Policy (EVPP)

Environmental Science and Policy

110 The Ecosphere: An Introduction to Environmental Science I (4:3:3) Studies components and interactions that make up natural systems of our home planet. Teaches basic concepts in biological, chemical, physical, and Earth sciences in integrated format with lecture, laboratory, and field exercises. First semester of two-semester lab science sequence that can fulfill science requirements for BA students in CAS. (3:3:0)

111 The Ecosphere: An Introduction to Environmental Science II (4:3:3) Prerequisite: EVPP 110. Studies components and interactions that make up natural systems of our home planet. Teaches basic concepts in biological, chemical, physical, and Earth sciences in integrated format with lecture, laboratory, and field exercises. Second of two-semester lab science sequence that can fulfill science requirements for BA students in CAS. (3:3:0)

201 Environment and You: Issues for the Twenty-First Century (3:3:0) Introduces broad aspects of anthropocentric environmental considerations in contemporary world. Topics include global populations and wastewater treatment, environmental law, and genetic engineering. (3:3:0)

318 Conservation Biology (3:3:0) Prerequisites: BIOL 307 and 311. Introduces science used to identify species in need of conservation, and techniques to manage and protect organisms. (3:3:0)

335 People, Plants, and Culture (3:3:0) Prerequisites: completion or concurrent enrollment in all other required general education courses. Introduces students to the complex interactions of people and plants in historical and contemporary times. The course is team taught by professors of both natural and social science. The instructors will lend their expertise to fully address the fundamental links between botany, human ecology, and environmental health and sustainability. (3:3:0)

336 Human Dimensions of the Environment (3:3:0) Prerequisite: one of EVPP 110, GEOL 101, SOCI 101, or ANTH 114. Overview of current knowledge regarding human and environment interactions and human ecology. Topics include basic theoretical and conceptual issues, relationship between social and biological sciences, human causes and consequences of environmental change, and contemporary perspectives on environmental issues. (3:3:0)

337 Environmental Policy Making in Developing Countries (3:3:0) Prerequisite: 60 credits. Overview of environmental policy process in developing countries around the world. Major focus on understanding distinctive problems and dynamics of environmental policy making in poor countries to generate better policy decisions and management. (3:3:0)

339 Vertebrate Natural History (4:3:3). Prerequisite: BIOL 307 or equivalent. Introduces vertebrates with emphasis on systematics, life history, behavior, and ecology. Laboratory emphasis on identification and natural history of local fauna. (3:3:3)

350 Freshwater Ecosystems (4:3:3) Prerequisites: CHEM 211/212, and either EVPP 110/111 or BIOL 103/104. Studies physical, chemical, and biological processes in lakes, streams, and wetlands. Teaches physical and chemical aspects of aquatic systems and life cycles, and adaptations of aquatic organisms. Lectures, field trips, lab exercises. (3:3:3)

361 Introduction to Environmental Policy (3:3:0) Prerequisites: 30 credit hours. Environmental politics and policymaking since the 1970s. Primary focus on United States, with some discussion of global issues. Examines policy strategies and outcomes, ethical and economic debates, political controversies, lawmaking and enforcement, and role of key players. (3:3:0)

363 Coastal Morphology and Processes (4:3:3) Prerequisite: GEOL 309, BIOL 309, or GEOL 317; or 9 credits in geography, including GEOG 309. Studies global coastal geomorphology and processes with emphasis on U.S. Atlantic and gulf coasts. Topics include plate tectonics; sea-level changes; sediment supply; impact of waves, tides, and storms; and human activities. Lectures and extended weekend field trips to mid-Atlantic coast. (3:3:0)

377 Applied Ecology (3:3:0) Prerequisite: 60 credits, including 8 credits of biology, geology, or chemistry; or permission of instructor. Introduces ecosystem concepts and applications to natural and managed ecosystems. (3:3:0)

395 Undergraduate Research in Environmental Science and Policy (1–3:0:0) Prerequisites: 45 credits including at least two upper-level science lab courses. Original research project. May involve field and lab study, computer modeling and analysis, or other original research as appropriate. Research formulated and completed under instructor's guidance. Culminates in final report. May be repeated for total 10 credits. (1–3:0:0)

396 Directed Topic in Environmental Science and Policy (1–4:0:0) Prerequisites: 45 credits. Study of topic not otherwise available. May involve readings, lectures, lab assignments, and tutorials as jointly agreed on by student and instructor. Culminates in term paper, final exam, or both. May be repeated for maximum 8 credits. (1–4:0:0)

419 Marine Mammal Biology and Conservation (3:3:0) Prerequisites: BIOL/GEOL 309-001 or BIOL 449; 60 credit hours. Covers the evolution, biology, ecology, and behavior of marine mammals from polar bears and sea otters to whales and dolphins. Marine mammal conservation and policy is also a major component of the course; several lecture sessions are devoted to the issue of whaling, threats to marine mammal populations, and recent conservation issues such as marine mammals and noise pollution. The course also includes a number of guest lectures from a variety of international marine mammal experts. (3:3:0)

421 Marine Conservation (3:3:0) Prerequisites: BIOL/GEOL 309 and completed or concurrent enrollment in all other required general education courses. Provides an overview of threats to the marine environment, and discusses the scientific, socioeconomic, and political issues behind marine conservation. Covers categories of marine pollutants (chemical, biological, and physical contaminants) and their impacts on the marine ecosystem, as well as impacts on humans (health, social, and economic), threats to key marine species (e.g., coral, sharks, turtles, and marine mammals) and initiatives and laws developed to reduce these threats. Scientific and socioeconomic problems that hinder sustainable fisheries management and the science and policy behind the global warming debate are also discussed. The course also provides an overview of marine environmental law and policy issues related to marine conservation policy. (3:3:0)
Courses

451 Fungi and Ecosystems (3:3:0) Prerequisite: BIOL 304 or course in microbiology; or permission of instructor. Considers impact of fungi on ecosystems in terms of effects on biogeochemical cycling, primary and secondary production, and regulating community structure and populations of individual species through activities as symbionts and parasites. Discusses role of fungi in ameliorating pollutants produced by anthropogenic activities.

490 Special Topics in Environmental Science and Policy (1–4:1–4:1–4) Prerequisites: 60 credits, and permission of instructor. Studies selected topics in environmental science and policy using lectures, guest lectures, student presentations, or laboratory exercises. Topics vary, but each offering has coherent syllabus. May be repeated for credit if topics significantly different.

503 Field Mapping Techniques (3:0:6) Prerequisites: MATH 105 or equivalent; and EVSC 110, GEOG 102, or GEOL 101 or equivalent. Basic techniques for collecting, recording, and plotting spatial field data, including topographic maps, compass, transit, alidade, and global positioning systems. Field work and field-based research project.

505 Selected Topics in Environmental Science (1–4:1–3:0–6) Prerequisite: course in ecology or geology, or permission of instructor. Topic depends on instructor’s specialty.

515 Molecular Environmental Biology I (3:3:0) Prerequisite: introductory biology and genetics course, or permission of instructor. Introduces molecular environmental biology covering basic concepts of molecular biology, molecular evolution, and bioinformatics, and application to problems in molecular and environmental biology.

519 Marine Mammal Biology and Conservation (3:3:0) Covers the evolution, biology, ecology, and behavior of marine mammals from polar bears and sea otters to whales and dolphins. Marine mammal conservation and policy is also a major component of the course; several lecture sessions are devoted to the issue of whaling, threats to marine mammal populations, and recent conservation issues such as marine mammals and noise pollution. The course also includes a number of guest lectures from a variety of international marine mammal experts.

521 Marine Conservation (3:3:0) Provides an overview of threats to the marine environment, and discusses the scientific, socioeconomic, and political issues behind marine conservation. Covers categories of marine pollutants (chemical, biological, and physical contaminants) and their impacts on the marine ecosystem, as well as impacts on humans (health, social, and economic), threats to key marine species (e.g., coral, sharks, turtles, and marine mammals) and initiatives and laws developed to reduce these threats. Scientific and socioeconomic problems that hinder sustainable fisheries management and the science and policy behind the global warming debate are also discussed. The course also provides an overview of marine environmental law and policy issues related to marine conservation policy.

524 Introduction to Environmental and Resource Economics (3:3:0) Prerequisite: basic algebra skills. Introduces theory of external costs and benefits, public goods, natural resource management, and benefit and cost analysis for noneconomicists. Lecture-discussion format with student presentations and participation. Analytical problems set, short writing assignments, and exams.

525 Economics of Human/Environment Interactions (3:3:0) Prerequisite: EVPP 524/GEOG 524 or equivalent. Advanced topics in environmental, natural resource, and ecological economics for noneconomists. Emphasizes sustainability, intergenerational equity, and economic-ecological feedbacks. Lecture, discussion with substantial student participation. Problem sets, class presentations, term paper.

531 Land-use Modeling Techniques and Applications (3:3:0) Prerequisite: GEOG 550, or permission of instructor. Surveys literature on spatially explicit empirical models of land-use change. Offers hands-on experience developing and running simple models. Includes statistical models, mathematical programming models, cellular automata, agent-based models, and integrated models.

536 Ichthyology (4:3:3) Prerequisites: ecology course, or permission of instructor. Studies systematics, evolution, physiology, ecology, and behavior of fishes. Lab time used for field trips, practice in identifying species, and hands-on experience with lecture subjects.

538 Mammalogy (4:3:3) Prerequisites: Courses in zoology and ecology (BIOL 303 and 307, or equivalent). Biology of mammals with emphasis on behavior, ecology, and conservation.

543 Tropical Ecosystems (4:3:3) Prerequisites: ecology course, and permission of instructor. Terrestrial, aquatic, and marine ecosystems in the tropics, emphasizing plant communities, plant-animal interactions, and role of humans in tropics. Requires field trip to tropics as part of lab.

546 Estuarine and Coastal Ecology (4:3:3) Prerequisites: course in ecology, and permission of instructor. Emphasizes marine biology of estuarine and coastal habitats of Chesapeake Bay region, and factors affecting distribution and abundance of organisms. Lab provides training in field measurement of physical and chemical parameters, and collection and identification of local organisms. Extended field trips to mid-Atlantic sites.

550 Waterscape Ecology and Management (3:3:0) Prerequisites: course in chemistry, and course in ecology. Studies physical, chemical, and biological components of freshwater ecosystems with emphasis on streams, rivers, and lakes; links between watersheds and freshwater ecosystems; and impact of human management.

551 Fungi and Ecosystems (3:3:0) Prerequisite: BIOL 304 or course in microbiology, or permission of instructor. Considers impact of fungi on ecosystems in terms of effects on biogeochemical cycling, primary and secondary production, and regulating community structure and populations of individual species through activities as symbionts and parasites. Discusses role of fungi in ameliorating pollutants produced by anthropogenic activities.

555 Lab in Waterscape Ecology (1:0:3) Prerequisite: EVPP 550 or permission of instructor. Field and laboratory approaches to freshwater ecology with emphasis on study design, sampling methods, laboratory and data analysis, and report writing.

563 Coastal Morphology and Processes (4:3:3) Prerequisite: previous courses in geology, oceanography, marine science or physical geography; or permission of instructor. Studies global coastal geomorphology and processes, emphasizing U.S. Atlantic and gulf coasts. Topics include plate
tectonics; sea-level changes; sediment supply; impact of waves, tides, storms; and human activities. Lecture, extended weekend field trips to mid-Atlantic coast.

576 Microbial Ecology of Soils (3:3:0) Prerequisite: course in microbiology or permission of instructor. Surveys microbial ecology in surface and subsurface soils. Describes organisms and their function and interaction.

577 Biogeochemistry: A Global Perspective (3:3:0) Prerequisites: course in ecology and course in chemistry; or permission of instructor. Structure and function of ecosystems, their interactions as components of landscapes, and contributions to the global environment. Emphasizes biogeochemical cycles of natural, disturbed, and managed ecosystems, and integration at landscape and global level as related to current ecological problems such as transfer of nonpoint source pollutants, atmospheric deposition, stratospheric ozone depletion, and global change.

607/BIOL 607 Fundamentals of Ecology (3:3:0) Overview of concepts in physiological, population, community, and ecosystem ecology restricted to graduate students with little or no background in ecology.

610 Bioremediation: Theory and Applications (3:3:0) Prerequisites: courses in microbiology and either organic chemistry or biochemistry; or permission of instructor. Provides basis for understanding proper application of bioremediation technologies to treatment of hazardous wastes. Includes evaluation of data to determine successful treatment.

613 Environmental Geochemistry and Mineralogy (3:3:0). Prerequisite: graduate standing. Explores hot topics and aids students in developing intellectual skills to identify key research problems. Students will also improve their writing and presentation skills.

615 Molecular Environmental Biology II (4:3:3) Prerequisite: EVPP 515 or permission of instructor. Applied course covering theory and methodology of molecular environmental biology, including analysis of selected case studies in conservation biology of macro-organisms, molecular systematics, and microbial ecology.

620 Development of U.S. Environmental Policies (3:3:0) Prerequisites: course in policy process and course in ecology; or permission of instructor. Through lectures, guest speakers, class discussions and assigned reading, examines nature and historical development of environmental policy in the United States, including consideration of social, political, economic and environmental factors, and ways it is expressed and implemented. Also consider sustainability and emerging issues.

621 Overview of Biodiversity Conservation (3:3:0) Prerequisites: 8 graduate credits in ecology and environmental science or environmental policy, or permission of instructor. Lectures, reading assignments, class discussions, and orally presented and written case studies to explore what biodiversity is, why it is important, how conservation has evolved, and status today.

622 Management of Wild Living Resources (3:3:0) Prerequisites: 6 credits of ecology or permission of instructor. Through lectures, case studies, and discussions, examines management and different types of wild living resources: animal and plant, aquatic and terrestrial. Reviews status of resources, analyzes factors that have led to present situation, and considers what may be required to achieve effective and sustainable management.

623 Translating Environmental Policy into Action (3:3:0) Prerequisites: 8 graduate credits in environmental science or environmental policy, or permission of instructor. Guest lecturers, class discussions, written and orally presented case studies, and assigned reading to identify and analyze factors involved in moving from science and policy to concrete action. Provides understanding of basic principles, skills, and strategies.

626 Environment and Development in South and East Asia (3:3:0) Prerequisites: course work in policy process, international development, and ecology; or permission of instructor. Guest lecturers, assigned reading, class discussions, and oral and written case studies to examine environment and development in selected countries of South and East Asia. Reviews relationship between environment and development, considers background and history leading up to the present, and considers requirements to achieve more effective and sustainable results.

627 Environmental Policy in Latin America (3:3:0) Prerequisites: course work in policy process, international development, and ecology; or permission of instructor. Guest lecturers, assigned reading, class discussions, and oral and written case studies to examine environmental policy in Latin America. Reviews evolution of environmental policy and relationship between environment and development, considers background and history leading up to the present, and considers requirements to achieve more effective and sustainable results.

628 Environment and Development in Africa (3:3:0) Prerequisite: course work in policy process, international development, and ecology; or permission of instructor. Guest lecturers, assigned reading, class discussions, oral and written case studies to examine environment and development in sub-Saharan Africa. Reviews relationship between environment and development, considers background and history leading up to the present, and considers requirements to achieve more effective and sustainable results.

630 Methods and Logic of Social Inquiry (3:3:0) Prerequisite: undergraduate statistics and research methods, or permission of instructor. Emphasizes gathering, interpretation, and evaluation of scientific evidence. Develops critical-thinking skills and covers logic of scientific inquiry, including various data collection methods such as experiments, observational research, and Q methodology.

631 Spatial Agent-based Models of Human-Environment Interactions (3:3:0) Prerequisite: EVPP 531 or CSS 600, or permission of instructor. Discusses key challenges in spatial modeling of human–environment interactions. Reviews agent-based modeling applications in urban and rural interactions, agriculture, forestry, and other areas. Hands-on development of simple ABM models, and investigation of links between GIS and ABM.

635 Environment and Society (3:3:0) Human–environment interactions in human ecology perspective, historical basis of human environmental impact, indigenous and nonindigenous worldviews in context of modernization, environmental degradation and globalization, and contemporary policy and research initiatives geared toward resilience and sustainability. Discussion format.
636 Gender, Race and the Natural World (3:3:0)
Advanced study of links among gender, race, and nature using social-psychological framework, original sources, and seminar and discussion. Analyzes ideologies that underpin the interlocking narratives of gender, race, and nature, and examines role of science in producing these ideologies.

637 Human Dimensions of Global Change (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines human dimensions of climate change, biodiversity loss, ozone depletion, and related anthropogenic alterations of biosphere.

638 Corporate Environmental Management and Policy (3:3:0) Provides understanding of how environmental issues interact with business strategy decisions. Emphasizes learning about proactive win-win environmental management strategies being implemented by world’s leading firms, and shows how government policies and regulations can be designed to simultaneously promote higher environmental protection and competitiveness. Combines mini lectures, participatory discussions.

641 Environmental Science and Public Policy (3:3:0) Prerequisite: course in ecology, or permission of instructor. Effects of human activities on environment. Considers airborne, waterborne, and solid waste material with respect to sources, control, and effect on ecosystems.

642 Environmental Policy (3:3:0) In-depth examination of U.S. efforts since 1970 to mitigate pollution of air, land, and water. Addresses issues of global concern, including biodiversity loss, ozone depletion, and climate change.

643 Microbial Ecology (4:3:3) Prerequisite: course in microbiology, or permission of instructor. Studies relationships between microorganisms and their natural environment, and methodology for observing their natural environment and its biochemical activities.

645 Freshwater Ecology (3:3:0) Prerequisite: EVPP 550, or permission of instructor. Studies biotic and abiotic interactions that affect structure and composition of freshwater ecosystems. Emphasizes research literature.

646 Wetland Ecology and Management (3:3:0) Prerequisites: BIOI 306 or EVPP 377, or permission of instructor. Emphasizes structure, functions, and ecological processes of created and natural wetlands from an ecosystem perspective. Students will be expected to develop an understanding of hydrologic, physiochemical, and ecological aspects of wetlands and the management of these systems through in-class and field/lab works. Each student is required to carry out an individual research project that involves field and lab works, and write a research paper.

647 Wetland Ecology Lab and Field (1:0:3) Prerequisites: EVPP 646 (or previously EVPP 644), or permission of instructor. Use laboratory and field work to study the structure and function of wetland ecosystems.

648 Population Ecology (3:3:0) Prerequisite: course in ecology or permission of instructor. Surveys ecological models and theory. Topics include population growth and regulation, competition, predator-prey, herbivore-plant, and parasite-host interactions, mutualism, and metapopulation ecology.

650 Environmental Analysis and Modeling (4:3:3) Prerequisite: course in ecology, or permission of instructor. Introduces principles, history, and methodologies of systems ecology, emphasizing development and simulation of ecological models for natural resource/ecosystem management, conceptual and symbolic models, and simulation techniques on microcomputers.

652 The Hydrosphere (3:3:0) Prerequisites: two semesters of calculus and partial differential equation. Components and transfer processes within hydrosphere, which consists of aqueous envelope of Earth including oceans, lakes, and rivers; and snow, ice, glaciers, soil, moisture, ground water and atmospheric water vapor.

670 Environmental Law (3:3:0) Prerequisites: courses in ecology and environmental biology, or permission of instructor. Studies environmental laws such as the National Environmental Policy Act, and regulatory issues such as the Clean Water and Clean Air Acts. Emphasizes critical evaluation of alternatives to unresolved issues in environmental policies.

675 Environmental Planning and Administration (3:3:0) Prerequisite: permission of instructor. Interaction of man and ecological systems; causes of damage or deterioration in environment; content, oversights, and externalities in management decision processes that affect environment and effectiveness of plan implementation; means of assessing environmental impact; and administrative approaches for minimizing environmental impact.

677 Applied Ecology and Ecosystem Management (3:3:0) Prerequisite: EVPP 607 or equivalent. Uses ecological principles to manage natural resources. Emphasizes hierarchical levels of organization within ecological systems, and management of ecosystems to conserve biodiversity, natural resources, and environment.

681 Introduction to Bioinformatics (3:3:0) Prerequisite: course in molecular biology, or permission of instructor. Overview of methods and tools in bioinformatics including Internet interfaces to sequence databases, methods for performing searches of biological databases, sequence alignment, phylogenetic analysis, other types of DNA sequence analysis, web-based tools, and databases in structural biology.

692 Master’s Seminar in Environmental Science and Public Policy (1:1:0) Explores selected topics in environmental science and public policy using lectures, guest lectures, student presentations, and discussions of current literature. Topics vary. May be repeated for credit.

693 Directed Studies in Environmental Science and Public Policy (1–4:0:0) Prerequisite: permission of instructor and chair. Studies topic not otherwise available in graduate program. May involve reading assignments, tutorials, lectures, papers, presentations, and lab or field study determined in consultation with instructor. Short study plan required. May not be used to fulfill explicit undergraduate prerequisites for graduate work.

741 Advanced Topics in Environmental Science and Public Policy (1–4:0:4–0) Prerequisite: 8 credits of graduate course work in environmental science and public policy, or permission of instructor. Studies selected advanced topics in environmental science and public policy. Lectures, guest lectures, student presentations, laboratory exercises. Topics vary; each offering has coherent theme. May be repeated for credit if topics significantly differ.

745 Environmental Toxicology (3:3:0) Prerequisites: courses in ecology and physiology, or permission of instruc-
tor: Studies nature, distribution, and interaction of toxic chemicals released into environment. Emphasizes effects on nonhuman biota, detection and fate of chemicals, and implications for government regulation.

791 Colloquium in Earth Systems Science (1:1:0) Covers various parts of Earth systems. Invited talks by Mason faculty and primarily Earth science experts in region. Students graded on written reports demonstrating understanding of wide topics covered.

792 Seminar in Earth Systems Science (2:2:0) Prerequisites: 15 graduate credits; and courses on atmosphere, hydrosphere and lithosphere. Seminar for Earth systems science graduate students with background in major systems. Capstone experience. Seminars presented by faculty and students. Topics vary from semester to semester.

793 Research in Environmental Science and Public Policy (1–3:0:0) Prerequisites: 8 graduate credits in EVPP, and permission of instructor and chair. Library, laboratory, or field investigation under supervision of instructor. Short proposal required. May be repeated for total 6 credits.

798 Master's Research Project in Environmental Science and Public Policy (1–3:0:0) Prerequisites: approved project proposal, and permission of instructor and chair. Experimental, observational, literature-based, or theoretical research project chosen and completed under guidance of faculty member. Proposal required before enrollment. Comprehensive report acceptable to student’s committee required for completion. Students taking EVPP 798 may receive no more than 6 credits for both EVPP 793 and EVPP 798. Graded S/NC.

799 Master's Thesis in Environmental Science and Public Policy (1–6:0:0) Prerequisites: approved thesis proposal, and permission of instructor and chair. Experimental, observational, or theoretical research under instructor’s supervision that culminates in production of thesis. Thesis work should be potentially publishable. No more than 6 credits of EVPP 793 and EVPP 799 may be applied to master's degree. Graded S/NC.

894 Supervised Internship (3–12:0:0) Prerequisite: permission of program director and student’s doctoral committee. Training in application of ecological skills to environmental management and policy under supervision of a qualified environmental scientist at governmental agency, consulting firm, industry, or other acceptable organization.

911 Advanced Seminar in Environmental Science (2:2:0) Prerequisite: 8 hours of ecology, or permission of instructor. Topics generally address interface between environmental science and public policy. May be repeated for credit.

998 Doctoral Dissertation Proposal (1–6:0:0) Prerequisite: admission to doctoral candidacy. Work on research proposal that forms basis for a doctoral dissertation. Graded S/NC.

999 Doctoral Dissertation Research (1–12:0:0) Prerequisite: approval of dissertation proposal. Research on basic or applied problem in environmental science and public policy. Graded S/NC.

See additional course work under Biology (BIOL), Chemistry (CHEM), Public and International Affairs (PUAD), School of Public Policy (PUBP), Geography (GEOG), and Geology (GEOG).

Executive Master of Business Administration (EMBA)

School of Management

603 Managerial Economics and the Decisions of the Firm (3:3:0) Develops and applies economic analysis tools in managerial decision situations. Focuses on economic analysis to understand firm’s competitive environment.

612 Managing Costs and Evaluating Performance (1–3; 1–3:0) Focuses on developing accounting information for use by managers in planning and control activities. Examines traditional and emerging cost-management systems. Special emphasis on information for decision-making, operational control, and performance evaluation.

613 Financial Reporting and Decision Making (3:3:0) Develops framework of concepts and procedures essential for interpreting general-purpose financial statements and internal managerial accounting reports. Emphasizes understanding basic concepts and applying selected procedures to problem-solving situations.

623 Marketing Management (3:3:0) Prerequisite: admission to EMBA program. Develops market-based knowledge and skills for effective marketing strategy design, implementation, and evaluation. Develops ability to make marketing decisions in wide variety of institutional and competitive situations. Emphasis on case studies, team work, and projects.

633 Statistics for Managers (3:3:0) Applies statistical methods in analyzing problems in business decision-making. Topics include descriptive statistics, probability distributions, estimation and hypothesis testing, and linear regression.

638 Strategies for Operations Management: Process and Supply Chain Leadership (3:3:0) Integrates theory and practice of operations management with mathematical modeling and quantitative techniques of management science. Addresses range of operations management issues, including technology and strategy decisions, systems design issues, project operations, quality control, and inventory planning.

641 Building the High-Performing Team (1–3:1–3:0) Develops the knowledge and skills needed for creating powerful, high-performance teams within and among organizational units. Strategies are offered for alignment of goals, building conditions for coordinated action, generating innovation, and resolving breakdowns.

643 Managerial Finance (3:3:0) Introduces theories of finance and their application to the formulation of business policy. Topics include internal financial analysis, financial forecasting, valuation, risk and return analysis, capital allocation, and capital structure.

653 Organizational Behavior (3:3:0) Examines development, theories, and practice of management within organizations. Emphasizes human behavior and how it influences organizational effectiveness.

660 Management of Information Technology (3:3:0) Examines computer-based information technologies and their interrelation with management processes, especially problem-solving and decision-making at individual, work group, and organization levels. Topics include management information system life cycle, with emphasis on manager’s perspective, and modeling and analysis to support decision-making.
673 Legal Environment for Management (1:1–3:0)
Examines interrelationships among organizations, external environment, and regulatory process. Emphasizes legal and ethical issues and managerial implications.

678 Strategic Management (3:3:0)
Integrates business strategy and policy with functional knowledge developed in other courses and business practice. Issues include formulation of strategy, industry analysis, building core competencies, and strategy implementation.

703 Financial Markets (3:3:0)
Explores the relationships between financial markets and their impact on corporate financial decision making. Considers cross-market interrelationships, including how financial markets respond by creating financial instruments to meet the varying financial requirements of business firms. The course includes a domestic financial residency in New York that focuses on contemporary developments in these markets.

708 Taxation and Business Strategy (1–3:1–3:0)
Examines influences of taxation on decisions of firms, and effects of taxes on performance in competitive setting. Emphasizes specific coverage of international issues, and role of non-tax costs in tax planning.

709 Global Capital Markets (1–3:1–3:0)
Considers emerging topics in finance, with focus on links between global markets and strategic firm decisions. Emphasizes understanding valuation of strategic investment opportunities, and identification of financing alternatives.

710 Business, Government, and the Global Economy (1–3:0)
Focuses on modern system of international trade, and opportunities that global trading environment creates for firms. Attention to roles of national policies, international agreements, and business activities in system development.

Focuses on the basic concepts of international macroeconomics—national income accounts, monetary and fiscal policies, balance of payments, and exchange rates. These concepts will be introduced and discussed in situations where national economic strategies affect the decisions and performance of business operations.

715 Special Topics in Accounting (1–3:1–3:0)
In-depth examination of advanced topics in accounting.

716 Managing Change (1–3:1–3:0)
Focuses on how organizations can successfully adapt and change. Topics include understanding forces that make change necessary, developing vision of appropriate course, aligning organization behind that vision, and motivating people to achieve it.

717 Corporate Governance (1–3:1–3:0)
Investigates past, present, and future of corporate governance. Focuses on relationships among shareholders, boards of directors, and top-level managers in examining governance process, with emphasis on rights and responsibilities of participants.

722 Consumer Behavior (3:3:0)
Prerequisite: completion of EMBA core requirements or permission of instructor.
Examines behavioral science concepts to understand and predict marketplace behavior. Emphasizes applications of product and service strategies, as well as on market segmentation and targeting.

724 Marketing Communications (3:3:0)
Prerequisite: completion of EMBA core requirements or permission of instructor.
Examines all forms of communication and sources of brand or company contacts as potential message channels in building and managing relationships with various publics. Focuses on an integrated planning process for these communication elements, including consumer and trade advertising, public relations, direct and database marketing, promotions, and sales presentations to achieve synergy in the overall marketing communications program. Emphasis is placed on appreciating the scope, strengths, and weaknesses of these tools.

725 Leadership (3:3:0)
Prerequisite: completion of EMBA core requirements or permission of instructor.
Explores key leadership roles in organizations and their own leadership competencies. Provides understanding of leadership development, power and influence, motivation, strategic decision making, leading change, the influence of globalization and diversity on leadership, and ethical issues.

727 Applied Macroeconomics (1–3:1–3:0)
Examines how firm environment is shaped by economy and macroeconomic policy. Topics include business cycle, determinants of economic growth, influence of fiscal and monetary policies, and use of economic forecasts.

734 Electronic Commerce (1–3:1–3:0)
Explores ongoing transformation of business activities and markets by computer and telecommunications technologies. Examines technology and its application in variety of functional areas and industry settings.

735 Systems Thinking for Business Performance (1–3:1–3:0)
Enables students to develop, express, improve, and validate holistic mental models of problems. In doing so, they will build a foundation for better decision making leading to improved business performance. The main strength of the systems-thinking approach is its emphasis on long-term strategic outcomes as opposed to short-term tactical ones.

745 Special Topics in Finance (1–3:1–3:0)
In-depth examination of advanced topics in finance.

750 Capstone Project: Action Learning Project (1–6:1–6:0)
Prerequisite: completion of EMBA core requirements or permission of instructor.
The Integrated Project Application is a lab-based course designed to provide an action learning experience that integrates course content from throughout the EMBA program. Students will work in teams to develop solutions to organizational challenges and opportunities.

751 Corporate Strategy and Policy (1–1:1–3:0)
Examines issues in strategy for firms operating in multiple markets or businesses, including diversification, portfolio approaches to corporate strategy, mergers and acquisitions, corporate alliances and joint ventures, restructuring, and coordinating multibusiness corporations.

752 A Strategic View of the Firm (1–3:1–3:0)
Examines the interplay between the industry environment and a firm’s resources and capabilities to drive superior performance. The course seeks to integrate multiple functional perspectives to arrive at a complete understanding of the firm within its environment.

765 Special Topics in Management Information Systems (1–3:1–3:0)
In-depth examination of advanced topics in management information systems.

775 Special Topics in Marketing (1–3:1–3:0)
In-depth examination of advanced topics in marketing.

798 International Business Environment (1–3:1–3:0) Develops global perspective through seminars led by professors and high-level managers; briefings by officials of government and other policy-making organizations; and site visits to production and distribution facilities, research centers, IT units, and other corporate offices.

Exercise, Fitness, and Health Promotion (EFHP)

School of Recreation, Health, and Tourism

Prerequisite to all courses: graduate standing or permission of instructor.

500 Workshop in Exercise, Fitness, and Health Promotion (1–3:1–3:0) Provides concentrated full-time workshops, weekend seminars, and workshops on selected topics in exercise, fitness, and health promotion. May be repeated. No more than 6 credits may be applied for degree credit.

522 Anatomy for the Athletic Trainer: Structure and Function of the Neuromuscular and Musculoskeletal Systems (3:2:1) Prerequisites: BIOL 124 and 125 or equivalent, and permission of instructor. Promotes familiarity and proficiency with anatomy of neuromuscular and musculoskeletal systems, which relate directly to sports-related injuries.

524 Physiology for the Athletic Trainer Including the Pharmacology of Sports Injuries (3:2:1) Prerequisites: BIOL 124 and 125 or equivalent, and permission of instructor. Promotes familiarity and proficiency in physiology, pharmacology, and rehabilitation of sports injuries.

526 Athletic Training Perspectives: Evaluation and Prevention of Sports Injuries (3:2:1) Prerequisites: BIOL 124 and 125 or equivalent, and permission of instructor. Recommended that this course be taken concurrently with EFHP 522. Promotes familiarity and proficiency with assessment and physical examination of sports-related injuries.

528 Advanced Athletic Training (3:2:1) Prerequisites: BIOL 124 and 125 or equivalent, EFHP 526, and permission of instructor. Promotes familiarity and proficiency with assessment and intervention of neuromusculoskeletal system and other systems of body that relate directly to sports-related injuries.

598 Special Topics (1–6:1–6:0) Focuses on projects related to exercise, fitness, or health promotion. May be repeated with no more than 6 credits earned.

599 Independent Study in Exercise, Fitness, and Health Promotion (1–3:1–3:0) Study of problem area in exercise, fitness, and health promotion research, theory, or practice under direction of faculty member. May be repeated. No more than 3 credits may be earned.

600 Foundations of Exercise, Fitness, and Health Promotion (3:3:0) Insights into historical and philosophical foundations that guide exercise, fitness, and health promotion professions. Through assigned readings, group exercises, individual research, and class discussion, students explore disciplines, professions, and associated philosophical trends and issues.

610 Advanced Exercise Physiology (3:3:0) Lecture, demonstration, and seminar experiences in applying research findings to understanding physiological function and effects of exercise on people.

611 Fitness Assessment: Theory and Practice (3:2:2) Promotes familiarity and proficiency with methods and instrumentation in assessing individual fitness and establishing base for exercise and other lifestyle alternatives to improve fitness.


615 Epidemiology and Environmental Health (3:3:0) Principles, methods, and application of epidemiology. Reviews behavioral, psychological, social, and environmental risks to disease distribution. Focuses on lifestyle, exercise patterns, and environmental factors to health and disease conditions.

618 Exercise and Sport Psychology (3:3:0) Covers psychological and social-psychological antecedents and consequences of exercise, physical activity, and sports participation. Emphasizes theory and research on personality, motivation, arousal, cognition, attributions, attitudes, self-efficacy, leadership effectiveness, and group dynamics.

623 Research Design and Statistical Reasoning (3:3:0) Introduces techniques of research and methods of data analysis.

630 Exercise, Health, and Fitness Program Development (3:3:0) Covers exercise and health program development related to fitness and health of adult populations. Provides 3 to 6 hours of field experience.

660 Management of Exercise, Fitness, and Health Promotion Organizations (3:3:0) Advanced study in management and administration of organizations dedicated to human development and improvement of quality of life. Covers application of theories and practices of management and behavioral sciences, fiscal management, marketing, and evaluation research.

670 Analysis of Teaching in Physical Education (3:3:0) Presents qualitative and quantitative research methods for studying teacher and student behaviors in physical education setting, and engaging teacher as researcher. Revisits teaching strategies, develops action research projects, and examines current education reform movements.

680 Ethical Issues in Exercise, Fitness, and Health Promotion (3:3:0) Covers formulation of coherent framework for ascertaining good, right, and just; and for assessing evidence and reason underlying positions and arguments. Examines ethical issues in exercise, fitness, and health promotion.

798 Project (1–3:1–3:0) Addresses an applied exercise, fitness, and health promotion issue under supervision of graduate faculty member.

799 Thesis (1–6:1–6:0) Explores exercise, fitness, and health promotion problem using appropriate research methodology and under supervision of graduate faculty member.
802 Readings for the Doctor of Arts in Community College Education (3–9:3–9:0) Prerequisite: admission to doctor of arts program in National Center for Community College Education with physical education specialty. Intensive reading in recent scholarship in physical education and related fields. Students must propose reading list, which must be approved by faculty advisor, and use list to prepare potentially publishable literature review.

Film and Video Studies (FAVS) College of Visual and Performing Arts

100 Film and Video Studies Colloquium (1:1:2) Prerequisite: for majors only. Students are exposed to the film and video industry through film professionals. Students are required to attend all sessions, review the speaker’s materials prior to the class, prepare questions, and complete written critiques. Students completing their senior project will present their work as part of their last FAVS 100. FAVS majors must take three times.

352 Ethics of Film and Video (3:3:0) An examination of ethical issues associated with image production and consumption. Topics include the technological development of the film apparatus, privacy, the pursuit of objectivity, excess, consent, and representing others. All issues highlight the increasingly sophisticated (and powerful) role of film and media authorship. Students will develop a more complex view of the ethics of screen representation (both fiction and nonfiction) and be encouraged to take stock of the ethics of their own media literacy.

355 Film Business Practices (3:3:0) Prerequisite: COMM 434 or equivalent ethics course. An overview of the film industry from a business perspective. Students learn basic business practices, film financing, business plans, film distribution, and management and marketing techniques appropriate for the film industry.

365 Documentary Filmmaking I (3:3:0) Prerequisite: satisfactory completion of COMM 355. An introduction to documentary filmmaking in which each student makes a short digital documentary, from concept development to finished piece. The class covers essential technical skills, emerging styles of nonfiction film, and documentary storytelling techniques.

399 Special Topics in Film and Video Studies (1–3:1–3:0) In-depth presentation and exploration of topical studies. Subject matter varies. May be repeated for a maximum 12 credits when taken under different topics.

450 Internship in Film and Video Studies (3:1:0) Prerequisite: 75 credits, 15 credits in core FAVS courses, and permission of FAVS director. Required for all FAVS majors. On-the-job training in film and video studies through approved fieldwork study programs. Internships are arranged and supervised by the FAVS director.

499 Senior Project (3:3:0) Prerequisite: senior status in the film and video studies program. Culminating seminar devoted to analyzing and synthesizing knowledge and skills gained through undergraduate course work as it applies to film, video studies, and professional development. Students will be required to develop and present written materials and documentation related to the development and presentation of their works as well as present their work in FAVS 100 Film and Video Studies Colloquium as part of their formal oral presentation.

Finance (FNAN) School of Management

If a student takes noncore, upper-level business courses before acceptance to the School of Management (SOM), those courses will not count on an undergraduate degree application for any major in SOM except as general elective credit. A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

301 Financial Management (3:3:0) Prerequisites: credit for MIS 102 AND C or better in ECON 103, ACCT 203 and OM 210; and sophomore standing. Introduction to managing a firm’s financial resources given wealth maximization decision criterion. Includes working capital management, fixed-asset investment, cost of capital, capital structure, and dividend decision analysis. Lecture, problems, and discussion. Lecture, recitation format; requires attendance in weekly lecture and weekly recitation.

302 Financial Analysis, Forecasting, and Valuation (3:3:0) Prerequisites: C or higher in FNAN 301, degree status. Examines techniques for analyzing, understanding, and applying financial information in decision situations. Topics include financial statement analysis, development of financial models, and financial planning and forecasting. Lecture, discussion, computer-assisted research.

311 Principles of Investment (3:3:0) Prerequisites: C or higher in FNAN 301, degree status. Introduces analysis of the valuation of equity and debt securities given modern capital market theory. Includes discussion of portfolio analysis as related to valuation of securities. Lecture, discussion, and computer-assisted research.

321 Financial Institutions (3:3:0) Prerequisites: C or higher in FNAN 301, degree status. Discusses basic objectives of financial institutions in light of industry structure and regulatory environment, and decision variables that management should concentrate on to achieve objectives. Includes role of financial institutions in allocation of funds in financial markets. Lecture, discussion, and computer-assisted research.

351 Principles of Real Estate (3:3:0) Prerequisites: C or higher in FNAN 301, degree status. Studies dimensions and specialties involved in public control and private development, sale, finance, and management of real estate. Includes land planning, land-use control, appraisal, finance, brokerage, property management, and investment. Lecture, discussion, and computer-assisted research.

401 Advanced Financial Management (3:3:0) Prerequisites: C or higher in FNAN 301, degree status. Analyzes decision-making in firm, emphasizing conceptual structure of problems and using advanced analytic techniques. Topics include current asset management, capital budgeting and structure, dividend policy, long-term financing, mergers, and corporate planning models. Lecture, discussion, and case analysis.

411 Investment Analysis and Portfolio Management (3:3:0) Prerequisites: C or higher in FNAN 301 and FNAN
311, degree status. Analyzes modern techniques of portfolio management including evaluating standards for selecting individual securities to include or delete from portfolios. Presents risk-return analysis for portfolios and portfolio performance measures. Lecture, discussion, computer-assisted research.

412 Futures and Options Markets (3:3:0) Prerequisites: C or higher in FNAN 301 and FNAN 311, degree status. Introduces options, commodity, and financial futures markets as they function to provide pricing mechanisms and alternative investment vehicles. Lecture, discussion, and computer-assisted research.

421 Money and Capital Markets (3:3:0) Prerequisites: C or higher in FNAN 301 and FNAN 321, degree status. Discussion of how financial markets are organized, their role in the allocation of funds to various market segments, and interaction between markets. Topics include aggregate flow of funds analysis; and money, government, corporate, and mortgage markets. Lecture, discussion, and computer-assisted research.

440 International Financial Management (3:3:0) Prerequisites: C or higher in FNAN 301 and 311, degree status. Introduces management of contemporary firm’s international financial operations. Topics include foreign exchange risk, political risk, returns and risks of international projects, international money and capital markets, financial accounting, capital structure, and cost of capital. Lecture, discussion, readings, and problems.

451 Real Estate Finance (3:3:0) Prerequisites: C or higher in FNAN 301 and FNAN 351, and degree status. Studies mechanisms of real estate finance, sources of funds, loan contracts, principles of mortgage risk analysis, and secondary mortgage markets. Develops analytical skills including using microcomputer and appropriate software.

454 Real Estate Development (3:3:0) Prerequisite: C or higher in FNAN 351 Examines commercial real estate development process and principles plus actual residential, office, retail, and industrial projects. Includes financial analytical techniques to investigate project feasibility, density, financing viability, cash flows, and valuation. Emphasis placed on real-world, entrepreneurial, decision-making skills for developing commercial real estate. Lecture, discussion, project analysis.

462 Honor Seminar in Finance (3:3:0) Prerequisites: finance major, senior standing, and permission of the instructor. Provides an in-depth study and analysis of contemporary developments and topics of interest in finance. The topics and format will vary. Enrollment In this course if limited and competitive.

491 Special Topics in Finance (3:3:0) Prerequisites: finance majors with at least 9 upper-level finance credits, and degree status. Advanced study of special topics in finance.

499 Independent Study (1-3:0:0) Prerequisites: Finance majors with at least 9 upper-level credits. May be repeated to a maximum of 6 credits if topics vary. Degree status. Research and analysis of selected problems or topics in finance. Must be arranged with instructor and approved in writing by associate dean for undergraduate programs before registration. Written report required. May be repeated for maximum 6 credits if topics vary.

Foreign Languages (FRLN)

Modern and Classical Languages

310 Outside of Hitler’s Shadow: Germany in its Global Context (3:3:0) Prerequisites: completion of concurrent enrollment in all other general education courses. Critical examination of images of Nazis, Hitler, and Holocaust in media, popular culture. Course seeks to demystify and de glamorize such images while highlighting philosophical, cultural, and scientific contributions of Germany, Austria, and Switzerland.

330 Topics in World Literature (3:3:0) Prerequisites: ENGL 101 and 45 credits, or permission of instructor. Major works of world literature with varying perspectives and topics, such as specific cultures, histories, myths, or music and the arts, as represented in literature. All course work in English. May be taken toward fulfilling literature requirement of baccalaureate degrees. May be repeated twice when course content substantially differs, with permission of department.

380 Topics in the Sociopolitics of Language (3:3:0) Prerequisites: ENGL 101 and 45 credits, or permission of instructor. Topics will address relationship between language and other social and cultural systems (macro sociolinguistics), and critical study of people’s ideas about language (language ideology). Utilizes comparative approach to explore ways people use language to perform and communicate various social identities and categories; how and why people attach social meanings and values to particular ways of using language; development of official and unofficial language policies; and impact of language policies.

385 Multilingualism, Identity, and Power (3:3:0) Prerequisites: completion or concurrent enrollment in all other required general education courses. Study of individual and societal aspects of multilingualism including language choice, linguistic maintenance and shift, code-switching, language planning, educational policy, and representations of multilingualism. Interdisciplinary approach emphasizes the social and political aspects of multilingualism, as well as the relationship of language to cultural, ethnорacial, and national identities and categories.

431/ENGL 431/ HIST 431 Medieval Intellectual Topics (3:3:0) May be taken for credit by English or history majors. Focuses on topic in intellectual history of Middle Ages. Emphasizes literary or historical, depending on discipline of instructor. Relevant material may be drawn from philosophy, theology, and art.

510 Bibliography and Research in Foreign Languages and Literature (3:3:0) Prerequisite: graduate standing, or permission of department. Use of basic bibliographical tools and methodologies for scholarly research in French, German, and Spanish. Taught in cooperation with university library staff. Conducted in English.

525 Literary Translation (3:3:0) Prerequisite: graduate standing, or permission of instructor. Advanced work in literary translation. Critical approach and analysis of diverse texts such as poetry, drama, essay, and novel excerpts.

550, 551 Special Topics (3:3:0) Themes, periods, or genres vary from semester to semester. Focuses on topics that incorporate one or more languages taught in department, but instruction is in English. May be repeated for credit with permission of department.
565 Theory of Translation (3:3:0) Lectures on nature, function of translating process. Evaluates theories of translation with respect to text typology. Critiques selected translations from target languages to English and vice versa.

572 Integrating Technology into Language Learning (3:3:0) Prerequisites: graduate standing or permission of department, language teaching methods course, and language teaching experience; or permission of instructor. Explores pedagogical and theoretical basis for integrating interactive technologies into language learning programs, and examines potential for learning, teaching, testing, and research. Includes hands-on analysis and evaluation of materials. Prior experience with technology not required.

573 Basic Issues in Language Pedagogy (3:3:0) Prerequisites: graduate standing or permission of department, language teaching methods course, and language teaching experience; or permission of instructor. Explores major issues controversial in language pedagogy. Topics include communicative competence as pedagogical goal, role of explicit grammar teaching, proficiency movement, cultural authenticity, student-centered learning, and technology.

590 Internship and Seminar in Translation (3:3:0) Prerequisite: admission to translation certificate program. Internships are nonpaying, work-study positions that focus on the practice of translation. Qualified students placed with area institutions, interest groups, agencies, or corporations. Placement depends on availability of positions.

600 Workshop in Foreign Languages (1–6:0:0) In-service workshops, tours, and seminars on selected topics in literature, language, bilingualism, culture, methodology. May not usually be applied toward MA in modern and classical languages.

620 Literary Theory and Criticism (3:3:0) Studies nature of literary work, and analyzes contemporary critical approaches to literature. May not be taken for credit by students who previously received credit for FRLN 615.

650 The Teaching of Culture in Foreign Language Programs (3:3:0) Purpose and methods of study of culture, with emphasis on strategies and techniques for teaching culture in foreign language programs.

660 Approaches to the Study of Language (3:3:0) Linguistics and its relationship to other disciplines, including study of generative grammar with syntactic problems drawn from commonly taught foreign languages.

670 Foreign Language Learning and Teaching (3:3:0) Theories, methods, and strategies of second and foreign language learning and teaching. May not be taken by students who have completed FRLN 570.

French (FREN)

Modern and Classical Languages

101 Elementary French I (3:3:1) For students with no knowledge of French. Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

102 Elementary French II (3:3:1) Prerequisite: FREN 101, appropriate placement score, or permission of instructor. Continuation of FREN 101. Lab work required.

105 Review of Elementary French (3:3:1) Prerequisite: appropriate placement score, or permission of department. Review for students who have studied French previously. May not be taken for credit in combination with FREN 101.

109 Intensive Elementary French (6:6:2) Equivalent to FREN 101 and 102 taught in single semester. Recommended for students who desire intensive introduction. May not be taken for credit in combination with FREN 101, 102, or 105. Lab work required.

110 Elementary French (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for FREN 110 if they have received credit for FREN 101, 102 or 109. Lab work required.

201 Intermediate French I (3:3:1) Prerequisites: FREN 102, 105, and 109; appropriate placement score; or permission of department. Further development of skills in listening, speaking, reading, and writing. FREN 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate French II (3:3:1) Prerequisite: FREN 201, appropriate placement score, or permission of department. Applies language skills to reading, composition, and class discussion. Lab work required.

209 Intensive Intermediate French (6:6:2) Prerequisite: FREN 102, 105, and 109; appropriate placement score; or permission of department. Equivalent to FREN 201 and 202 taught in single semester. May not be taken for credit in combination with FREN 201 or 202. Lab work required.

210 Intermediate French (3:3:1) Prerequisite: FREN 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of French-speaking regions. Lab work required.

250 Gateway to Advanced French (3:3:0) Prerequisites: FREN 210, appropriate placement score, or permission of department. Integration of advanced intermediate-level French reading, writing, listening, and speaking skills, and the development of critical thinking about authentic texts from around the globe. Taught in French.

300 Study Tour in France (1–6:0:0) Prerequisite: FREN 202 or equivalent, or permission of instructor. Directed study tour of cultural and literary points of interest in France. Briefing sessions and reading selection given before the trip. All papers and exams required for credit are due by end of summer session.

309 Reading and Writing Skills Development (6:6:0) Prerequisites: FREN 202 or 209, appropriate placement score, or permission of instructor. Development of ability to write on topics of current interest. Readings provide examples of each topic and necessary vocabulary for compositions. Introduces reading strategies, and provides practice in reading of different kinds of texts.

310 Oral Proficiency in French (3:3:0) Prerequisite: FREN 202 or equivalent, appropriate placement score, or permission of instructor. Develops conversational proficiency in
French with attention to various specific communicative strategies and functions. Practice in pronunciation and dictation based on systematic study of sound system of French.

325 Major French Writers (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Studies works of major French writers. Writers to be studied vary. Course work in English. May be taken toward fulfilling general requirement in literature for baccalaureate degrees. May be repeated for credit with permission of department.

329 Problems of Western Civilization in French Literature (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Basic philosophical, moral, social, and political dilemmas reflected in literature of major French writers. Course work in English. May be taken toward fulfilling general requirement in literature for baccalaureate degrees. May be repeated for credit with permission of department.

340 Francophone Identities (3:3:0) Prerequisite: FREN 309, appropriate placement score, or permission of instructor. Provides opportunity to learn about richness, variety, and complexity of francophone world through study of literature, culture, social life, and identities of various francophone regions including Caribbean, Africa, Quebec, and Indochina.

350 French Conversation (3:3:0) Prerequisite: FREN 202 or equivalent. Development of conversational proficiency in French. Specifically designed for French majors who need practice in spoken language beyond the intermediate level.

351 Advanced French Grammar (3:3:0) Prerequisite: FREN 202 or equivalent. Systematic review of French grammar with emphasis on syntax, idiomatic construction, vocabulary building, and literary style. Written and oral exercises.

352 French Composition (3:3:0) Prerequisite: FREN 202 or equivalent. Develops writing skills through written reports on current events and literary topics. Specifically designed for students concentrating in French who need practice in written language beyond intermediate level.

355 Phonetics and Oral Expression (3:3:2) Prerequisite: FREN 202, or permission of instructor. Intensive study of French pronunciation and diction. Practice in discriminating French phonemes and allophones, and transcribing in phonetic symbols. Recitation of poems and rhythmic prose. Enrollment limited to 15.

357 Introduction to Translation (3:3:0) Prerequisite: FREN 202, or permission of instructor. French to English, English to French translations, of texts from current periodicals and newspapers in various fields. Recommended for students who wish to improve language skills.

370 French Civilization, Culture, and Literature: Ancient Gaul to 1789 (3:3:0) Prerequisite: FREN 309, or permission of instructor. Examines history, civilization (daily life, politics, science, philosophy, religion), culture (architecture, art, music, dance), and literature of France from Ancient Gaul to eve of French Revolution. Studies development of French nation and its people through written texts, visual arts, and music.

371 French Civilization, Culture, and Literature: 1789 to the Present (3:3:0) Prerequisite: FREN 309, or permission of instructor. Examines history, civilization (daily life, politics, science, philosophy, religion), culture (architecture, art, music, dance), and literature of France from French Revolution of 1789 to present. Studies development of French nation and its people through written texts, visual arts, and music.

375 French Civilization: From Ancient Gaul to the French Revolution (3:3:0) Prerequisite: 15 credits of French, or permission of instructor. Studies contributions of France to world civilization. Emphasizes ideas, arts, sciences, and institutions. Offered in alternate years.

376 French Civilization: From the Revolution to Contemporary France (3:3:0) Prerequisite: 15 credits of French, or permission of instructor. See FREN 375.

377 Survey of French Literature: Middle Ages to 1800 (3:3:0) Prerequisite: 15 credits of French, or permission of instructor. French literature through the centuries, with reading and analysis of representative texts of major authors. Offered in alternate years.

381 Introduction to Literary Analysis (3:3:0) Prerequisite: 15 credits of French. Structured approach to reading and analysis of French literary texts.

391 French for the Business World I (3:3:0) Prerequisite: 15 credits of French, or permission of instructor. Studies styles in commercial, private, and official formats for correspondence and various common business documents. Emphasizes written exercises. Satisfies needs of students equipping themselves for multinational business and foreign service.

392 French for the Business World II (3:3:0) Prerequisite: FREN 391, or permission of instructor. Continuing study of terminology used in business affairs, with attention to form and style of business documents. Oral and written practice of French used in everyday work situations. Students may use course to prepare for Paris Chamber of Commerce certificate in business French.

405 French Literature of the Renaissance (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Studies works of major French writers of Renaissance period, with emphasis on their contributions to humanistic tradition in France during 16th century, especially as reflected in works of Rabelais and Montaigne.

413 French Literature of the Seventeenth Century: Classical Drama (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Studies dramatic literature of 17th century.

414 French Literature of the Seventeenth Century: Prose and Poetry (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Reading and analysis of representative texts of major authors. May be taken toward fulfilling general requirement in literature for baccalaureate degrees.

421 French Literature of the Eighteenth Century: Montesquieu and Voltaire (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Studies Montesquieu, Voltaire, and other writers of first half of century.

422 French Literature of the Eighteenth Century: Diderot and Rousseau (3:3:0) Prerequisite: 18 credits of French,
or permission of instructor. Studies Diderot, Rousseau, and other writers of second half of century.

431 French Literature: 1800–1850 (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Poetry, theater, and novels of Romantic and Parnassian movements.

432 French Literature: 1850–1900 (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Poetry, theater, and novels of Realist, Naturalist, and Symbolist movements.

441 Twentieth-Century Prose Fiction (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Principal literary trends in contemporary French literature. Emphasizes evolution of novel from Proust and Gide to Beckett and “Nouveau Roman.”

442 Twentieth-Century Drama and Poetry (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. French drama from Surrealism to “Nouveau Theater.” French poetry from Symbolism to contemporary poets.

451 Sub-Saharan African Literature (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. For non-Western credit. Studies selected writers expressing culture and civilizations of French-speaking countries south of the Sahara.

452 French-Canadian Literature (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Studies Francophone literature of Canada with emphasis on contemporary works.

453 Francophone Literature from North Africa (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Studies Francophone literature of North Africa (the Maghreb) with emphasis on contemporary works. May be repeated once for credit with permission of instructor.

454 Caribbean Literature in French (3:3:0) Prerequisites: 18 credits of French, or permission of instructor. Studies selected writers expressing culture and civilization of French-speaking countries of Caribbean.

460 Advanced Oral and Written Expression (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Intensive course to help students obtain fluency in oral and written French. Develops conversational skills and mastery of vocabulary. Class discussions and oral and written reports on current topics.

461 Linguistic Structure of Modern French (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Analyzes phonology, morphology, and syntax of modern standard French. Optional lab work.

462 Stylistics (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Analyzes more complex aspects of French language and various stylistic processes. Develops writing skills through readings, discussion, and composition.

470 Topics in French Cinema (3:3:0) Prerequisite for film and media studies students: English 332, or permission of instructor; for French students, 18 credits in French, or permission of instructor. Topics such as early days of French cinema, La Nouvelle Vague, women film directors, Quebecois, and African and Caribbean films selected by type, period, or director. Emphasis varies from year to year. Required viewing, student discussion, and written critiques. May be repeated once with permission of department or film studies advisor.

480 Special Topics (3:3:0) Prerequisite: 18 credits of French, or permission of instructor. Studies selected literary theme, topic, period, or genre. May be repeated once with permission of instructor.

490, 491 Independent Study (1–3:0:0), (1–3:0:0) Prerequisites: French majors with 90 credits, and permission of chair. Research and analysis of selected problem in literature or linguistics in consultation with department member. Only 6 credits of independent study may be applied to fulfilling requirements in concentration.

497, 498 Senior Honors Tutorial (3:0:0), (3:0:0) Prerequisites: French majors with 90 credits, cumulative GPA of 3.00, and 3.00 in major field. Students who meet these requirements admitted to candidacy after submitting letter of application to departmental Honors Committee in second half of junior year. Also requires faculty recommendation and interview by Honors Committee. First semester involves weekly meetings with faculty member to discuss readings from comprehensive list prepared by French faculty. Second semester requires independent research and completion of honors essay under supervision of French faculty member.

515 Medieval French Literature (3:3:0) Intensive study of outstanding literary works of Middle Ages. Course work in French.

517 Studies in Seventeenth-Century Literature (3:3:0) Selected writers, works, themes, or trends of French literature in classical era. Content varies. May be repeated once for credit. Course work in French.

518 Studies in Eighteenth-Century Literature (3:3:0) Selected writers, works, themes, or trends of French literature in 18th century. Content varies. Course work in French. May be repeated for credit with permission of department.

519 Studies in Nineteenth-Century Literature (3:3:0) Selected works, themes, genres, and authors of 19th-century French literature. Content varies. Course work in French. May be repeated for credit with permission of department.

525 Studies in Modern French Literature (3:3:0) Selected writers, works, themes, or trends of French literature in modern era. Content varies. May be repeated for credit with permission of department. Maximum 6 credits may be earned. Course work in French.

550 Special Topics (3:3:0) Specialized topics relating to French culture and literature. Content varies. May be repeated once for credit. Course work in French.

560 History of the French Language (3:3:0) Evolution of French language from Latin to present-day French.

575 Grammatical Analysis (3:3:0) Studies characteristic features of contemporary French. Examines spoken and written French, including syntactic analysis, distributional analysis, and generative-transformational grammar. Emphasizes problem areas for American learners.

576 Advanced Translation (3:3:0) Advanced work in translation of topics from social and political sciences and humanities. Comparative terminology, sight translation, and precise writing. Stresses importance, function, and techniques of documentation in translation. Translations from French to English and English to French.
580 Contemporary French Society and Culture (3:3:0) Studies structure and evolution of society and culture of contemporary France.

798 Directed Reading and Research (3:0:0) Open only to degree students who have completed at least 18 credits. Reading and research on specific project under direction of department member. Oral or written report required.

799 Thesis (1–6:0:0) Students who take FREN 798 and then elect the thesis option receive 3 credits for FREN 799 after completing thesis. Students who do not take FREN 798 receive 6 credits for FREN 799 after completing thesis. Graded S/NC.

See also FRLN course listings.

Forensics (FRSC)  College of Science

500 Introduction to Forensic Science (3:3:0) Prerequisite: graduate standing. Overview of forensic science and related investigative techniques. Includes coverage of crime scene investigation, crime scene procedures, the role of the forensic pathologist, the modern forensic laboratory, DNA analysis techniques, microanalysis, examination of trace evidence, hair and fibers, examination of questioned documents, forensic anthropology, forensic odontology, homicide investigation, and analysis of a mock crime scene.

510 Crime Scene Analysis (3:3:0) Prerequisite: graduate standing. Examines the role of the first officer at the scene, search, seizure and related legal issues, traditional crime scene measurements, photogrammetry, processing latents, crime scene reconstruction methods, 2-D and 3-D impressions, blood spatter analysis, collection of trace evidence, packaging and preserving evidence, outdoor crime scenes, and explosion and fire scenes.

520 Toxicology (3:3:0) Prerequisite: a 400-level course in molecular or cellular biology, or permission of instructor. Examines toxic substances and their effects on human cellular and organ systems. The course focuses on human physiological concepts, the chemistry of toxins, the human enzymatic detoxification processes, and the analytical techniques required for detecting the presence of toxins and their metabolites in human tissue or serum.

530 Criminal Law (3:3:0) Prerequisite: graduate standing. Introduction to the criminal justice process, constitutional overview, the Fourth, Fifth, and Sixth amendments, continuation of criminal justice process, exclusionary rule and the Bill of Rights. Search warrants requirements, including probable cause, particularity, and proper execution. Covers warrantless searches and seizures, the plain view doctrine, exigent circumstances, searches incident to an arrest and consent, and challenges to searches, including the exclusionary rule and the concept of standing. Also explores warrant requirements for arrest and interrogation, including the Miranda rule and its limitations; the grand jury process and pretrial discovery issues; trial and the right to counsel; burden of proof, guilty pleas, and plea bargaining; and sentencing issues, including an overview of sentencing guidelines.

540 Chemical Analysis (3:3:0) Prerequisite: undergraduate degree in chemistry or biology, or permission of instructor. Theories and models of separation with applications to analyses of a wide range of chemical, biological, and environmental samples. Topics include high-resolution gas and high-performance liquid chromatography. Emphasizes theory of reverse phase, normal phase, ion exchange, size exclusion, and affinity based separations. Also presents instrumentation such as detectors, pumps, columns, and data acquisition.

550 Issues in Forensic Anthropology (3:3:0) Prerequisite: graduate standing. Examines issues related to skeletal analyses and interpretation of forensic case reports in determining personal identification and cause of death. Discussions include skeletal variation, age criteria, sexing criteria, pathology, trauma, and postmortem damage.

560/BINF 637 Forensic DNA Sciences (3:3:0) Prerequisites: graduate standing or permission of instructor. Intensive introduction to parameters affecting data QC and analysis, including factors arising from biochemistry, chemistry, genetics, statistics, instrumentation, and software.

570 Introduction to Biochemical Forensics (3:3:0) Prerequisites: a course in biochemistry or permission of instructor. Introduces students to the application of standard biochemical techniques and assays to the collection and interpretation of evidence in criminal investigations. Emphasizes sample processing and methodology used in sample analysis. Covers mass spectrometry, DNA chip technology, and bioterrorism as it relates to forensic science and law enforcement. Includes a survey of laboratory methods and instrumentation for testing of drugs and biological samples, as well as a discussion of drug abuse and toxicology from the perspective of forensic analysis. Assignments cover sample preparation, handling, analysis, and data interpretation for samples from simulated crime scenes. Techniques covered include chromatographic and spectroscopic analysis and mass spectrometry. Use and conformity to standard protocols, quality assurance, and quality control methods will be stressed, along with statistical methods for calibration and analysis of data.

590 Forensics Capstone Course (3:3:0) Prerequisite: permission of instructor. Integrates all the various techniques used in the study of forensic science and medicine, and applies them to the interpretation of events and the reconstruction of the sequence of events at a variety of typical death scenes. Integrates medical, scientific, sociological, and legal methodology as they apply to medicolegal death investigations, using a variety of forensic literature and text resources. Presents an integrative approach to crime scene analysis based on actual case studies, in which students apply theoretical concepts discussed in class to real-world situations. Includes weekly group projects, with students organized in rotating groups and assigned a research topic in forensic medicine. Students discuss, examine, and analyze forensic, medical, and physical elements present at the death scenes, and develop their own hypotheses, which are then evaluated and discussed as the case is reconstructed.

Geography (GEOG)

Geography and Geoinformation Sciences

101 Major World Regions (3:3:0) Patterns, problems, and prospects of the world’s principal human-geographic regions. Emphasizes areal differentiation and role of geographic differences in interpreting current world scene.
102 Physical Geography (3:3:0) Interrelated processes affecting global distribution and character of climate, soils, vegetation, hydrology, and landforms. Includes elements of mapping (natural science credit).

103 Human Geography (3:3:0) Overview of major ideas and approaches to studying spatial aspects of human social and behavioral systems. Surveys distribution and movement of human populations, characteristics and distribution of cultural mosaics, patterns of economic interdependence, and study of forces of cooperation and conflict among people from global perspective.

110 Maps and Mapping (3:3:0) Introduces maps and spatial analytic tools and methods, including geographic information systems. Familiarizes students with key geographic concepts and skills through integrating information technology with map-making technology. Includes introduction to computer and web-based geographic applications, databases, and graphics.

300 Quantitative Methods for Geographical Analysis (3:3:0) Prerequisites: 30 credits, including GEOG 102 and 103, or permission of instructor; and permission of department. Comprehensive introduction to quantitative methods in spatial analysis, with emphasis on solving geographical research problems. Topics include nature of spatial data; collection of spatial data; preparation of spatial data for mapping, geographic information systems, and statistical analysis; descriptive spatial statistics; areal sampling theory and methods; probability theory and distributions; hypothesis testing; correlation and regression; and areal and point pattern spatial statistics.

301 Political Geography (3:3:0) Prerequisite: 30 credits. Distribution and effects of power on landscape, particularly on national and global scales.

303 Conservation of Resources and Environment (3:3:0) Prerequisites: 30 credits, and completion or concurrent enrollment in all other required general education courses. Provides analysis of world resources distribution, conservation, and preservation; and problems resulting from their natural occurrence and utilization. Uses knowledge from physical and social sciences to develop complex and sophisticated understanding of issues surrounding natural resource exploitation and management, conservation, and preservation.

304 Geography of Population (3:3:0) Prerequisite: 30 credits. Spatial distribution of population, its causes and effects, and changing patterns resulting from population mobility. Emphasizes spatial characteristics of variables such as age, sex, race, education, and income.

305 Economic Geography (3:3:0) Prerequisite: 30 credits. Analyzes pattern of distribution of world economic activity, spatial economics behind this pattern, and influence of distribution on other spatial systems.

306 Urban Geography (3:3:0) Prerequisite: 30 credits. Structure and internal differentiation of cities. Variety of perspectives on nature of cities, and opportunities for intensive use of space. Urban problems and alternatives in their spatial context.

308 Field Mapping Techniques (3:0:6) Prerequisites: MATH 105, GEOG 102 or 101, and 30 credits. Basic techniques for collecting and recording spatial field data, including topographic maps, compass, transit, alidade, and geographic positioning systems. Includes field work.

309 Introduction to Meteorology and Climate (3:3:0) Prerequisite: GEOG 102 or equivalent, or permission of instructor. Elements of meteorology; analysis of world distribution of meteorological controls as bases of regional climatic variations (natural science credit).

310 Introduction to Digital Cartography (4:3:2) Origins, principles, and methods of thematic map design and production. Principles of graphic design, data compilation, analysis, and display.

311 Introduction to Geographic Information Systems (3:3:0) Fundamental concepts and theories for appropriate use of geographic information systems (GIS). Discusses basic GIS functionality, and applications in various fields.

315 Geography of the United States (3:3:0) Prerequisite: 6 credits of geography or American studies, or permission of instructor. Diversity of U.S. physical and cultural landscapes.

316 Geography of Latin America (3:3:0) Prerequisite: 6 credits of geography or Latin American studies, or permission of instructor. Regional survey of physical resources, populations, cultural characteristics, and economic activities in Latin America.

320 Geography of Europe (3:3:0) Prerequisite: 6 credits of geography or European studies, or permission of instructor. Environmental, economic, social, and political factors influencing regional structure of Europe.

325 Geography of North Africa and the Middle East (3:3:0) Prerequisite: 6 credits of geography or courses related to Middle East; or permission of instructor. Environmental, economic, and social factors of differentiation of regional structure and distribution of resources in North African and Middle Eastern countries.

330 Geography of the Soviet Succession States (3:3:0) Prerequisite: 6 credits of geography or Russian studies, or permission of instructor. Analyzes geographic factors involved in history, economic development, and geopolitical situation of the former Soviet Union.

333 Issues in Regional Geography (1–6:0:0) Prerequisite: 30 credits. Geographical study of particular region or relevant regional issue. Content varies. May be repeated to a maximum of 12 credits.

357 Structures in Urban Governance and Planning (3:3:0) Prerequisite: 30 credits. Reviews spatial, policy, and administration principles that guide planning activity in United States. Outlines differences between theory and practice; and provides tools, methods, and perspectives commonly incorporated into practice of urban and regional policy analysis. Provides orientation to public-sector economy in general; and urban administration, planning, and policy in particular.

380 Geography of Virginia (3:3:0) Prerequisite: 30 credits. Natural and cultural forces of Virginia. Studies regional makeup and analysis of human and environmental characteristics.

399 Selected Topics in Geography (3:0:0) Prerequisite: 30 credits. Content varies; determined by instructor. May be repeated to a maximum of 12 credits.

406 Suburban Geography (3:3:0) Prerequisite: 60 credits. Analyzes spatial aspect of social, economic, and political
activities in suburbia. Suburbanization viewed as independent force and component of larger urbanization process. Uses Northern Virginia as lab for suburban geographical study and student-initiated field work projects.

411 Advanced Digital Cartography (3:3:0) Prerequisite: grade of C or better in GEOG 310. Design and production of full-color digital maps and information graphics, map cognition and use, and principles of desktop mapping.

412 Aerial Photography Interpretation (3:3:0) Prerequisites: 60 credits and GEOG 102 or 103, or permission of instructor. Methods and techniques of interpreting and using information contained in aerial photography, including applications to various aspects of physical and cultural landscape.

415 Seminar in Geography (3:3:0) Prerequisites: GEOG 300 and 310. Capstone seminar for geography majors integrating previous course work into disciplinary framework. Students produce, present original research papers.

416 Satellite Image Analysis (3:3:0) Prerequisites: 60 credits and GEOG 412, or permission of instructor. Examines methods and techniques of interpreting and using information obtained by nonphotographic remote sensing systems, with particular emphasis on space-borne platforms. Includes analysis of imagery for both physical and cultural environments.

420 Physiography of North America (1–3:0:0) Prerequisite: 60 credits, GEOG 102, 3 additional credits of geography or geology, or permission of instructor. Physiographic features of North American continent; spatial distribution; and influence on cultural, demographic, and economic development of United States and Canada.

463 Applied Geographic Information Systems (3:3:0) Prerequisites: 2.00 or better in GEOG 300 and 311. Selected applications in geographic information systems (GIS). Topics include automated data capturing and processing, spatial data models and structure including object-oriented approach, advanced spatial analytical techniques including raster modeling and network analysis, programming, and algorithm development in GIS. Major purpose of course is to extend fundamental theories and concepts in GIS so students are able to conduct research with and on GIS.

480 Internship in Geography (1–3:0:0) Prerequisite: open only to majors with 90 credits and GPA of 2.50 in geography course work. Approved study programs with specific employers. Credit determined by department, may be repeated to a maximum of 6 credits. Contact department one semester before enrollment.

490 Practicum in Geographical Applications (1–6:0:0) Prerequisite: open only to authorized majors with 90 credits. Application of geographical research tools and techniques in conjunction with faculty instruction and research. Individualized sections taught by arrangement with full-time faculty. May be repeated to a total of 6 credits.

499 Independent Study in Geography (1–3:0:0) Prerequisite: open only to geography majors with 90 credits, and permission of department and instructor. Individual study of selected area of geography. Requires directed research paper. May be repeated to a maximum of 6 credits with permission of the department.

503 Problems in Environmental Management (3:3:0) Prerequisite: 6 credits of geography, including GEOG 102. Case studies of effects of human activities on atmospheric, hydrologic, geomorphic, and biotic processes.

505 Transportation Geography (3:3:0) Prerequisite: 6 credits of geography. Structure, principles, location, and development of world transportation. Critical role of transportation in moving people, goods, and ideas at international, national, regional, and urban levels.

520 Geography for Teachers (3:3:0) Prerequisite: graduate standing, or permission of department. Emphasizes problems and techniques in teaching geography; and current developments in research, methodology, and philosophy in the discipline.

525 Economics of Human/Environment Interactions (3:3:0) Prerequisite: GEOG 550, or permission of instructor. Survey of literature on spatially explicit empirical models of land-use change. Hands-on experience developing and running simple models. Techniques covered include statistical models, mathematical programming models, cellular automata, agent-based models, and integrated models.

533 Issues in Regional Geography (1–6:0:0) Geographical study of particular region or relevant regional issue. Content varies. May be repeated to a total of 12 credits with permission of the department.

540 Medical Geography (3:3:0) Prerequisite: course in statistics. Spatial approaches to study of health and disease. Topics include disease ecology and diffusion, and geographic perspectives on improving health care delivery.

550 Geospatial Science Fundamentals (3:3:0) Introduces geospatial sciences, emphasizing concepts and theories of cartography, remote sensing, air photo interpretation, Global Positioning Systems, spatial data structures, and geographic information systems. Lectures accompanied by hands-on exercises. Only available for students without previous course work in cartography.

551 Thematic Cartography (3:3:0) Prerequisite: GEOG 310 or 550. Analyzes nature of perceptual organization and visual systems in thematic map communication portrayal, graphic handling, and data analysis.

553 Geographic Information Systems (3:3:0) Prerequisite: GEOG 550, or course in cartography. Sources of digital geospatial data; and methods of input, storage, display, and processing of spatial data for geographic analysis using GIS. Lectures, hands-on exercises familiarize students with current technology.

554 History of Cartography (3:3:0) Prerequisite: graduate standing. History of cartographic portrayal of Earth from ancient times through 19th century, emphasizing interrelation of human culture, technological development, and geographical knowledge as reflected in maps.
556 Automated Cartographic Generalization (3:3:0). Prerequisite: GEOG 550, or permission of instructor. Survey of algorithms and techniques to generalize information on maps and in geographic information systems. Covers simplified representation of geographic objects, surfaces, and thematic information. Includes GIS programming component.

562 Photogrammetry (3:3:0) Prerequisite: GEOG 412, or permission of instructor. Treatment of photogrammetric problems, including least squares adjustments, image co-odination refinements, colinearity equation, resection, relative orientation, and analytic aerotriangulation.

563 Advanced Geographic Information Systems (3:3:0) Prerequisites: GEOG 553 or equivalent. Discusses advanced GIS concepts including spatial data structure, spatial analysis, programming data fusion, Internet components, and spatial database management. Hands-on activities demonstrate concepts and specific applications in both cultural and physical geography.

570 The Hydrosphere (3:3:0) Prerequisite: two semesters of calculus, partial differential equation recommended; or permission of instructor. Covers fundamental aspects of hydrosphere, which consists of aqueous envelope of Earth including oceans, lakes, rivers, snow, ice, glaciers, soil moisture, ground water, and atmospheric water vapor.

575 Reconstructing Past Environments: Seminar in Geoarchaeology (3:3:0) Prerequisites: permission of instructor and course work in geography, biology, geology, or archaeology. Research seminar examining intersection of geoarchaeology and paleoecology with cultural ecology. Addresses methods common to these research areas, and ranges of scales and reliability of evidences to reconstruct past environments, both natural and cultural. Applied examples cover selected geoarchaeological and paleoecological projects from variety of geographical regions.

579 Remote Sensing (3:3:0) Prerequisite: GEOG 412, or permission of instructor. Examines use of various types and combinations of electromagnetic energy to obtain spatial information. Concentrates on nonphotographic and spaceborne remote sensing platforms and sensors. Examines essential operational parameters for existing and future systems and strategies for visual extraction of features.

580 Digital Remote Sensing (3:3:0) Prerequisite: GEOG 416 or 579. Examines theory and techniques of using digital remotely sensed data for obtaining geographic information of Earth’s surface, including image-enhancement methods and classification strategies for variety of physical and cultural features.

581 World Food and Population (3:3:0) Prerequisite: graduate standing. Topics include maldistribution of population, regional disparities in growth rates and income distribution, food production, and world hunger. Discusses population policies, with emphasis on Third World countries.

585 Quantitative Methods (3:3:0) Prerequisite: previous course work in statistics, or GEOG 310 or 550. Survey of quantitative methods commonly used in geographic research. Emphasizes spatial analysis techniques.

590 Selected Topics in Geography and Cartography (3:3:0) Prerequisite: permission of department. Analyzes topics of immediate interest. Content varies. May be repeated to a maximum of 12 credits.

Graduate standing is prerequisite to all 600-level courses.

603 Geographic Perspectives of Complex Natural Resource Management Topics (3:0:0) Develops better understanding of strengths, limitations of restoring large and complex natural resource systems by examining critical aspects of one such effort.

605 Socioeconomic Applications of GIS (3:0:0) Prerequisite: GEOG 553. Provides those working with spatially-referenced data the technical skills to use GIS to conduct spatial analyses on socioeconomic phenomena related to labor, retail and real estate markets. Introduces and emphasizes the development of technical and methodological skills to understand the potential and the pitfalls of using GIS for spatial analyses of socioeconomic phenomena.

631 Spatial Agent-based Models of Human-Environment Interactions (3:3:0) Prerequisite: GEOG 531 or CSS 600, or permission of instructor. Discusses key challenges in spatial modeling of human-environment interactions. Reviews agent-based modeling applications in urban and rural interactions, agriculture, forestry, and other areas. Hands-on development of simple ABM models and investigation of linkages between GIS and ABM.

644 Fundamentals and Interpretation of Imaging Radar (3:0:0) Prerequisites: GEOG 579 or EOS 753, or other basic course in remote sensing. Provides understanding of components, functionality, and use of radar remote sensing for acquiring spatial information. Concentrates on operational systems. Includes hands-on assignments.

653 Geographic Information Analysis (3:3:0) Prerequisites: GEOG 553 and 583. Explores existing and potential capabilities of geographic information systems in conducting spatial analysis and modeling.

655 Map Design (3:3:0) Prerequisite: GEOG 310 or 550. Advanced examination of principles of map design, including discussions of map design research.

656 Terrain Mapping (3:3:0) Prerequisite: GEOG 553 or equivalent, or permission of instructor. Covers fundamental methods of digitally representing terrain data, major technologies, and programs for generating terrain data; methods for quantifying terrain error and assessing terrain data quality; and a variety of applications.

661 Map Projections and Coordinate Systems (3:3:0) Prerequisite: GEOG 310 or 550. Covers development of various map projections and coordinate systems, property analysis, distortions, and applications.

664 Spatial Data Structures (3:3:0) Prerequisite: GEOG 310 or 550. Studies spatial data structures and their application in digital cartography, geographic information systems, and image-processing systems. Examines raster and vector data structures, and attribution schemes and topological models. Includes data transformation, information loss, data quality, and the role of metadata.

670 Applied Climatology (3:3:0) Prerequisite: course in weather and climate, or permission of instructor. Applies climatic concepts to natural and human-modified environments, and analyzes climatic change.

671 The Lithosphere (3:3:0) Prerequisite: graduate standing. Global-scale overview of lithosphere, the solid non-living Earth, its materials, cycles, plate tectonic and geomorphic processes; and history, including interactions
with and history of hydrosphere, atmosphere and biosphere, and methods of analysis.

674 Environmental Impact Analysis (3:3:0) Scientific and administrative processes involved in environmental impact analysis and environmental impact statements.

680 Seminar in Thought and Methodology (3:3:0) Prerequisite: GEOG 585. Includes historical development of geographic thought and current philosophy of geography; rationale for various subfields; and geographic research techniques and methods of analysis.

690 Advanced Practicum in Geographical Applications (1–6:0:0) Prerequisite: permission of department. Applies spatial technologies in conjunction with faculty instruction and research. Individualized sections taught by arrangement with full-time faculty.

695 Internship (1–6:0:0) Prerequisite: permission of department. Approved study programs with specific employers. Students and employer supervisors must demonstrate relevance of study program to degree requirements.

698 Directed Readings and Research (1–3:0:0) Prerequisite: permission of instructor and department. Reading and research on specific topic under direction of faculty member. Written report required; oral exam and report may be required. May be repeated to a maximum of 12 credits.

750 Advanced Geographical Research Applications (1–6:0:0) Prerequisite: permission of instructor. Advanced research employing geographical tools and research techniques. Content varies. May be repeated to a maximum of 12 credits with permission of the department.

785 Geographic Field Work (3:3:0) Introduces nature, scope, and objectives of geographic field methods and techniques, including use of base maps, acquisition of data, and field research design. Taught as much as possible in field situations with students required to develop and carry out relevant field research projects pertaining to both physical and cultural geography.

791 Colloquium in Earth Systems Science (1:1:0) Introduces in colloquium format various parts of Earth systems. Invited talks by Mason faculty and primarily Earth science experts in Washington, D.C. area. Students graded on written reports demonstrating understanding of wide topics covered.

792 Seminar in Earth Systems Science (2:2:0) Prerequisites: 15 graduate credits and courses on atmosphere, hydrosphere and lithosphere. For graduate students with background in Earth’s major systems. Capstone experience. Seminars presented by faculty and students. Topics vary from semester to semester.

795 Seminar in Regional Analysis (3:3:0) Analyzes and synthesizes physical and cultural elements of geography in selected region. Should be taken near end of master’s degree program. Provides opportunity to apply selective knowledge gained in previous systematic courses to specific region.

799 Thesis (1–6:0:0) Prerequisites: degree candidacy and departmental approval of thesis proposal. Graded S/NC. May be repeated to a maximum of 5 credits.

Geology (GEOL)

Environmental Science and Policy

101 Introductory Geology I (4:3:3) Covers Earth, processes that operate within Earth and on surface, and human interaction with Earth. Topics include minerals, earthquakes and seismology, isotasy, igneous processes and rocks, paleomagnetism and plate tectonics, weathering, mass movements, rivers and streams, groundwater, glaciers, and marine processes. May include field trips.

102 Introductory Geology II (4:3:3) Prerequisite: GEOL 101. Earth processes in historical context. Topics include sedimentary rocks and principles, deformation and metamorphism, mountain building and plate tectonics, geologic time, fossils, and historical development of continents. May include field trips.

206 Topics in Geology I (1–3:1–3:0) Discusses particular topic in geology. May include field trips.

302 Mineralogy (4:3:3) Prerequisites: GEOL 101 and 102 with grade of C or better, and CHEM 211. Crystallographic, optical, chemical, and physical properties of minerals. May include field trips.

303 Field Mapping Techniques (3:0:6) Prerequisites: 30 credits including MATH 105 or equivalent, and GEOL 102 or GEOL 101. Basic techniques for collecting, recording, and plotting spatial field data including use of topographic maps, compasses, transit, alidade, and global positioning systems (GPS). Includes field work.

304 Sedimentary Geology (4:3:3) Prerequisites: GEOL 101 and 102, and grade of C or better in GEOL 302. Introduces sedimentation, sedimentary petrology, facies analysis, and stratigraphy. May include field trips.

305 Environmental Geology (3:3:0) Prerequisites: GEOL 101, and either GEOL 102, GEOL 309/BIOI 309, or GEOL 309. Investigates geological principles directly relating to environmental problems, geological causes and effects of natural disasters, geology of natural resources, geology of land-use planning, and geology as related to health problems. May include field trips.

306 Soil Science (3:3:0) Prerequisites: GEOL 101, and CHEM 103 or 211. Composition, classification, physical properties, and origin of soils. May include field trips.

308 Igneous and Metamorphic Petrology (4:3:3) Prerequisites: GEOL 101 and 102, grade of C or better in GEOL 302, and MATH 105 or equivalent. Genesis, classification, and recognition of igneous and metamorphic rocks. May include field trips.

309 Introduction to Oceanography (3:3:0) Prerequisites: GEOL 101 and BIOL 103 or 213. Introduces physical, chemical, biological, and geological aspects of oceanic environment. May include field trip.

312 Invertebrate Paleontology (4:3:3) Prerequisites: GEOL 101, or BIOL 103, 104; or BIOL 213, 303, 304. Classification, evolutionary trends, and distribution of common invertebrate fossils. May include field trips.

313 Hydrogeology (3:3:0) Prerequisites: GEOL 101 or GEOG 102, MATH 113, and CHEM 211. Geological and hydrologic factors controlling occurrence, distribution, movement, quality, and development of groundwater.
315 Topics in Geology II (1–3:1–3:0) Prerequisites: CHEM 211, 212; MATH 113 or permission of instructor. Discusses particular topic in geology. May include field trips.

316 Computers in Geology (3:3:0) Prerequisites: GEOL 101, 102, and 302, and one semester of mathematics; or permission of instructor. Uses of mainframe and microcomputers, with emphasis on geologic applications.

317 Geomorphology (4:3:3) Prerequisites: GEOL 101 and 102, with grade of C or better; or 6 credits in GEOG, including GEOG 412 strongly recommended. Analyzes processes that occur at Earth’s surface and resulting landforms. Labs stress recognition and evaluation of landforms using maps and aerial photographs, and methods of data collection used in study of surficial geology. May include field trips.

363 Coastal Morphology and Processes (4:3:3) Prerequisite: GEOL 309, BIOL 309, or GEOL 317; or 9 credits in geography, including GEOG 309. Studies global coastal geomorphology and processes with emphasis on U.S. Atlantic and Gulf coasts. Topics include plate tectonics, sea level changes, sediment supply, waves, tides, storm impacts, and human activities. Lecture and extended weekend field trips to mid-Atlantic coast.

401 Structural Geology (4:3:3) Prerequisite: grade of C or better in GEOL 302; and MATH 110, 111, or 113. Igneous, sedimentary, and metamorphic rocks in folded, faulted, and metamorphosed terrains. May include field trips.


403 Geochemistry (3:3:0) Includes stable isotope, crystal, water, and organic geochemistry; geochronology; and geochemistry of rocks.

404 Geological Field Techniques (3–8:0:6–12) Prerequisites: GEOL 101, 102, 302, 304, 308, and 401. Mapping techniques involved in collecting geological field data. Includes field work.

405 Geology of Mineral and Energy Resources (3:3:0) Prerequisites: GEOL 101, 102, 302, 304, 308, and 401. Topics include metallic and nonmetallic ore deposits, fossil fuels, alternate energy resources, and methods by which each is used. May include field trips.

406 Seminar in Earth and Environmental Science (3:3:0) Prerequisite: 90 credits. Capstone seminar for Earth and environmental science majors. Students read, discuss research literature; produce, present original papers.

408, 409 Practicum for Geology Laboratories (1:1:3) Prerequisites: geology major with 80 credits, and permission of department chair. Studies techniques to make geology lab effective component in geological education. Discusses developing testing materials, supplemented by experience operating geology course lab section.

410 Research Proposal Preparation (1:1:0) Prerequisites: geology or Earth science major with 80 credits, and permission of department chair. Prepares for research in GEOL 411. Includes literature research, initial data collection, and preparing research proposal.

411 Geological Research (3:0:3) Prerequisite: GEOL 410. Geological research: data collection and reduction, interpretation, preparation of written report, and oral presentation of results.

417 Geophysics (3:3:0) Prerequisites: GEOL 101, MATH 113, and one year of physics; or permission of instructor. Basic principles of geophysics including gravity, magnetism, and seismic reflection and refraction.

420 Earth Science and Policy (3:3:0) Prerequisites: completion of or concurrent enrollment in all other required general education courses; completion of at least 18 credit hours in major or minor (geology, Earth science, ocean and estuarine science, or global and environmental change), and one of the following social science-based courses: EVPP 361, ECON 103, ANTH 114, GEOG 103, GLOA 101, GOVT 132 or 133, HISTORY 125 or 130, SOCI 101, 102, or 120. Discusses Earth science issues that have policy implications. Course uses a broad definition of Earth science, from atmosphere to geosphere. Course taught seminar-style, with emphasis on discussion, reading, writing, critical analysis, and student oral presentations. Course may include field trips.

480 Internship (1–3:0:0) Prerequisite: open only to majors with 90 credits. Approved study programs with specific employers. Contact department one semester before enrollment.

500, 501 Selected Topics in Modern Geology (1–3:1–3:0) (1–3:1–3:0) Prerequisite: baccalaureate degree in geology, or permission of instructor. Lecture, lab, field trip. Topic designated in class schedule.

503 Special Topics in Earth Science (1–6:1–6:0) Prerequisite: employment or anticipated employment as Earth science teacher. In-service course to strengthen and update knowledge of Earth science. May include field trips.

601 The Lithosphere (3:3:0) Prerequisite: graduate standing. Global-scale overview of lithosphere, solid non-living Earth, materials, cycles, plate tectonic and geomorphic processes; and history, including interactions with and history of hydrosphere, atmosphere and biosphere, and methods of analysis.

613 Environmental Geochemistry and Mineralogy (3:3:0) Prerequisite: graduate standing. Explores hot topics and aids students in developing intellectual skills to identify key research problems. Students will also improve their writing and presentation skills.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study geology. Program of studies designed by discipline director and approved by doctoral committee that allows student to participate in current research of discipline director and results in paper reporting student’s original contributions. Enrollment may be repeated.

German (GERM)

Modern and Classical Languages

Placement: See the Academic Testing section in the Admission chapter.

101 Elementary German I (3:3:1) Designed for students with no knowledge of German. Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.
102 Elementary German II (3:3:1) **Prerequisite:** GERM 101, or permission of department. Continuation of GERM 101. Lab work required.

105 Review of Elementary German (3:3:1) **Prerequisite:** appropriate placement score, or permission of department. Reviews elements for students who have studied German previously. May not be taken for credit in combination with GERM 102. Lab work required.

110 Elementary German (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for GERM 110 if they have received credit for GERM 101 and 102. Lab work required.

201 Intermediate German I (3:3:1) **Prerequisite:** GERM 102 and 105, appropriate placement score, or permission of department. Further development of skills in listening, speaking, reading, and writing. GERM 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate German II (3:3:1) **Prerequisite:** GERM 201, appropriate placement score, or permission of department. Applies skills to reading, composition, and discussion. Lab work required.

210 Intermediate German (3:3:1) **Prerequisite:** GERM 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of German-speaking regions. Lab work required.

250 Gateway to Advanced German (3:3:0) **Prerequisites:** GERM 210, appropriate placement score, or permission of department. Integration of advanced intermediate-level German reading, writing, listening, and speaking skills, and the development of critical thinking about authentic texts from around the globe. Taught in German.

301 Culture and Civilization (3:3:0) **Prerequisite:** 60 credits, or permission of instructor. Covers development of German civilization from 18th century to present. Includes German cultural contributions to world civilization. Taught in English.

310 Conversation and Composition (3:3:0) **Prerequisite:** GERM 202 or equivalent, or permission of instructor. Develops fluency in speaking, and proficiency in writing German through discussion, reports, and compositions based on texts dealing with contemporary events and issues. Not for native speakers.

316 German for the Business World (3:3:0) **Prerequisite:** GERM 202 or equivalent, or permission of instructor. Introduces terminology and structural features of business German. Emphasizes acquiring vocabulary and developing facility in reading German business articles and correspondence.

318 Translation of Texts (3:3:0) **Prerequisite:** 12 credits of German, or permission of instructor. Introduces principles and techniques of translation. Translation of texts from the natural and social sciences, current events, and contemporary culture. Translations mainly from German into English.

325 Major Writers (3:3:0) **Prerequisite:** ENGL 101 or equivalent, or permission of instructor. Works of major German, Austrian, and Swiss writers in translation. Writers to be studied vary. Course work in English. May be repeated for credit with permission of department.

340 Survey of German Literature (3:3:0) **Prerequisite:** GERM 202 or equivalent, or permission of instructor. Overview of history of German literature to 1880.

355 Readings in Poetry (3:3:0) **Prerequisite:** GERM 202 or equivalent, or permission of instructor. Intensive reading of German poetry in its historical context. Studies genre characteristics and development. Types of poetry studied vary. May be repeated for credit when subtitle is different, with permission of department.

365 Readings in Narrative Prose (3:3:0) **Prerequisite:** GERM 202 or equivalent, or permission of instructor. Intensive reading of German narrative prose, such as autobiographical fiction, fairy tales, and film. Studies genre characteristics and development. Topics vary. May be repeated for credit when subtitle is different, with permission of department.

375 Readings in Drama (3:3:0) **Prerequisite:** GERM 202 or equivalent, or permission of instructor. Intensive reading of German dramas in their historical context. Study of genre characteristics and development, including performance aspects. Genre varies; may be historical drama, radio play, or epic theater. May be repeated for credit with permission of department when subtitle differs.

415 Advanced Grammar and Style (3:3:0) **Prerequisite:** 15 credits of German or permission of instructor. Studies syntax, idiomatic features, and levels of style. Extensive practice in different types of written expression.

418 Advanced Composition (3:3:0) **Prerequisite:** 15 credits of German, or permission of instructor. Develops proficiency in writing German through intensive practice in preparing guided and original compositions.

442 The Age of Goethe (3:3:0) **Prerequisite:** 15 credits of German, or permission of instructor. Major works of Enlightenment, Sturm und Drang, Classicism, and early Romanticism. Emphasizes drama and poetry by Goethe and Schiller, with additional works by Lessing, Kleist, and other important writers of the era.

444 The Literature of Romanticism (3:3:0) **Prerequisite:** 15 credits of German, or permission of instructor. German Romantic poetry and prose. Background and some theory included.

450 Modern Literature: 1880–1925 (3:3:0) **Prerequisite:** 15 credits of German, or permission of instructor. Literature of Naturalism, Impressionism, and Expressionism, in Germany, Austria, and Switzerland.

451 Modern Literature: 1925 to the Present (3:3:0) **Prerequisite:** 15 credits of German, or permission of instructor. Literary trends since 1925 in Germany, Austria, and Switzerland.

480 Special Topics (3:3:0) **Prerequisite:** 15 credits of German, or permission of instructor. Special topics on language, literature, or culture by theme, approach, or era. May be repeated for credit with permission of department. See also FRLN course listing.
Global Affairs (GLOA)  •  Global and Community Health (GCH)

Global Affairs (GLOA)
College of Humanities and Social Sciences

101 Introduction to Global Affairs (3:3:0) Surveys wide range of global topics: previous periods of globalization, international organizations and law, transnational corporations and global economy, immigration and refugees, world environmental concerns, world culture, war and peace, paradoxical presence of nationalism and fundamentalism in global world, and antiglobalization movement.

490 Independent Study in Global Affairs (1–3:1–3:1–3) Prerequisite: global affairs majors with 90 credits, GLOA 101, and permission of instructor. Reading or research on specific topic related to globalization, under direction of faculty member. At least one written paper required. Course may involve combination of reading assignments, tutorials, presentations, or off-campus activities. May be repeated for credit up to total 6 credits.

495 Global Experiential Learning (1–18:0:0) On-the-job training in transnational or international fields through approved internship programs. Enrollment and credits controlled by Global Affairs Program. Contact Global Affairs Program one semester before planned enrollment.

Global and Community Health (GCH)
College of Health and Human Services

205 International Health (3:3:0) Examines cross-cultural values in health and nutrition, exploring health- and nutrition-related problems that afflict populations throughout the world and efforts to achieve optimal health for all. Introduces nutrition and health concerns from variety of cultures and considers population dynamics, vital statistics, global disease patterns, and cultural variations. Includes lectures, discussion, video presentations, oral presentations, and web research.

295 Nutrition for Health Professionals (3:3:0) Prerequisite: one semester of science or permission of instructor. Introduces nutrition science, emphasizing macro- and micro-nutrients in body, digestion, energy metabolism, weight loss, fitness and nutrition, prevention of chronic diseases, nutrition therapy, and nutritional assessment. Problem-solving and critical-thinking methodologies used in group presentations that address nutrition-related case studies. In-class activities, outside readings, and class discussion reinforce concepts. Students use computer-based diet analysis to evaluate personal dietary intakes.

332 Concepts of Health Care Promotion and Disease Prevention throughout the Life Span (3:3:0) Introduces epidemiology, health promotion, and disease prevention, and effect on health status of culturally diverse and vulnerable individuals, families, small groups, and communities. Focuses on health problems and potential interventions throughout life span, and incorporates principles of teaching and learning as they apply to health professionals.

350 Health Education, Promotion, and Holistic Health Perspectives (3:3:0) Enables students to survey health and wellness issues related to their personal profile and explore options in reducing personal risk factors. Students define health in context of family, environment, culture, society, and life span. By examining, comparing, and using various methods of health-risk appraisal and assessment tools, students plan health education and promotion projects for targeted populations. Stresses motivational strategies for improving and maintaining health.

402 Case Management (3:3:0) Open to seniors. Survey course on the state of case management programs and practice for health and human service professionals. Special emphasis on comparing nature, process, and outcomes guided by the objectives.

420 Strategies for Nutrition Education (3:3:0) Prerequisite: GCH 295 or permission of instructor. Examines methods and techniques for educating individuals about nutrition. Addresses nutrition education issues from variety of populations with respect to culture, age, religion, and specific disease states.

421 Community Nutrition (3:2:1) Prerequisite: GCH 295 or permission of instructor. Focuses on nutrition and health problems of specific community settings, and examines practices of nutrition services in various communities.

422 Nutrition throughout the Life Cycle (3:3:0) Prerequisite: GCH 295 or permission of instructor. Focuses on nutrient needs and food habits throughout life cycle. Emphasizes nutrient needs prior, during, and after pregnancy, and nutritional requirements of infants, children, adolescents, adults, and elderly.

423 Nutrition and Chronic Illnesses (3:3:0) Prerequisite: GCH 295 or permission of instructor. Examines nutrient needs related to specific chronic illnesses, including cardiovascular disease, cancer, obesity, and diabetes. Focuses on principles of nutritional therapy and prevention.

440 Community Health and Epidemiology (3:3:0) Prerequisite: completion of 300-level requirements. Addresses population-focused health care. Emphasizes primary, secondary, and tertiary prevention of health problems. Examines concepts of community, public health, and health policy affecting culturally diverse and vulnerable populations.

460 Public Health Research and Methods (3:3:0) Prerequisite: statistics course. This introductory research course is designed to present basic concepts and methods of public health research. Emphasis is placed on critique and use of current community and public health research methods.

466 Nutrition and Weight Management: Obesity, Anorexia, and Bulimia (3:3:0) Prerequisite: GCH 295, GCH 332, GCH 440, or approval of instructor. Focuses on the physiological, emotional, genetic, and societal and cultural factors that influence the relationship between eating and weight regulation.

480 Health Maintenance and Health Aspects of Aging (3:3:0) Studies physiological and psychological factors that influence health and have implications for preventive measures in disease and health disorders. Examines nutrition, nature of health problems, and methods of assessing physical and psychological needs.

494 Special Topics in Global and Community Health (3:3:0) Selected topics analyzing specialized areas in global and community health. Content varies. Lecture, seminar, laboratory, workshops.

496/NURS 496 Violence in Today’s Society (3:3:0) Examines magnitude of problem of violence globally and more specifically within the United States. Discussion and reflective activities engage students in the learning process.
498 Global and Community Health Internship (6:2:8) Involves a seminar and an internship in a community health organization. Open to community health majors only. Students are required to work a minimum of 224 hours during the semester they take the internship. This course provides for experiential learning in a community health organization under the direction of a faculty advisor and a preceptor. Students are expected to understand the roles and functions of the community health organization and complete a project approved by the faculty advisor and the preceptor.

499 Independent Study in Global and Community Health (1–3:0:0) Prerequisite: permission of college. Provides individual study of a particular problem area in global and community health research, theory development, or education under the direction of faculty. May be repeated for maximum 6 credits.

502 U.S. Role in Global Health, Nutrition, and Population (3:3:0) The course will cover U.S. history in responding to health, nutrition, and population challenges worldwide; examine current programs in each area, including those of the U.S. government and nongovernmental organizations, foundations, and the private sector; and examine future directions for responding to health, nutrition, and population trends.

506 Clinical Exercise Physiology (3:3:0) Prerequisites: bachelor’s degree, and 8 credits in anatomy and physiology; or permission of instructor. Examines acute and chronic alterations, adaptations associated with exercise and training. Covers role of exercise therapy in preventing and rehabilitati- ing from disease across lifespan. Particular emphasis on role of exercise therapy in cardiorespiratory, musculoskeletal, and metabolic diseases.

510 Scientific Basis for Pain, Fatigue, and Suffering in Chronic Illness and Disability (3:3:0) Reviews the scientific literature describing the theories of the initiation and perpetuation of pain, fatigue, and suffering. Describes the methodologies used to evaluate these symptoms. Students will apply the theories of pain, fatigue, and suffering and will further their understanding of specific clinical problems.

530 Nutrition: A Global Perspective (3:3:0) For students from a variety of disciplines. Examines malnutrition and how it occurs by looking at several situations from around the world. Covers how nutrition can affect society and community, and examines benefits of well-nourished population.

543 Global Health: Trends and Policies (3:3:0) Covers today’s health challenges and their various social, economic, and epidemiological causes; role and likely success of information and technology transfer; primary preventive health care; social awareness; and intervention in alleviating problems. Lecture, discussion.

555 Human Biology (3:3:0) Provides an overview of the biological aspects of disease processes, with emphasis on the pathophysiology of common diseases and public health measures for the prevention and control of disease in populations.

560 Environmental Health (3:3:0) Prerequisite: an undergraduate community health course. Examines principles and methods, risk factors, prevention and control, and policies related to the aspects of human health determined by biological, physical, and chemical factors in the environment at the local, regional, and global levels.

566 Nutrition and Weight Management (3:3:0) Prerequisite: GCH 295 or other introductory nutrition course. Focuses on the physiological, emotional, genetic, and societal/cultural factors that influence the relationship between eating and weight regulation.

571/NURS 571 HIV/AIDS Concepts, Principles, and Interventions (3:3:0) Overview of HIV disease, including retrospective and current concepts and analyses, global and societal effect, and cutting-edge research. Examines development of therapeutic tools and skills to educate, reduce risks, control infection, and affect care and healing of client, family, and community, and issues of increasing dilemma for health care professionals.

583 Food and Culture: Biocultural Perspectives on Food and Nutrition (3:3:0) Prerequisite: GCH 295 or permission of instructor. Examines food and eating behaviors, diet, and nutrition from cross-cultural perspective. Focuses on how and why people choose what to eat, range and significance of cross-cultural variability in diet, how diets have changed, and health and social implications of those changes. Lecture, discussion, video presentations, audiovisual aids, student presentations, and case study analyses.

590 International Health Organizations (3:3:0) Directed at students in the global health concentration. Examines inner workings of international health organizations such as WHO, PAHO, Red Cross, Red Crescent, USAID, UNICEF, Doctors without Borders, and the World Bank. Primary concern is on organizations focused on health prevention and promotion, disease remediation, and epidemiology. Explores goals and mechanisms of these international health organizations and the mission, roles, procedures, funding sources, and evaluation of effectiveness in global community.

594/HAP 594/NURS 594 Special Topics in Health Care (3:0:0) Selected topics analyzing specialized areas in health care. Content varies. Lecture, seminar, laboratory, and workshops.

601 Introduction to Biostatistics (3:3:0) Applies selected biostatistics techniques to public health and health system management issues. Includes univariate and bivariate statistics, and regression analysis.
602 Global Health Issues Related to Violence (3:3:0) Prerequisite: admission to a graduate program or permission of instructor. Explores worldwide view of violence and its impact on health. Examines biological, psychological, and social determinants of violence. The epidemiology of violence is examined with special attention to collective violence, youth violence, abuse and neglect of children and the elderly, intimate partners, sexual violence, self-directed violence, and transgenerational violence. Preventive approaches attempted to help reduce the prevalence of violence will be addressed.

605 Social Epidemiology (3:3:0) Students will learn the basic foundations of social epidemiology and learn how they can apply these principles to the global community and their own professions. Throughout the course, students will explore the health-enhancing and health-deteriorating effects of social factors, with special emphasis on the personal social environment. They will also examine the effect of macro-social variables, such as socioeconomic status, cultural traditions, life cycle stages, and circumstantial changes, such as migration and relocation on health and well-being.

610 Foundations of Health Education and Behavior (3:3:0) Introduces students to the fundamentals of social and behavioral sciences, emphasizing current health behavior theories and models. Students develop an understanding of the theoretical and scientific basis of health promotion/health education interventions and develop community need and asset assessment skills.

611 Planning, Implementing, and Evaluating Health Promotion Programs (3:3:0) Addresses the process of program planning, development, and fundamental evaluation principles, emphasizing health promotion programs. The focus is on development of clear and concise objectives leading to the design of effective primary, secondary, and tertiary prevention strategies.

620 Psychosocial Aspects of Rehabilitation (3:3:0) Explores social and psychological impacts of disability. Processes by which people with disabilities adapt to limitations will be examined, as will the influence society has in promoting independence/dependence among people with disabilities.

637 Normal Aging and Health Deviations (3:3:0) Examines biopsychosocial aspects of aging. Examines effects of age changes and health deviations on functional capacity of older persons and interventions and promotion of the elderly’s capacity for self care.

659 Health Care of Aging Persons with Chronic Illnesses (3:3:0) Prerequisite: GCH 637. Focuses on biological, psychological, and sociocultural aspects of aging and chronic illness. Examines functional capacity and capacity for self care.

680 International Research Ethics and Methods (3:3:0) Prerequisite: GCH 543. Prepares students to conduct global and community health research. Discusses ethical issues in international health research. Develops plans for identifying a research project, collecting and analyzing data, and reporting results of international health research.

690 Independent Study (1–3:1–3:0) In-depth studies of selected area of health science theory, research, or practice under direction of faculty. May be repeated for a maximum of 3 credits.

691 Project Management in Public Health (3:3:0) Course examines project management roles and environments, the project lifecycle and various techniques of work planning, and control and evaluation to achieve project objectives. Emphasizes leadership, communication, grant writing and ethics.

712 Introduction to Epidemiology (3:3:0) Prerequisite: HAP 730 or comparable other as approved by instructor. Introduction to epidemiology and health service research as body of knowledge and a method for analyzing health problems. Students learn the role of health services research and epidemiology in policy and evidence-based management and clinical practice. Students design experiments, analyze secondary data, and evaluate impact of programs on health outcomes.

714 Epidemiology for Nursing Practice (3:3:0) Targeted at students in the doctor of nursing practice program, this course provides an introduction to epidemiology as a body of knowledge and a method for analyzing health problems. Students use analytic methods to critically appraise existing literature, design and implement evaluation processes, collect and analyze data, and apply relevant findings to the practice environment. Note: Only one of GCH 714 or GCH 712 can be taken for credit.

722 Infectious Disease Epidemiology (3:3:0) Infectious disease epidemiology is the study of the distribution and determinants of infectious diseases in populations. Covers agent, host, and environmental characteristics; the infections transmission process; epidemiological study, design, and analysis; surveillance, outbreak investigation, and disease control; and advanced techniques such as mathematical modeling and spatial analysis.

726 Advanced Seminar in Epidemiology (3:3:0) Prerequisites: GCH 597 or an approved graduate-level statistics course, GCH 712, a topics-based epidemiology course (GCH 605, GCH 722, or GCH 732), and permission of instructor. Develops epidemiological skills through completion of an original research project. Focuses on epidemiological methodology and analysis, critical review of the literature, and scientific writing.

732 Chronic Disease Epidemiology (3:3:0) Prerequisite: GCH 712 or approved epidemiology course. Focuses on the epidemiology of chronic diseases, including cancers, cardiovascular and lung diseases, and mental health disorders. Emphasizes study design, critical reading, and public health approaches to disease control, such as surveillance and screening.

740 Applied Physiology: Cardiorespiratory System (3:3:0) Prerequisites: GCH 506 or EFHP 610 or other graduate physiology course, plus one of the following: two semester course sequence in anatomy and physiology (100 level or above) or one course in animal or comparative physiology (500 level or above) or one course in human physiology (300 level or above). Rigorous, evidence-based study of biological factors and medial conditions that limit oxidative metabolic function. Emphasis on examining current hypotheses of physical activity limitations in chronic illness and disability.

751 Nutritional Assessment, Monitoring, and Surveillance (3:3:0) Prerequisite: GCH 530 or approved graduate nutrition course. Introduces students to methods and tools used in assessing nutritional status and the practice and application
of these to monitoring among individuals and population groups. Methods of interpretation of nutrition-related information will be examined.

**752 Nutritional Epidemiology (3:3:0)** Prerequisite: GCH 712. Introduces students to the principles of epidemiology and their application to nutrition. Examines the methodologies and interpretation of dietary assessment and the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet, and disease.

**770 Gerontology Practicum I (3:2:3)** Prerequisite: all core course work; corequisite for gerontology tract majors: health services research for MS in health science. Field practicum in gerontology, emphasizing applying gerontological knowledge in designated facility and developing skills to function in service organization for aging. Includes problem identification and analysis, project development, and practical experience under supervision of qualified professional. Students collaborate with preceptor to develop useful project based on organizational and client needs. Uses case study analyses to explore problem-solving approaches in variety of situations and health care or service organizations.

**771 Gerontology Practicum II (3:2:3)** Prerequisite: GCH 770. Continuation of field practicum in gerontology. Students receive practical experience under supervision of qualified professional. Emphasizes implementation of approved project. Gerontological theoretical concepts applied in implementation and evaluation. Uses case study analyses to explore problem-solving approaches.

**788 Public Health Research I (3:3:0)** Prerequisites: GCH 530, 543, 590, 597, 680, and 712. Only students enrolled in graduate degree programs within the Department of Global and Community Health may enroll. Provides students with skills to develop their research proposal, conduct their research goals, and complete their master’s thesis, which will be completed in Public Health Research II. Repeatable to maximum of 6 credits.

**789 Public Health Research II (3:3:0)** Prerequisite: GCH 788. Provides students with skills to complete their research projects and write the master’s thesis. Repeatable to maximum of 6 credits.

**798 Practicum in Public Health I (3:1:8)** Prerequisite: completion of the global health core curriculum. Provides students with supervised experience in an identified public health organization. Students will explore the structure, functions, and activities of the public health organization and understand its relationships to improving health from a global perspective.

**799 Practicum in Public Health II (3:1:8)** Prerequisite: GCH 798. Provides students with an in-depth supervised experience in an identified public health organization. Provides students the opportunity to complete a project related to an actual public health issue that is a focus within the organization.

**804/NURS 804 Advanced Quantitative Data Analysis for Health Care Research I (3:3:0)** Prerequisite: a graduate level statistics course. Examines factorial ANOVA, factorial ANCOVA, repeated measures ANOVA, ANOVA and ANCOVA via regression approach, and multiway frequency analysis. Students apply mathematical calculations and interpret SPSS outputs using health care research data.

**805/NURS 805 Advanced Quantitative Data Analysis for Health Care Research II (3:3:0)** Prerequisite: GCH/NURS 804 or an equivalent statistics course. Examines multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), multiple regression (ordinary least squares), and logistic regression. Students apply mathematical calculations and use linear combinations of multivariate tests in health care research data.

**806/NURS 806 Advanced Multivariate Statistics and Data Analysis for Health Care Research (3:3:0)** Prerequisite: GCH/NURS 805 or an equivalent multivariate statistics course. Examines canonical correlation, discriminant analysis, factor analysis and causal analysis (path models and structural equation modeling). Students analyze and interpret data using these statistical techniques.

**807/NURS 807 Measurement Theories and Applications in Health Care Research (3:3:0)** Prerequisite: doctoral-level course in research design and statistics. Completion of GCH/NURS 803 or GCH/NURS 806 is highly recommended. Theories, principles, and techniques presented as foundation for the development and evaluation of instruments for use in health care research. Includes review of statistical techniques required for understanding measurement theory, reliability, validity, item analysis, and instrument construction. Students required to design, construct, administer, analyze, and evaluate an original instrument or evaluate an existing instrument in health care research.

### Government and International Politics (GOVT)

#### Public and International Affairs

**101 Democratic Theory and Practice (3:3:0)** Comparative exploration; topics include contemporary analysis of the meanings of liberty, equality, representation, property rights, voting rights, and civil responsibilities.

**103 Introduction to American Government (3:3:0)** American government examined in light of basic concepts and institutions of democracy. Includes citizenship project, a first-hand observation or participation in and analysis of some public activity.

**132 Introduction to International Politics (3:3:0)** Nature of international politics, approaches to study of international politics, state and nonstate actors in international system, patterns of action and interaction between nation-states, international institutions, and major global issues.

**133 Introduction to Comparative Politics (3:3:0)** Discusses methods and subject matter of comparative political analysis. Includes political systems, politics, participation in politics, government structures, policy-making process, and evaluation of political performance.

**300 Research Methods and Analysis (4:3:1)** Required for all majors in government and international politics, and public administration. Strongly recommended before or during first semester of enrolling in 300-level courses. Emphasizes asking clear, researchable questions and using appropriate evidence to answer them. Introduces broad range of evidence including quantitative and qualitative information. Studies design and analysis of surveys, government archives, case studies, and interpretations of events in journals. Examines ethical implications of information technologies.
301 Public Law and the Judicial Process (3:3:0) Prerequisite: GOVT 103. American judicial organization and operation, role of the Supreme Court in policy formation, and selected constitutional principles.


305 Contemporary American Federalism (3:3:0) Prerequisite: GOVT 103. Legal, administrative, fiscal, and political dimensions of evolving American federalism.

307 Legislative Behavior (3:3:0) Prerequisite: GOVT 103. Organization, processes, functions, and roles of legislature and U.S. Congress members. Topics include state legislatures and cross-national comparisons as time and resources permit.

308 The American Presidency (3:3:0) Prerequisite: GOVT 103. Survey of modern presidency, including constitutional origins of office, growth and influence of White House staff, Cabinet, presidential appointees and control of executive branch, relations with Congress, and domestic and national security policy-making.

309 Government and Politics of Metropolitan Areas (3:3:0) Prerequisite: GOVT 103. Government, politics, and problems of metropolitan centers and surrounding areas.

311 Public Opinion and Electoral Behavior (3:3:0) Prerequisites: GOVT 103 and 300. Studies actions of voters, candidates, and political parties in relation to the expression of relevant public opinion in a democratic system.

312 Political Parties and Campaigns (3:3:0) Prerequisite: GOVT 103. Characteristics and functions of political parties, influence of parties and other political forces on electoral decisions, and emphasis on parties’ inability or ability to hold government accountable to citizens.

318 Interest Groups, Lobbying, and the Political Process (3:3:0) Prerequisite: GOVT 103. Role, internal operations, strategies, and activities of interest groups. Evaluates ability of these groups to enable citizens to influence or control government and enhance democratic process. Considers conditions under which social movements become, or fail to become, effective interest groups.

319 Issues in Government and Politics (1–3:3:0) Prerequisite: GOVT 103. Special issues relevant to government and politics. Topics announced in advance. Examples include politics and the arts, ethnic conflict and the political system, gender politics, and changing dynamics in political institutions. May be repeated for credit when topic is different, with permission of department.

322 International Relations Theory (3:3:0) Prerequisite: GOVT 132 or 133. Advanced inquiry into international relations. Studies theories, concepts of international relations, and major forces and issues in international politics.

323 Classical Western Political Theory (3:3:0) Prerequisite: GOVT 101, or 3 credits of philosophy. Lectures, discussions of developments in Western tradition of political thought from Renaissance to mid-19th century. Topics include nature and purpose of politics, relationship between individual and state, political significance of religion and tradition, and concept of natural law.

324 Modern Western Political Theory (3:3:0) Prerequisite: GOVT 101, or 3 credits of philosophy. Lectures, discussions of developments in Western tradition of political thought from Renaissance to mid-19th century. Topics include rise of individualism in political theory, early developments in social contact theory, theories of radical popular sovereignty, and early criticisms of liberal theory.

327 Contemporary Western Political Theory (3:3:0) Prerequisite: GOVT 101, or 3 credits of philosophy. Lectures, discussions of developments in Western tradition of political thought from mid-19th century to today. Different sections focus on various political theories that have been influential during this period, such as liberal, libertarian, conservative, communitarian, Marxist, feminist, and postmodern thought. May be repeated for credit when subject matter is different.

328 Non-Western Political Theory (3:3:0) Prerequisite: GOVT 101 or 133. Theory and history of political community, governance, and development as understood by various non-Western societies, including China, Japan, India, Africa, and Islamic World; relations to Western tradition; methodology of studying other cultures; postcolonial theories; and cultural politics on contemporary globalization.

329 Issues in Political Theories and Values (1–3:3:0) Studies special issues relevant to theoretical and value aspects of government and politics. Topics announced in advance. Examples include ethics and politics, ethics and environmental policy, changing perspectives on civil rights and liberties, religion and politics, and changing views of public space. May be repeated for credit when topic is different, with permission of department, but no more than 9 credits of GOVT 329 are permitted.

331 Government and Politics of Latin America (3:3:0) Prerequisite: GOVT 132, 133, or 149. Contemporary political systems of Latin America, with emphasis on institutions, political processes, and political behavior. Presents case studies of several key Latin American politics; discusses problems of political development.

332 Government and Politics of the Middle East and North Africa (3:3:0) Prerequisite: GOVT 132, 133, or 149. Societies of Middle East and North Africa and their response to impact of internal sociocultural-political determinants and external forces. Focuses on contemporary politics, ideologies, popular manifestations, institutions, and operations.

333 Government and Politics of Asia (3:3:0) Prerequisite: GOVT 132, 133, or 149. Government structures and political processes of Asian countries. Examines patterns of conflict and cooperation, and issues of economic development and political reform in rapidly changing world.

334 Government and Politics of Europe (3:3:0) Prerequisite: GOVT 132, 133, or 149. Contemporary democratic political systems of Europe, with emphasis on political processes, institutions, and behavior. Presents case studies of key European policies. Discusses problems of multiparty systems, coalition governments, Eurocommunism, and stability and change in postindustrial societies.

336 Political Development and Change (3:3:0) Prerequisite: GOVT 132, 133, or 149. Process of political development and change in context of modernization and industrialization. Examines patterns of political development, with emphasis on developing world.
337 Ethnic Politics in Western Europe and North America (3:3:0) Prerequisite: GOVT 132, 133, or 149. Studies resurgence of ethnic nationalism in industrial democracies of Western Europe and North America, and the comparative analysis of policy issues related to ethnonationalism. Case studies drawn from the industrial democracies.

338 Government and Politics of Russia (3:3:0) Prerequisite: GOVT 132, 133, or 149. Examines continuity and change in Russia’s Soviet era and post-Soviet era politics and international relations.

339 Issues in the Politics of Advanced Industrial Societies (1–3:3:0) Prerequisite: GOVT 103 or 133, or permission of instructor. Studies selected current political issues in industrial democracies of Western Europe and North America. Specific topics chosen each semester to reflect contemporary political concerns in these countries, but political process in advanced industrial countries is organizing principle throughout the course.

340 Central Asian Politics (3:3:0) Comparative examination of political change in Central Asia with attention to national identity formation, political economy, political conflict, political Islam, and democratization.

341 Chinese Foreign Policy (3:3:0) Prerequisites: GOVT 132, 133. Discusses theories and practices of Chinese foreign policy decision-making, which are then used to understand China’s relations with United States, Japan, Russia, Europe, and its Asian neighbors, and China’s policy in issues such as human rights, environmental protection, and nuclear nonproliferation.


343 International Political Economy (3:3:0) Prerequisite: GOVT 132, 133, or 149; or permission of instructor. Introduces international political economy. Examines interplay of economics and politics, and applies these to different issues. Focuses on issues of contemporary significance, with attention to historical issues and basic political and economic concepts.

344 American Foreign Policy (3:3:0) Prerequisite: GOVT 132, 133, or 149. Central issues surrounding the conduct of America’s foreign relations, with special emphasis on structural and constitutional questions, national policy objectives abroad, and conduct of foreign policy in a democracy.

345 Political Islam (3:3:0) Covers politics of religion in Muslim societies; history, ideology, and practices of key individuals, movements, and institutions; case studies of political Islam in the Middle East, Asia, Africa, and the West; plurality and diversity of political expression in Muslim world; nature of democracy in Islam; and Islamic state.

346 American Security Policy (3:3:0) Prerequisites or corequisites: GOVT 132, 133. Approaches U.S. national security policy from perspective of organization and implementation of specific policies. Applies theoretical concerns to historic cases to illuminate problems that continue to challenge country.

347 International Security (3:3:0) Prerequisite: GOVT 132. Explores enduring security problems and new developments. Examines effects of international system on defense policies of states, particularly tensions of world caught between emerging interdependence and national demands. Encourages development of critical-thinking and group and oral presentation skills.

349 Issues in the Analysis of Global Systems (1–3:3:0) Prerequisite: GOVT 149 or permission of instructor. Overview of global systems with emphasis on political subsystem and interactions with other global systems.

351 Administration in the Political System (3:3:0) Prerequisite: GOVT 103. Administrative structures and processes in political setting of public management. Presents organization and administrative theory, critiques, and current practices; and examines impact of changes in social, political, and economic environment on concepts, models.

355 Public Personnel Administration (3:3:0) Prerequisite: GOVT 351. Analyzes techniques and tools in human resource management including merit system, classification, compensation, evaluation, recruitment, and labor relations. Emphasizes current local and policy issues in personnel administration, such as diversity and privatization.

356 Public Budgeting and Finance (3:3:0) Prerequisite: GOVT 351. Covers tools and techniques in budgeting and financial management in U.S. governments, including management of public financial institutions, budgetary process and reform, and relationship of public budgeting to national economic policy.

357 Urban Governance and Planning (3:3:0) Prerequisite: GOVT 351. Framework, subject matter, uses, methods, administration, and future of public planning. Emphasizes setting goals, defining objectives, and choosing between program alternatives. Discusses political and bureaucratic constraints, and problems of implementation. Planning illustrations may be drawn from various levels of government.

358 Nonprofit Financial Planning (4:3:1) Prerequisite: 60 credits or permission of instructor. Provides understanding of social mission and entrepreneurial cross pressures underlying financial planning and accounting in nonprofit sector. Topic include revenue sources and projections, entrepreneurial techniques, and cost analysis for nonprofit and nongovernmental entities. Lectures, student case studies.

359 Computers in Public Management (3:3:0) Prerequisite: GOVT 300. Applies computers and computer-based analytical techniques to management information needs in public sector. Focuses on mainframe and microcomputer applications.

361 Introduction to Environmental Policy (3:3:0) Prerequisite: 30 credits. Environmental politics and policymaking since the 1970s. Primarily U.S. focus, with some discussion of global issues. Examines policy strategies and outcomes, ethical and economic debates, political controversies, lawmaking and enforcement, and role of key players.

364 Public Policy Making (3:3:0) Prerequisite: GOVT 103. Processes, agencies, and politics involved in the proposal making, implementation, evaluation, and revision of U.S. public policy.

365 State and Regional Public Policy (3:3:0) Examines public policy decisions that affect local and state jurisdictions in context of federal system of government. Examines context, substance, and impact of such policies as housing,
transportation, land use, crime prevention, service delivery, and health care.

366 Public Policy Analysis (3:3:0) Prerequisite: GOVT 300. Methods of public policy analysis, evaluation, and research. Studies design and development of alternative courses of government action and evaluation of results, and problems in applying systematic analysis to political issues.

399 Research Practicum in Public and International Affairs (1–3:1–3:0) Prerequisites: GOVT 300, and permission of instructor. Applies research methods in context of assisting with faculty research. Individualized sections taught by arrangement with full-time faculty. Methods adopted vary but generally include library research, data collection, data analysis, and report construction.

400 Political Research and Data Analysis (3:3:0) Prerequisite: GOVT 300. Methods of research and data analysis used in research about politics. Examines ways to design research to answer questions, select appropriate techniques for data collections, and use statistics to organize and interpret data. Students also learn to carry out data analysis using microcomputers and programs such as SPSS to process data and compute statistics.

407 Law and Society (3:3:0) Prerequisite: ADJ 100 or GOVT 301. Explores relationship between law and society, including concept of law; origin, development, and role of law in society; and relationship between law and social change. Assesses different approaches and methodologies.

409 Virginia Government and Politics (3:3:0) Prerequisite: GOVT 103. Examines history of politics in Virginia and current political issues. Particular attention to changing dynamics of political parties, key legislative issues, and policies of recent administrations.


414 Politics of Race and Gender (3:3:0) Prerequisite: GOVT 103. Examines political, economic, and social impact of public policies and implications for race, gender, and age.

420 American Political Thought (3:3:0) Prerequisite: GOVT 103. Major political values and theories in America from formation of American republic to present. Covers changes in American political values in crisis periods, and contemporary American political theory including pluralism, elite theories of democracy, and empirical political theory.

421 Contemporary Political Ideologies (3:3:0) Studies political ideologies that shape values, beliefs, and actions of contemporary regimes and political movements. Topics include liberalism, conservatism, socialism, communism, and fascism in theory and contemporary practice; and totalitarianism and nationalism in postindustrial and developing societies.

422 Constitutional Interpretation (3:3:0) Prerequisite: GOVT 103. Examines Supreme Court’s interpretation of constitutional powers of Congress, presidency, and judiciary. Includes examination of major decisions concerning state regulation, taxation, and interstate relations.

423 Constitutional Law: Civil Rights and Liberties (3:3:0) Prerequisite: GOVT 103. Studies First Amendment freedoms of speech, press, assembly, association, and religion; right to privacy; and Fourteenth Amendment equal protection.

424 Constitutional Law: Criminal Process and Rights (3:3:0) Prerequisite: GOVT 103. Studies constitutional law pertaining to rights of criminally accused from stages of investigations and evidence through attorney, trial, and punishment stages at federal and state levels.

427 Feminist Political Thought (3:3:0) Prerequisites: GOVT 101, WMST 200, 3 credits of philosophy, or permission of instructor. Explores feminist political thought in historical context. Topics include feminist political movements, feminist critiques of political philosophy, and feminist contributions to political theory.

428/PHIL 428 Advanced Democratic Theory (3:3:0) Prerequisites: GOVT 101 or one course in philosophy. Explores various theoretical approaches to nature and justification of democracy. Topics may include liberal, communitarian, pluralist, and deliberative theories and their critiques; constitutionalism; role of markets; and transnational democracy.

430 Comparative Political Leadership (3:3:0) Prerequisite: GOVT 132, 133, or 149. Comparative political leadership, relationships between political cultures and types of leadership, patterns of leadership recruitment, and linkages between political elites and citizenry.

432 Political Change and Social Development in Sub-Saharan Africa (3:3:0) Prerequisite: GOVT 132, 133, or 149. Examines relationship of culture, history, ethnicity, and religion, and contemporary political and socioeconomic developments in Africa. Special attention to implications of ethnic conflict for nation-building in the post-Cold War period, and strategies for resolving conflicts.

433 Political Economy of East Asia (3:3:0) Prerequisites: GOVT 133 and 60 credits, or permission of instructor. Discusses different theoretical perspectives of East Asian political economy; transformation of East Asia; and issues such as money, finance, trade, investment, environment, and energy. Focuses on issues of contemporary significance, but attention also given to history.

434 Democracy in Global Perspective (3:3:0) Prerequisite: GOVT 133. Comparative study of structures and performance of democracies around the world since 1975. Examines growing influence of global forces such as economy, media, and culture in process of democratization. Examines select current elections.

435 Law and Ethics of War (3:3:0) Prerequisite: GOVT 132. Explores sources of morality in armed conflict, and implications of such ideas for international relations. Examines content and philosophy of modern law of war.

444 Issues in International Studies (1–3:3:0) Prerequisite: GOVT 132, 133, or 149. Major issues in international system, including international political economy and security. May be repeated for credit when topic is different, with permission of department, but no more than 9 credits of GOVT 444 permitted.

445 Human Rights (3:3:0) Prerequisite: GOVT 132. Explores philosophical, legal, and political issues at heart of modern international human rights movement. Examines
historical background legal architecture of modern human rights movement.

446 International Law and Organization (3:3:0) Prerequisite: GOVT 132, 133, or 149. Nature, sources, and subject of law of nations; law and individual; territorial questions; nature, sources, and functions of international organizations; international transactions and organizations; war and present; and future status of international law.

447 Revolution and International Politics (3:3:0) Prerequisite: GOVT 133. Historical overview of modern revolutions as well as different theories about causes and consequences of revolutions. Special attention to Marxist-Leninist, Arab nationalist, and Islamic revolutions.

448 Ethics and International Politics (3:3:0) Prerequisites: 60 credits, and GOVT 132 or PHIL 151. Ethics and international politics ask students to wrestle with dilemmas raised by a desire to behave morally in an international system in which consensus about ethical matters is absent. Distributive justice and use of force are two overarching themes. Students also develop, apply, and justify their own perspectives on ethical problem using philosophical theory, history, and social science research.

452 Administrative Law and Procedures (3:3:0) Prerequisite: GOVT 351. Law of public office. Studies procedures followed by and the legal limits on administrative agencies and their officers and employees.

460 Surveillance and Privacy in Contemporary Society (3:3:0) Prerequisite: ADJ 100. Philosophical perspectives, historical context, technological developments, and institutional changes that surround controversies about privacy and surveillance in contemporary society. Explores public and private institutions doing surveillance, how they calculate and manage risk, and legal constraints on surveillance activities.

464 Issues in Public Policy and Administration (1–3:3:0) Prerequisites: GOVT 103 plus 60 credits. Analyzes selected policy issues in administering public policies. Topics announced in advance. Examples include environmental policy, government regulation, federal mandates, state policy, and regional policy. May be repeated for credit when topic is different, with permission of department.

470 Faith and Reason in the Making of the Modern Mind (3:3:0) Investigates the interlocking claims of religious faith and human reason in Western culture, from Biblical times to the present. First covers tightly focused reading assignments in theology and philosophy, and second covers particular case studies, from Galileo to the Intelligent Design debate.

471 Millennialism and Philosophies of History in Western Culture (3:3:0) Is there purpose in human history? Are we really going anywhere as humanity moves through time? This seminar studies major patterns by which thinkers in the West have discerned meaning in humanity’s temporal existence. Extends from the Jewish roots of historical understanding, through Christian millennialism, to contemporary naturalism.

472 Christianity, Secularism, and Democracy (3:3:0) Examines the evolving relationship between religion and the American political order, from the Reformation to George W. Bush.

480 Internship (3–6:0:0) Contact department one semester before enrolling. Approved work-study programs with specific employers. Students develop individual contracts defining learning and competencies they plan to gain from the experience.

490 Synthesis Seminar (3:3:0) Prerequisite: completion or concurrent enrollment in all other required general education courses, GOVT 300, and 18 credits in major. Readings, individual or group projects, and discussion of papers reflecting on connections between liberal arts and sciences and political world.

491 Honors Seminar (3:3:0) Prerequisite: completion or concurrent enrollment in all other required general education courses, GOVT 300, and 18 credits in major. Subject varies. Readings, individual or group projects, and discussions of seminar papers.

496 Directed Readings and Research (1–3:3:0) Open to majors in public and international affairs with 90 credits, and permission of instructor and department. Reading and research on specific topic under direction of faculty member. Written report required; oral report of research may be required.

500 Research Methods in Political Science (3:3:0) Introduces research methods and data sources to study political science and practice of government. Topics include measurement of political concepts, research design, archival research techniques, survey research and case study development, and data analysis with elementary statistics.

510 American Government and Politics (3:3:0) Examines institutions and processes of American government, including separate institutions of power in national government, theory and practice of federal system, role of interest groups and political parties, and effects of media and public opinion on electoral behavior and policy making. Seminar examining normative and empirical research.

520 Political Theory (3:3:0) Analyzes selected major works of ancient, modern, or contemporary political theory that illuminate basic problems and questions for people engaged in political or civic life. Examines justice, liberty, equality, autonomy, rights, obligation, participation, and nature of politics.

530 Comparative Politics (3:3:0) Examines fundamental issues in comparative politics and provides broad coverage of the central themes under study. Designed to help students think theoretically and critically about the study of comparative politics, its scientific objectives, and its epistemological assumptions. Within this context, students will look at concepts and approaches, as well as important theories and debates that characterize the subfield. Helps prepare students for qualifying exams in comparative politics.

540 International Relations (3:3:0) Focuses on changing structure of international politics, post-Cold War security issues, effect of globalized economy and information technology revolution, enhanced role of global corporations and nongovernmental organizations, and rise of nonsecurity issues in emerging international agenda.

541 Introduction to Critical Analysis and Strategic Response to Terrorism (3:3:0) Introduces terrorism as a complex threat to human security. Focuses on tools for analyzing terrorism and the underlying sources and conditions that contribute to it. Considers similarities and differ-
ences between terrorism and other threats to human security. Explores the lessons learned in the history of responding to terrorism. Focuses not only on different tactics of response, but also includes how different types of societies (dictatorship, democracies, etc.) have responded to terrorism and what the results of those responses have been. Includes case studies of responses to terrorism.

603 Seminar in the Courts and Constitutional Law (3:3:0) Analyzes role, influence, and effects of U.S. courts in creating constitutional legal norms and interpreting them. Special attention to First and Fourteenth Amendments and Commerce Clause. Lecture and discussion; students expected to read and analyze leading court cases.

604 Seminar on Congress and Legislative Behavior (3:3:0) Prerequisite: GOVT 510. Examines theories and empirical research on the U.S. Congress and legislative behavior, including elections, representation, structures, and processes. Also examines Congress’s impact on the design and implementation of public policy, interactions with other branches of government, and comparisons with parliamentary systems.

605 Seminar on the Presidency (3:3:0) Prerequisite: GOVT 510. Examines the American presidency from a number of substantive and methodological perspectives. Readings and discussions in the course appraise the presidency within the system and focus on the role the presidency plays in formulating and implementing public policy.

631 Seminar in Comparative Politics and Institutions (3:3:0) Examines theories and practices of governance, development, and conflict resolution in comparative national settings. Covers elections in presidential and parliamentary democracies, institutional forms, political cultures, and ideologies. Comparative analysis theories and research reflecting alternative analytic perspectives applied to institutions and political processes of nations, regions.

640 Strategic Responses to Terrorism: Coordinated Decision Making (3:3:0) Revisits, expands, and examines the critical themes developed in the terrorism certificate program. The central feature of this course is to provide the students with the opportunity to apply the theoretical concepts developed in practice. Finally, this course integrates the ideas, theories, and practices considered in this track within the larger field of terrorism analysis and strategic responses to this threat. This is the capstone course for the terrorism certificate program and must be completed in the final semester of the certificate program.

641 Seminar in Global Systems (3:3:0) Prerequisites: completion of all core courses. Applies systems approach to understanding global politics. Emphasizes properties and functions of global systems such as population, food, disease, energy, and trade, and how world’s political systems interact with them. Discusses how governance at municipal, national, and international levels affected by global systems. Examines role of nongovernmental organizations in global affairs.

650 Seminar in Theories of Public Administration (3:3:0) Prerequisite: GOVT 510. Reviews the theoretical traditions in American public administration, from the earliest days of the founding to the present. Concludes with consideration of contemporary theoretical debates over the proper role of public administrators and controversies about conflicting demands made on the public service and the public sector.

706 Federalism and Intergovernmental Relations (3:3:0) Prerequisite: GOVT 510. Examines broad trends in governance, including theory and practice of federal, state, and local governments. May include privatization, devolution, mandating, regulatory reform, and comprehensive federalism reform.

711 Problem Solving and Data Analysis I (3:3:0) Techniques and research skills to solve policy-related problems or analyze politics-related data. Focuses on problem definition, research design, and problem solving under conditions of uncertainty in politics and public sector.

712 Problem Solving and Data Analysis II (3:3:0) Prerequisite: GOVT 711. Advanced techniques and skills for solving policy-related problems or analyzing political data. Focuses on data gathering and analysis, use of statistical software, and multivariate analysis.

713 The Constitution, Criminal Procedure, and Security (3:3:0) Prerequisite: JLCP 720/GOVT 728, or permission of instructor. Examines legal doctrines that form basis of U.S. constitutional procedural rights, how these doctrines develop, and why courts rule as they do. Evaluates strengths, weaknesses of these rights.

715 Advanced Seminar in Political Methodology (3:3:0) Prerequisites: GOVT 500. Common statistical techniques employed in political science research including OLS regression, logistic regression, probit, factor analysis, multidimensional scaling, discriminant analysis, cluster analysis, and analysis of variance. Sampling and inferential statistics.

719 Issues in American Politics (3:3:0) Prerequisite: GOVT 510. Examines significant issue in American politics and political behavior. Analyzes topic of contemporary and emerging concern. Course may be repeated when topics are different.

725 Democratic Theory and Democratization (3:3:0) Prerequisites: GOVT 520. Examines democracy in terms of versions of liberalism, theories of social capital and civic participation, and discourses about civil, political, and human rights. How is democracy conceptualized normatively and empirically? What underlying economic, social, and cultural conditions promote democracy? What role do institutions play in creating and sustaining a stable democratic society? Takes a broadly comparative perspective, focusing on variety of established and emerging democracies around the world. Elective for students specializing in American government or international politics and comparative governments.

726 Theories of Justice (3:3:0) Overview of ancient and modern theories of justice with application to contemporary issues involving justice system and other social and political institutions.

727 Restorative Justice (3:3:0) Prerequisite: JLCP 700, or permission of instructor. Origins of restorative justice, its principles, implications for different justice organizations and processes, and application to problems such as family violence, human rights, and reconciliation following mass victimizations.

728 Behavior of Law (3:3:0) Examines development of law, and law’s effect on human behavior. Reviews theories of law’s meaning and aims. Examines construction of law, and investigates consequences of law and legal decisions.
731 Advanced Seminar in Comparative Politics (3:3:0)  
Prerequisite: GOVT 540. Assumes basic proficiency in comparative analysis. Addresses theoretical and methodological issues central to comparative politics by focusing on specific topic such as international development, race and ethnicity, and social movements; or region such as Latin America, Asia, Middle East, European Union, Africa, and Russia. Focuses on advanced modes of inquiry through in-depth analysis and discussion. May be repeated for credit when topic is different and with permission of department.

732 Comparative Justice (3:3:0)  
Prerequisite: JLCP 700/GOVT 726, or permission of instructor. Survey of justice systems and their environments in different lands and cultures. Identifies commonalities and differences among justice systems, evaluates them, and considers policy implications.

739 Issues in Comparative and International Politics (3:3:0)  
Prerequisite: GOVT 540. Explores issues of contemporary and emerging concern in comparative and international politics.

741 Advanced Seminar in International Politics (3:3:0)  
Prerequisite: GOVT 540. Examines theoretical and methodological issues central to study of international relations by focusing on specific topic: American foreign policy, diplomacy, international law and organization, international relations theory, international ethics, human rights and humanitarian intervention, the environment, and others. May be repeated for credit when topic is different and with permission of department.

743 International Political Economy (3:3:0)  
Prerequisite: GOVT 343 or equivalent. Examines interplay of international politics and economics. Discusses theoretical perspectives and analytical tools in academic field of international political economy, and applies theories and tools to trade, investment, exchange rates, development, regionalization, and globalization. Explores how international economic and political forces increasingly shape domestic interests, and how domestic politics affect international political economy. Lecture, discussion.

745 International Security (3:3:0)  
Prerequisites: GOVT 540. Examines interplay of international politics and international security. Discusses theoretical perspectives and analytical tools in academic field of international security, and applies theories and tools to nuclear, biological, and chemical weapons, strategy and defense, and arms control. How domestic issues affect defense policies, terrorism, changing nature of international conflict, and human security will be examined.

753 Third-Party Governance (3:3:0)  
Examines design and management of government programs that rely on other levels of government and the private sector for delivery, with focus on such governmental tools as contracts, grants, loans, regulation, and tax credits.

755 Seminar in Politics and Bureaucracy (3:3:0)  
Prerequisite: GOVT 510. Explores research and theory on political causes and effects of actions of government bureaucratic agencies. Readings examine origins of agencies, influences on decisions and programs, sources of internal and external accountability, pathologies of bureaucracies, and contributions bureaucracies make on effective and just governance.

758 Homeland/Transportation Security Administration (3:3:0)  
Examines the terrorist attacks of 9/11, vulnerabilities of the aviation security at that time, failure of elected officials and administrators to act more decisively to improve security before 9/11, and the policy and administrative responses to the 9/11 attacks, including the creation of the Transportation Security Administration and the Department of Homeland Security. Includes the development of radical Islam and the rise of Osama bin Laden and Al Qaeda.

794 Internship (1–6:0:0)  
Prerequisite: 12 credits in MAIS-political science concentration. Open only to students admitted to MAIS-political science concentration. Contact internship coordinator one semester before enrollment. Work-study program with specific employers. Credit determined by department.

795 Leadership in Justice and Security Organizations (3:3:0)  
Prerequisite: JLCP 740/PUAD 790, or permission of instructor. Examines leadership theories and explores fundamental questions about leadership in justice and security organizations today.

796 Directed Research and Study (1–3:0:0)  
Prerequisites: 15 credits of GOVT courses at 500 level and above, and permission of instructor. Reading and research on specific topic under direction of faculty member. Written paper required.

798 Political Science Research Project (3:0:0)  
Prerequisites: 24 credits. Research project related to student’s concentration under supervision of a faculty advisor. Student produces substantial and original contribution to political science knowledge on model of article in scholarly journal. Graded S/NC.

799 Political Science Thesis (1–6:0:0)  
Prerequisite: 24 credits, and approval of thesis proposal. Substantial and original research paper with guidance of faculty advisor. Thesis proposal must be approved in advance by advisor and two faculty, who comprise thesis committee. Completed research must be approved by committee and defended publicly in oral presentation. Graded S/NC.

810 American Political Development (3:3:0)  
Prerequisite: GOVT 510. Advanced graduate-level seminar on historical roots of American politics. Examines political culture and historical development of U.S. institutions, and how laws and programs have been affected by historical and cultural development.

811 Advanced Seminar in American Institutions (3:3:0)  
Prerequisite: GOVT 510. Advanced graduate-level seminar on specific topics of contemporary research and theory in American governmental institutions. Topics vary to include presidential politics, Congress, and politics of the judiciary. Readings include classic and contemporary literature. Seminar format with discussion, student presentations. May be repeated for up to 9 credits on different topics.

815 Advanced Seminar in Political Behavior (3:3:0)  
Prerequisite: GOVT 510. Advanced graduate-level seminar on specific topics of contemporary research and theory in American political behavior. Topic varies to include political parties, electoral politics, public opinion and voting behavior, interest groups, and lobbying. Readings include classic and contemporary literature. Seminar format with discussion, student presentations. May be repeated for up to 9 credits on different topics.

820 Advanced Topics in Political Thought (3:3:0)  
Prerequisite: GOVT 520. Advanced graduate-level seminar on
topics of contemporary research and theory in political thought. Topics vary to include political ideologies, feminist theory, and political theory. Seminar format with discussion, student presentations. May be repeated for up to 9 credits on different topics.

831 Research Seminar in Regional Political Culture and Development (3:3:0) Prerequisite: GOVT 540. Advanced graduate-level seminar on theories of political culture and economic development applied to Middle East, Latin America, Asia, and Africa. Debates economic growth and development from broad and rigorous analytical base.

833 European Union and Political Integration (3:3:0) Prerequisites: GOVT 540 and 631. Advanced graduate-level seminar on European integration and theories of international organizations. Examines evolution of European Union and other international organizations, such as NATO, which have brought most European states together since end of World War II.

841 Ethics and Human Rights in International Affairs (3:3:0) Prerequisite: GOVT 540. Seminar on ethical behavior in an international system in which consensus about ethical matters is absent. Overarching themes are distributive justice, human rights, and use of force. Students develop, apply, and justify their own perspective on an ethical problem using ethical theory and social science research.

843 Diplomacy (3:3:0) Prerequisite: GOVT 540. Advanced graduate seminar on theory and practice of diplomacy; alliance construction and destruction; coercive and cooperative diplomacy; diplomacy of certain great powers such as America, Russia, China, France, and Japan, and small and revolutionary powers. Also examines diplomacy and the media, and day-to-day diplomacy.

850 Advanced Seminar in Public Administration Research and Theory (3:3:0) Prerequisite: GOVT 510. Focuses on a topic of central concern in contemporary public administration research and theory. Content of the seminar varies but includes such topics as organizing for homeland security, managerial and political effects of e-government, and the application of principal-agency models in public management.

851 Doctoral Seminar in Theories of Organization and Administrative Systems (3:3:0) Prerequisites: GOVT 540 and 631. Advanced seminar on theories and practices of political and governmental leadership in American and comparative settings. Presents health planning and regulatory environment, current or proposed regulatory environments, and differences between assisted living and other

854 Advanced Seminar in Comparative Public Administrative Systems (3:3:0) Specific topics of contemporary research and theory in comparative public administration, including the international diffusion of governmental reform and innovation, public administration in developing countries, and international trends in public administration theory. Includes readings in classic and contemporary literature.

998 Doctoral Dissertation Proposal (1–6:0:0) Prerequisite: advancement to candidacy. Work on research proposal that forms basis for doctoral dissertation. Graded S/NC.

999 Doctoral Dissertation Research (1–12:0:0) Prerequisite: approval of dissertation proposal. Research on approved dissertation topic under direction of dissertation committee. May be repeated for up to 9 credits in a semester, but no more than 15 total. Graded S/NC.

Greek (GREE)

Modern and Classical Languages

150 Classical Greek I (3:3:0) Addresses linguistic, semantic, and cultural aspects. Covers basic structure and vocabulary, its place among other world languages and its unique role in development of modern thought. Lectures, discussions supplemented by web-posted material.

160 Classical Greek II (3:3:0) Prerequisites: GREE 150 or permission of instructor. Expands proficiency, refines grasp of morphology and syntax, and fosters greater command of vocabulary. Introduces selected original passages from Greek classical authors. Lectures, discussions supplemented by web-posted material.

Health Administration and Policy (HAP)

College of Health and Human Services

290 Lifestyle Management through Systems Analysis (3:3:0) Students make resolutions (e.g., maintain a healthy diet, exercise more, etc.) and analyze their lifestyle to see what is causing and preventing success. Each student maintains a diary and analyzes it using Bayesian causal modeling techniques to understand the constraints and causes leading to successes and failures. Students analyze their pattern of success using statistical process control tools and engage in cycles of self improvement.

302 Health Care Finance (3:3:0) Introduces finance in health care organizations. Reviews issues in reimbursement structures, regulatory mechanisms, cost control, and related factors affecting financial management of health service organizations including financial decision support skills.

303 Strategic Health Management and Planning (3:3:0) Introduces past and present interventions that affect supply and demand for health care at community, state, regional, and national levels. Presents health planning and regulatory entities, and discusses strategic and program planning in context of current economic and market conditions.

307 Assisted-Living Management and Philosophy (3:3:0) Overview of growth of assisted living industry, its role in health care continuum, current or proposed regulatory environments, and differences between assisted living and other
forms of senior health care and senior living services. Specific instruction provided in philosophy and day-to-day management of assisted-living communities, including resident care, operations, finance and budgeting, human resources and staffing, and successful marketing and community relations. Also examines industry future, including cutting-edge programs and technologies, and approaches to creating next generation of assisted-living services.

320 Management of Project Resources (3:3:0) Prerequisites: HAP 360 or related course, HAP 378 or related course. An introductory course in the management of project resources, including, but not limited to, assessing return on investment for projects and cost-related tasks. Includes hands-on application of project management tools as they are applied in the health-related organization and the health service industry. Also includes a variety of variables that may affect cost control and cost variation, including the impact of finishing projects in shorter time frames than originally planned and activity-based costing.

334 Role Development for Health Administration Majors (3:3:0) Explores career opportunities that build on basic education in health science field. Includes historical perspectives on ethical, legal, political, social, and cultural issues related to health care policy and research. Explores multidisciplinary collaboration among health care providers.

360 Introduction to Health Information Systems (3:3:0) An introduction to basic information management in health care service organizations. Provides an overview of health information systems for selected administrative functions and clinical care services, including electronic data interchange for billing and claims management, institutional approaches to ensuring data security and privacy, and information management and decision support for managers and clinicians.

378 Health Care Delivery in the United States (3:3:0) Introduces history and current structure and function of U.S. health care delivery. Explores components and subsystems of health care, and sociopolitical (public and private) context that shapes system and affects access to health care and delivery of health services.

410 Introduction to Health/Medical Practice Management (3:3:0) An introductory course in the leadership and management of ambulatory health service practices and small provider organizations. Content covers a variety of health/military practice management functions, including administrative systems, operations and strategies for effective management of quality, efficiency and business performance (contracts and marketing), and human resources. Trends in practice integration and affiliations with multiprovider groups and larger enterprises will be covered.

416 Leadership and Management of Health Systems I (3:3:0) Prerequisite: completion of HAP 300-level course requirements. Introduces theoretical concepts and their application to the leadership and management of effective health administration organizations. Explores the structure and function of health-related organizations and selected administrative and operational issues in program development and service design, emphasizing strategies for effective performance management, decision making, and communication.

417 Leadership and Management of Health Systems II (3:3:0) Prerequisite: completion of HAP 416. Explores challenges to providing effective leadership and management of health care organizations and systems of care related to operational issues such as personnel management and labor relations, information management, conflict and goal alignment, financial management, accountability, and quality and safety improvement. Focuses on identification of management skills, technology, and strategy that influence optimal performance and communication between clinicians, administrative staff, and managers.

447/HAP 547 Regulatory Requirements for Health Care Systems (3:3:0) Helps health care professionals understand link between infrastructures of organization and regulatory and accreditation processes for health care organizations. Covers major accrediting agencies and their roles, accreditation principles, and survey process. Focuses on hospitals with reference to ambulatory care, managed care organizations, rehabilitation centers, laboratories, and home health and long-term care facilities. Emphasizes requirements of Joint Commission on Accreditation of Health Care Organization and regulations mandated by Health Care Finance Administration.

460 Information Technology Project Management (3:3:0) Focuses on project management as applied to management of health care information technology projects. Students learn critical path analysis, project resource management, crashing projects, vendor selection, assessment of project quality, and analysis of project risks. Students learn to use media for effective project communication.

494 Special Topics in Health Administration and Policy (3:3:0) Selected topics analyzing specialized areas in health administration and policy. Content varies. Lecture, seminar, laboratory, and workshops.

498 Health Administration Internship (6:2:12) Prerequisite: open to HAP majors only. Taken in last semester of studies. Capstone course involves a two-hour weekly seminar and a 12-hour internship in a health-related organization. Provides variety of applied management experiences in a health systems or related organization (field agency), under the direction of a HAP faculty member and a preceptor in the field. Students integrate and apply critical-thinking, project-planning, and management and communication skills in the internship experience and toward completion of an approved internship project. Not repeatable for credit.

499 Independent Study in Health Administration and Policy (1–3:0:0) Prerequisite: permission of college. Provides individual study of a particular problem area in health administration and policy research, theory development, or education under the direction of faculty. May be repeated for maximum 6 credits.

501 Business Statistics in Health Service Management (3:3:0) An introductory course in basic statistics applied to applications in health systems management. Students use spreadsheet applications to perform a variety of statistical analyses (parametric and nonparametric statistics, including regression) to support program evaluation and managerial decision making in health systems.

512 Introduction to Health Services Research (3:3:0) Prerequisites: HAP 678 (if required in program of study) and HAP 501 or equivalent statistics course. An introductory course in the basic methods of interdisciplinary health services research and program evaluation in health systems and policy. The course covers topics related to policy, management, and program effect and evaluation within health
delivery systems, including research design, existing data systems, measurement of quality and basic cost benefit, and effectiveness analysis.

540 Introduction to Emergency Preparedness/Disaster Recovery for Health Care Professionals (3:2:1) Introductory course in emergency preparedness and disaster recovery issues for health and human service professionals, using blended learning methods. Introduces policy guiding public and private sector emergency preparedness activities, and provides overview of issues in emergency preparedness infrastructure, needs assessment, and interdisciplinary roles in emergency response operations. Uses knowledge acquired from recent state and federal responses to disasters.

542 Health Policy (3:2:1) Explores development of public health policy, influence of health care delivery, nursing, and other health professions. Classroom and field experience required.

546/NURS 546 Leadership Strategies in Health Policy (3:3:0) Examines the leadership process from a policy and organizational perspective to expand students’ ability to impact the health policymaking process.

547/HAP 447 Regulatory Requirements for Health Care Systems (3:3:0) Helps health care professionals understand link between infrastructures of organization and regulatory and accreditation processes for health care organizations. Covers major accrediting agencies and their roles, accreditation principles, and survey process. Focuses on hospitals with reference to ambulatory care, managed care organizations, rehabilitation centers, laboratories, and home health and long-term care facilities. Emphasizes requirements of Joint Commission on Accreditation of Health Care Organization and regulations mandated by Health Care Finance Administration.

586 Process Improvement in Health Services (3:3:0) Examines how improved work processes lead to quality improvement. Explores contribution of operations research and quality management to improve delivery and production of health services and business processes from the perspective of health care managers.

594/GCH 594/NURS 594 Special Topics in Health Care (3:3:0) Selected topics analyzing specialized areas in health care. Content varies. Lecture, seminar, laboratory, and workshops.

601 E-Commerce and On-line Marketing for Health Services (3:3:0) Explores development of online health services; organization of online businesses; online marketing, financial, and clinical transactions; and venture capital and the IPO process. Explores creating and maintaining web pages and databases. Reviews literature on effect of computer environments. Includes writing of special routings for Electronic Health Record (HER), preferably VISTA.

610 Health/Medical Practice Management (3:3:0) Prerequisite: health care financial management or equivalent or instructor’s permission. Regulatory pressures, technology, managed care contracting, revenue cycle management, and legal issues are making medical practice management more complex. Physicians groups struggling with these demands are finding a need for sophisticated management. This course prepares the student to manage the modern practice by providing a foundation in the leadership and management of ambulatory health services and small provider organizations.

611 Computer Programming within Health Care Environment (3:3:0) Focuses on use of M computing program and its incorporation into electronic health records. Includes scientific principles for easy-to-maintain software programs. Includes writing of special routings for Electronic Health Record (HER), preferably VISTA.

612 Maintaining Business Continuity in Health Care (3:3:0) Considers potential types of catastrophes, their likely impact, and how organizations could continue their mission in the aftermath. Explores interdependences among various components of the health care delivery system, regional health services, disaster planning, business record protection, patient information and information systems protection, manpower planning, professional credentialing, access to supplies and drugs, and financial implications and resources.

613 Project Management in Health Information Technology (3:3:0) Covers the body of knowledge in project management as applied to information technology and prepares students to take project management professional certification exam. Includes needs assessment, project planning, project cost analysis, project control, project risks, and management of personnel within projects.

621 Management of Health Service Organizations (3:3:0) Prerequisite: admission to CHHS graduate program or permission of instructor. Introductory course in application of organizational and management theory relating to management of health service organizations. Emphasizes leadership and trends in organizational structure that affect performance effectiveness, quality, and interorganizational relations, and values and principles of health management as a profession. Explores challenges of managing health professionals’ decision making, power gradients, change, and other issues that affect function and performance of health service organizations. Introduces strategies used by learning organizations.

650 Assisted Living Management and Operations (3:3:0) Issues, trends, and practices related to administration of assisted-living and senior housing communities. Emphasizes budgeting, staffing, hospitality services, resident care, risk management indicators; and evaluation of demographic, cultural, and regulatory environments affecting industry.

660 Health Policy Formation and Implementation (3:3:0) Applies selected methods for studying theory and practice of health policy formulation and converting a policy into administrative decisions and a plan of action. Emphasis on acquiring a basic working knowledge of health system and problem complexity and evaluation of policy impact using contemporary health policy examples and case studies.
Identifies the institutional determinants of health policy formation and implementation, including special interest and stakeholder groups and their interaction.

661 Policy Development and Analysis for Community Health Programs (3:3:0) Prepares students to critically analyze issues and develop skills pertinent to effective policy development for community and family public health programs. Explores what constitutes a vulnerable population and examines current government programs and policies supporting these programs for such populations. Recent case examples ground students in current issues faced by community groups and other health interests.

662 Aging and Health Care Policy (3:3:0) Prerequisite or corequisite: GCH 637, SOC 599, or NURS 659; or permission of instructor. Focuses on policy perspective in relation to older adults in community and long-term care facilities. Students analyze policy issues and health care delivery systems as they affect older adults through lecture, discussion, field trips, projects, and policy analysis papers.

678 Introduction to the U.S. Health System (3:3:0) Prerequisite to all other certificate courses for students who do not have familiarity with all aspects of U.S. health care system and recent working experience. Explores structure, function, and financing of U.S. health care delivery systems. Explores development of various subsystems of care and ways public, private, and social forces influence politics of health care, shape the system, and affect public health. Includes analysis of systems infrastructure and sociopolitical context of U.S. health care system.

680 Applied Public Health Leadership and Management (3:3:0) Survey course in leadership, management, and planning applied to public health systems. Students apply theoretical knowledge from a variety of disciplines relevant to development and implementation of public health policy, regulatory directives, public health program planning and management (including human resources and financial management), and the design and evaluation of public health services/functions. Content includes strategies for ensuring access to essential public health services and use of evaluation and monitoring systems to ensure the safety, efficiency, and effectiveness of local public health systems. Course emphasizes leadership, communication, systems thinking, data-driven decision making, and ethical practice in public health systems.

690 Independent Study (1-3:1-3:0) In-depth studies of selected area of health science theory, research, or practice under direction of faculty. May be repeated for a maximum of 3 credits.

702 Managerial Accounting in Health Care (3:3:0) Practical examination of controllership function in health care organizations and systems (profit and nonprofit), with emphasis on policy formulation and evaluation of performance, including cost methods and systems; measurement criteria; and managerial planning, methods, and techniques.

703 Financial Management in Health Systems (3:3:0) Prerequisites: admittance to graduate program and working knowledge of health care industry. Examines tools and methods of financial management in health care organizations and systems, with emphasis on allocation and use of funds. Analyzes costs and constraints of alternative source of funds, and applies financial decision instruments and effect on operational management and market value of entity.

704 Contemporary Issues in Health Systems Management (3:3:0) Analyzes management theory and practice from recently evolving works that identify, analyze, and resolve recent strategic organizational problems and issues in health care systems. Applies leadership strategy to effectively manage variety of critical issues, including organizational development, change management, human relations and diversity, quality management for organizational and clinical effectiveness, technology, competing priorities, conflicting constituencies, delivery system redesign, and health services research.

705 Strategic Management and Marketing in Health Care (3:3:0) Develops executive skills for strategic decision making through use of marketing-based tools and techniques. Covers strategic planning, market research and opportunity and risk analysis, customer assessment, market segmentation, and life cycle assessment for health care services in managed-care and nonmanaged-care environments.

706 Integrated Health Systems Management (3:3:0) Explores emerging structures for financing and delivery of comprehensive health services in integrated health systems. Covers successful development and management of alliances, provider hospital organizations, and managed care systems with emphasis on strategies for vertical integration, community partnering, contract negotiation, governance, and management of antitrust situations.

709 Health Care Databases (3:3:0) Introduces design and use of health and medical databases, providing hands-on experience. Explores uses of medical record systems. Includes review and analysis of databases and database management systems. Examines application of databases to clinical and managerial transaction.

710 Inferential Statistics in Health Services Research and Management (3:2:1) Prerequisite: HAP 501 or equivalent introductory graduate statistics course and lab. Introduction and practical application of advanced statistical analyses and their use/application in health services (research, management, policy analysis) using various software applications (STATA, Microsoft Excel and Access, SAS, SPSS, Minitab). Topics include analysis of variance (one and two way) and design of experiments, multiple regression, model building, chi-square and the analysis of contingency tables, and nonparametric statistics.

711 Hardware and Networking in Health Care Environment (3:3:0) Focuses on the operating system, network of computers, and noncomputing hardware. Students learn to connect imaging and other equipment to electronic health records and provide electronic services online. Includes configuration of laboratory and imaging systems to VISTA electronic health record.

712 Topics in Public Policy (3:3:0) Presents selected topics current in public policy related to health care and health care administration.

715 Health Economics (3:3:0) Emphasizes understanding of economic efficiency in the U.S. health system. Microeconomic methods examine markets and resources in health care. Health care examined as commodity. Explores demand for health and medical care services, provider behavior, and function of insurance markets. Topics include government role, financing arrangements, insurance reform, rationing, price regulation, and provider competition.
720 Health Data Integration (3:3:0) Students learn to manipulate large databases, create link table queries, write SQL application programs, understand sources of data conflicts, and identify methods of integrating ODBC databases with legacy data. Covers data warehousing, methods of analyzing large databases, including Bayesian belief networks and machine learning in health care context. Features semesterlong data integration group project.

727 Program Evaluations in Health Care (3:3:0) Methods of evaluating health and social programs, including anthropological case studies, decision analytic and quasi-experimental approaches. Emphasis is placed on using methods of continuous quality improvement and benchmarking exchanges in evaluating multisite programs. Assess cost effectiveness of programs (including assessment of patient census, employee activities and program outcomes). Evaluation of health care interventions, rate setting, and managed care are discussed.

730 Health Care Decision Analysis (3:3:0) Prerequisite: HSCI 501 or any statistics course. Students analyze practice patterns and find optimal methods of improving them. Uses decision analysis and failure mode analysis in health care settings. Students integrate scientific evidence, patients' preferences, and experts' opinions to identify optimal alternatives.

735 Risk Analysis in Health and Bioscience (3:3:0) Students build and interpret causal model of risks and test the accuracy of them against extant incidence reports using risk analysis models, risk analysis life cycle, as well as methods of evaluating the validity and reliability of risk analysis. Bayesian probability models, probabilistic risk analysis, root-cause analysis, and failure mode analysis are covered. Includes applications to terrorism, unauthorized disclosures, and patient safety.

740 Management of Health Information Systems (3:3:0) Introduces health and medical information systems with emphasis on systems analysis and design to support managerial and clinical communications and decision making. Explores trends and innovations in information technology and systems, focusing on managerial oversight of health and medical information systems. Explores contemporary management strategies for information systems personnel.

745 Health Care Security Policy (3:3:0) The focus of this course is on health security and privacy policy and compliance issues. Students will develop policies for the type of threats faced by the facilities. The legal and business policies for facility, personnel, travel, information, and patient security will be discussed.

746 Advanced Seminar on Security (3:3:0) Describes new methods to manage and verify identity of patients and providers. Includes issues related to identity management in electronic and physical domains. Includes discussion of continuity of care, referral process, patient recruitment, and follow-up of community clinic visits. Includes emerging topics in health care security and the new role of compliance officers.

750 Analysis of Causality in Health Services Research (3:3:0) Prerequisites: A prior graduate-level course in statistics covering analysis of variance: HAP 501, GCH 601, GCH 804, or an equivalent course (approved by the instructor). Covers philosophical and statistical problems with analysis of causes as separate and distinct from associations. Topics discussed include structural modeling, self selection, risk adjustment, propensity scoring, and Bayesian modeling. Students examine real health care databases and the pitfalls of causal inferences. Special attention is made to investigation of causes of outbreaks and illness.

760 Philosophy of Science in Health Services Research (3:3:0) Prerequisite: admission to a doctoral program or permission of instructor. An introductory course on the theory and philosophy of science and humanism that relate to the design and conduct of health services research. The course examines selected theories on the nature of reality (ontology), the justification of knowledge claims (epistemology), and how knowledge is constructed (methodology) in design and analysis of health services research.

762 Cost-Effectiveness for Health Care Management and Policy Decisions (3:3:0) A survey course in health services research methods for the application of economic evaluation techniques used in health care policy analysis and clinical or administrative applications for health care service planning and evaluation. Content introduces methods applied to health care technology assessment, medical decision making, health resource allocation, and policymaking.

764 Health Policy and Government Payment Systems for Health Care Services (3:3:0) Examines the rationale for government intervention in provider payment and explores the current policy issues and politics of major government provider payment systems, including Medicare and Medicaid, and examines options for managing these programs more effectively. The course will “follow the money” as it flows through government and provider payment systems, model potential changes in such systems, and identify policies for improving the operation of these programs and payment systems.

765 Methods for Health Policy Analysis (3:3:0) Explores conceptual, analytic, and technical methods/approaches used in health policy analysis and planning. Students will learn to select from among alternative methods for applied concept modeling, graphical data presentation, needs assessment, goal clarification, group decision methods, and a variety of quantitative applications and frameworks for evaluating policy impact.

766 Policy Implementation and Health System Management Dilemmas (3:3:0) Prerequisite: HAP 703 or equivalent, or permission of instructor. Analyzes selected public policies and regulations and the impact of implementation and compliance/noncompliance on health care systems and organizations. Examines management responsibilities, challenges, and dilemmas (fiduciary and ethical) of implementing selected policies and regulations (promulgated or proposed).

780 Data Mining in Health Care (3:3:0) Prerequisite: HAP 501 or equivalent introductory graduate statistics course and lab, or permission of instructor. An introductory course to data mining and knowledge discovery in health care. Methods for mining health care databases and synthesizing task-oriented knowledge from computer data and prior knowledge are emphasized. Topics include fundamental concepts of datamining, data preprocessing, classification and prediction (decision trees, attributional rules, Bayesian networks), constructive induction, cluster and association analysis, knowledge representation and visualization, and an overview of practical tools for discovering knowledge.
from medical data. These topics are illustrated by examples of practical applications in health care.

790 Health Management Practicum and Capstone Seminar (3:2:6) Prerequisite: all course work. Team-based field practicum in health management, problem analysis, and project management in health care or service organization. Learning teams define complex problem in assigned facility and analyze problem with recommendations for management decision action. Analysis provides context in which theoretical concepts and management skills are applied. Uses case study analyses to explore problem-solving approaches in variety of situations and health care or service organizations.

820 Analytic Models in Health Services Management, Policy, and Research (3:3:0) Prerequisite: HAP 710 or equivalent graduate statistics course. An advanced statistics course in applied linear and multiple regression analysis, including polynomial regression, indicator variables and covariance analysis, model selection and validation, methods for measurement errors, diagnostic methods for outliers, influence and multicollinearity, nonlinear regression, logistic regression with non-normal distributions, correlations, and time-series analysis and forecasting as used in health services administration research and policy analysis.

821 Analysis of Categorical Data in Health Policy and Administration (3:3:0) Prerequisite: HAP 710 or equivalent graduate statistics course. An advanced statistics course in analysis of categorical data. Topics include tests and measures of association for contingency table analysis, including chi-square, odds ratio, relative risk, comparative trials, analysis of categorical data with matched samples, log-linear models, and logistic regression. Econometric models involving categorical variables could also be covered.

822 Research Designs and Analysis in Pharmaceutical and Health-Related Clinical Trials (3:3:0) Prerequisite: HAP 710 or equivalent graduate statistics course. A survey course that introduces students to the design and management of clinical trials research and pharmaceutical research and development, including drug development and FDA drug approval. This course also covers a variety of biostatistical methods as they apply to biomedical and biotechnology industry research with human subjects.

866 Health Care Public Policy (3:2:1) Focuses on process of formulating health care policy and analyzing implications for nursing, administration in nursing, and education and nursing service. Examines current and impending health issues, legislative process, and program implementation evaluation.

868 Advanced Research Seminar in Health Policy Analysis (3:3:0) Limited to doctoral students having completed core courses in statistics and research design, or permission of instructor. Seminar on advanced research methods that analyzes theoretical and analytic foundations to critique health services research and health policy analysis. Students synthesize, integrate, and apply theoretical knowledge and advanced skills relevant to health services research, policy analysis, and program evolution.

Health Education (HEAL)

School of Recreation, Health, and Tourism

110 Personal Health (3:3:0) Focuses on individual and family well-being through integrating fitness, nutrition, human sexuality, consumer health, drug education, and mental health.

205 Principles of Accident Causation and Prevention (4:3:1) Investigates safety-related problems. Emphasizes fire, home, occupational, and vehicle safety; identification, care, and treatment of various medical emergencies; and violence and property crime prevention.

220 Dimensions of Mental Health (3:3:0) Focuses on integrating behavioral and sociocultural factors in studying mental health.

230 Introduction to Health Behavior (3:3:0) Introduces health behavior in context of health psychology. Various theoretical models applied to understanding health and illness behavior. Studies nature of health from cognitive, behavioral, and biological perspectives. Examines means of preventing and treating health problems.

310 Drugs and Health (3:3:0) Analyzes drug use, with emphasis on positive aspects, and presents alternatives to drug misuse and abuse.

312 Health and Wellness Choices (3:3:0) May be taken by nonmajors. Actively involves students in becoming managers of their personal health and well-being throughout life span. Consistent with Healthy People 2000 goals for nation. Emphasizes lifestyle activity and fitness, behavioral change, and maintenance.

314 Community Health Issues and Strategies: Drugs and Alcohol (3:3:0) Emphasizes applications of theories underlying health promotion and risk reduction, with primary attention to drug and alcohol abuse. Focuses on applied strategies in range of community settings, including schools and colleges, workplace, social services, health care providers, citizen groups, and related services.

323 Program Leadership and Evaluation (3:3:0) Prerequisite: PRLS 310 or permission of instructor. Covers leadership and evaluation of health, fitness, and recreation programs. Uses computer technology to study evaluative aspects of program planning and administration.


327 Women’s Health (3:3:0) Examines health issues unique to women, including health care, food and exercise, reproductive and gynecological issues, chronic diseases, and issues of violence.

330 Nutrition (3:3:0) Assesses dietary habits and patterns in relation to nutrient requirements. Emphasizes weight control, diet and fitness, and current nutritional controversies.

350 Interventions for Populations and Communities at Risk (3:3:0) Identifies culturally, physically, emotionally, mentally, and demographically diverse populations and communities at risk. Covers implications for developing innovative programs, and role of HFRR interventions.

370 Health Determinants and Status (3:3:0) Focuses on determining person’s health status and health behavior-
change strategies. Covers skills acquisition in health-risk appraisal, screening, and related instruction.

372 Health Communication (3:3:0) Applies research-based models and theories of health assessment and promotion at individual, organizational, agency, and community levels. Uses communication approaches and skills in context of behavior change strategies, including policy and program development.

402 Introduction to Driver Education Instruction (3:3:0) Introduces vehicle operator’s tasks in highway transportation system. Provides essential knowledge and skills to instruct driver education.

403 Driver Education Practice and Administration (3:3:0) Applies driver education to simulated and actual driving environments. Provides essential knowledge and skills to administrate driver education.

405 Teaching Methods in Health Education (K–12) (3:3:0) Prerequisite: BSED status or permission of instructor. Covers content, methodology, and resource materials in teaching health education for physical education teaching majors. Field experience required.

430 Seminar in Exercise Science and Health Promotion (3:3:0) Prerequisite: 90 hours. Provides overview of contemporary and often controversial health issues with analysis of selected problems of current concern to society.

451 Epidemiology and Environmental Health (3:2:1) Covers incidence, distribution, and causes of diseases and injuries in human populations. Emphasizes essential diagnostics and planning for community health problem-solving with environmental consideration.

470 Community Health Systems (3:3:0) Examines complexities of community health and community health system infrastructure. Focuses on planning and navigating multi-system agency environment, including population and subpopulation health.

480 Special Topics (1–3:1–3:0) Presents selected health issues or problems. Focuses on applying information to education programs.

490 Internship (12:0:12) Prerequisite: 90 credits or permission of instructor. See internship manual for specific concentration requirements. Provides directed experience in observing and participating in health promotion and exercise science programs at community agencies, health care centers, and private sector organizations. Minimum period of 10 to 12 consecutive weeks. Graded Pass/Fail.

499 Independent Study in Health Education (1–3:1–3:0) Prerequisites: 90 credits or permission of instructor. Studies problem area in health education research, theory, or practice under faculty direction. May be repeated, but no more than 3 credits may be earned.

516 Program Development and Resources in Health Education (3:3:0) Open to licensed and provisionally licensed health and physical education teachers in the commonwealth of Virginia and students in ASTL physical education program. Focuses on program development, health content, methodology, and resources for teaching preK–12 health education. Distance learning course.
750 Legal Issues Relevant to Health Care Administration (3:3:0) Prepares health professionals to understand legal principles, statutes, regulations, and case law related to managing health care organizations and health professionals’ practice. May compare legal health care issues from domestic and international perspectives.

855/NURS 855 Ethics in Health Care Administration (3:3:0) Prerequisite: admission to PhD program; for non-PhD students, permission of instructor. Philosophical foundations of health care ethics. Students analyze specific ethical dilemmas faced by administrators in health care settings.

Hebrew (HEBR)

Modern and Classical Languages

101 Elementary Hebrew I (3:3:1) Designed for students with no knowledge of Hebrew. Introduction including grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

102 Elementary Hebrew II (3:3:1) Prerequisite: HEBR 101 or equivalent. Continuation of HEBR 101. Lab work required.

150 Introduction to Biblical Hebrew (3:0:0) Introduces basic vocabulary, grammar, and development of reading skills with introduction to religion and culture of ancient Israel that produced the Hebrew Bible/Old Testament.

160 Readings in Biblical Hebrew (3:3:0) Prerequisite: HEBR 150 or equivalent. Continuation of HEBR 150 to increase students’ proficiency in vocabulary and understanding of morphology and syntax. Selected passages from Hebrew Bible read; students introduced to text formation and analysis.

201 Intermediate Hebrew I (3:3:1) Prerequisite: HEBR 102 or equivalent. Further development of skills acquired in HEBR 101 and 102, including grammar, oral expression, listening comprehension, reading, and writing. Lab work required.

202 Intermediate Hebrew II (3:3:1) Prerequisite: HEBR 201 or equivalent. Continuation of HEBR 201. Lab work required.

History (HIST)

History and Art History

100 History of Western Civilization (3:3:0) Students who take HIST 100 may not receive credit for HIST 101 or HIST 102. History of Western civilization from ancient Mediterranean origins through medieval and modern development of Europe to contemporary world.

101 Foundations of Western Civilization (3:3:0) Students may not receive credit for HIST 101 if they have taken HIST 100. Evolution of Western culture from ancient Mediterranean world to formation of modern Europe in 17th century.

102 Development of Western Civilization (3:3:0) Students may not receive credit for HIST 102 if they have taken HIST 100. History of Western institutions and ideas from 17th century to the present.

120 U.S. History (3:3:0) Students cannot receive credit for HIST 120 if they have taken either HIST 121 or HIST 122. Examines American society from its founding documents, values, institutions, and peoples to present. Requires experience in historical analysis.

121 Formation of the American Republic (3:3:0) Students may not receive credit for HIST 121 if they have taken HIST 120. Social, political, economic, and intellectual growth of American institutions from colonization through Reconstruction.

122 Development of Modern America (3:3:0) Students may not receive credit for HIST 122 if they have taken HIST 120. History of the United States since 1877.

125 Introduction to World History (3:3:0) Analytical approach to world history overview that surveys major features of principal existing civilizations of world, as originally formed and as altered by key global processes including forces of modernity.

130 History of the Modern Global System (3:3:0) Provides understanding of processes that have shaped modern world. Beginning in 1500, traces developments that reorganized peoples, reshaped cultures, and generated new economies in interaction between Western and non-Western societies. Focuses on Western and non-Western regions of world, and their participation in global networks resulting from mercantile expansion, industrial revolution, imperialism, nationalism, and legacies in postcolonial period.

200 Freshman/Sophomore Seminar in U.S. History (3:3:0) Prerequisite: freshman or sophomore standing. Focuses on skills, methods of learning, and subject matter to introduce discipline of history. Topics vary.

201 Freshman/Sophomore Seminar in European History (3:3:0) Prerequisite: freshman or sophomore standing. Focuses on skills, methods of learning, and subject matter to introduce discipline of history. Topics vary.

202 Freshman/Sophomore Seminar in Global History (3:3:0) Prerequisite: freshman or sophomore standing. Focuses on skills, methods of learning, and subject matter to introduce discipline of history. Topics vary.

251, 252 Survey of East Asian History (3:3:0) HIST 251 surveys history of China and Japan from prehistoric times to ca. 1600. HIST 252 surveys history of China and Japan from early modern times (ca. 1600) to present.

261, 262 Survey of African Civilization (3:3:0) HIST 261 surveys African history from earliest times to the decline of western Sudanic states in 16th century. HIST 262 surveys African history from beginnings of interaction with Europe in 15th century to recent emergence of new states.

271, 272 Survey of Latin-American History (3:3:0) HIST 271 surveys colonial era to 1825. HIST 272 surveys development of independent Latin America since 1825. Emphasizes interactions of United States, Latin America.

281, 282 Survey of Middle Eastern Civilization (3:3:0) Survey of Middle Eastern history from rise of Islam to present, emphasizing processes that led to emergence of economic, cultural, social, and political institutions that characterize region today. HIST 281 surveys period from rise of Islam in 570 to medieval period (ca. 1258); HIST 282 surveys medieval period to present.

298 History and the Web (1:1:0) Introduces techniques and methods of creating historical web sites. Overview of historical resources on web, including Internet archives,
hypertext scholarly articles, and online exhibits. Examines new narrative and interpretive possibilities for doing history. Combines lecture, lab.

299 Databases for Historians (1:1:0) Introduces techniques and methods to create historical databases. Overview of web, CD-ROM, and personal databases helpful for historical research. Examines database as electronic archive and interpretive and analytical tool. Combines lecture and lab.

300 Introduction to Historical Method (3:3:0) Prerequisite: ENGL 302; COMM 100, 101 or 104; or permission of instructor. Introduces research skills and methods, as well as historical interpretation, culminating in written and oral presentations. Topics vary according to instructor. History majors strongly urged to take HIST 300 early in their program of upper-level courses. Grade of C or better is required to graduate with BA in history. Not offered in the summer.

301 Classical Greece (3:3:0) Political, social, economic, and cultural history of classical Greece from development of the city-state through 5th century.

302 Classical Rome (3:3:0) Political, social, economic, and cultural history of classical Rome from founding of the city through fall of Roman republic.

304 Western Europe in the Middle Ages (3:3:0) Survey of development of European society from collapse of Roman rule in 5th century to advent of Black Death in 14th century. Emphasizes political, social, cultural, and intellectual growth of society that developed from Roman, Catholic, and Germanic roots.

305 The Renaissance (3:3:0) Survey considering Renaissance as phenomenon rather than chronological period. Emphasizes growth of humanism in Italy in 14th and 15th centuries, development of new political concepts, and laicization of society. Includes transmission of these developments to transalpine Europe in late 15th and 16th centuries.

306 The Reformation (3:3:0) Late medieval ecclesiastical conditions and reform movements, late scholasticism, Protestant Reformation, Catholic Reformation, dynastic rivalries, and religious wars. Concludes with Peace of Westphalia.

307 Old Regime and Revolutionary Europe (3:3:0) Political, social, economic, and cultural history of Europe from 1648 to 1815. Crisis of authority, consolidation of the state, absolutism, colonial expansion, the Scientific Revolution and the Enlightenment, and the French Revolution and Napoleon.

308 Nineteenth-Century Europe (3:3:0) History of Europe from Congress of Vienna to outbreak of World War I.

309 Europe in Crisis: 1914–1948 (3:3:0) Prerequisite: 45 credits or permission of instructor. Two world wars, the Great Depression, and political and cultural revolutions transformed Europe as never before. Explores causes and consequences of these tumultuous events, and concludes with consideration of reconstruction that caps period.

312 Nationalism in Eastern Europe (3:3:0) Examines history of modern Eastern Europe from mid-19th century through collapse of communist regimes in 1989, and includes focus on Yugoslav wars of 1990s. Nationalism provides organizing theme; topic approached through literature, political, social, cultural, and new media sources. Class sessions emphasize discussion of central issues and sources.

314 History of Germany (3:3:0) Political, diplomatic, economic, social, and cultural development of Germany from dissolution of Holy Roman Empire to present.

321 Early Modern England (3:3:0) History of England from late 15th to mid-18th century, focusing on social, political, economic, and cultural changes of period with particular attention to English Reformation and causes and consequences of English Civil War.

322 Modern Britain (3:3:0) History of Britain from mid-18th century to present. Focuses on social, political, and economic transformations of industrialization; culture of 19th-century industrial society; problems of late 19th-century economic competition and imperialism; creation of welfare state; and experience of post-World War II political, social, and economic realignments.

328 Rise of Russia (3:3:0) Political, social, and cultural experience of Russia from appearance of Kievan state to mid-19th century.


330 The United States Since World War II (3:3:0) Examines major domestic and foreign policy factors that shaped American experience from World War II to present. Includes political, social, and economic forces as they affected nation’s history.

336 The African American Experience in the United States: Reconstruction to the Present (3:3:0) Prerequisite: 45 credits of history or permission of instructor. History of African American life in post-slavery America, and rise and consequences of racial segregation in 19th and 20th centuries. Examines African American response to continued racial inequality and repression. Covers great migration, urbanization, black nationalism, and civil rights era, as well as contemporary debates about race.

337 The Vietnam War (3:3:0) Covers the causes, major events, and legacies of America’s Vietnam War, including an introduction to Vietnamese history and culture, American decisions for war, strategy and major military engagements, diplomacy and peace talks, and the aftermath of the conflict in Vietnam and the United States.


345 History of American Foreign Relations (3:3:0) Survey of American diplomacy from Revolutionary War to present, with emphasis on 20th-century issues.

350 U.S. Women’s History (3:3:0) Prerequisite: 45 credits or permission of instructor. History of women and their changing status and gender roles in American society from colonial period through “second wave” of feminism in 1970s. Explores images and lives of women of different class, ethnic, and regional origins. Also focuses on women’s political, economic, and legal conditions, and changes in them.
351 History of the Old South (3:3:0) History of South to outbreak of Civil War, with particular emphasis on rise of sectionalism. Focuses on development of distinct Southern culture through emergence of economic, political, social, agricultural, and intellectual institutions.

352 The South since 1865 (3:3:0) History of South during Reconstruction, Redeemer era, and New South, with particular emphasis on race relations. Covers political, economic, cultural, and intellectual development from aftermath of war.

353 History of Traditional China (3:3:0) Prerequisite: 6 credits of history or permission of instructor. China from earliest times to period of modern Western intrusion. Development of traditional Chinese culture, society, and government.

354 Modern China (3:3:0) Prerequisite: 6 credits of history or permission of instructor. China from 1644 to the People’s Republic of China. Emphasizes coming of West, and various stages of Chinese reaction.

355 Women and Family in Chinese History (3:3:0) Prerequisite: 45 credits or permission of instructor. Explores women’s experiences and changing meanings of womanhood over course of imperial and modern Chinese history. Focuses on issues of marriage, education, motherhood, women’s work, property rights, legal status, sexuality, notions of love, foot binding and fashion, political participation, and women’s liberation.

356 Modern Japan (3:3:0) Japan from Meiji Restoration to World War II. Emphasizes Japan’s modernization in face of challenge.

357 Postwar Japan (3:3:0) Prerequisite: 45 credits or permission of instructor. History of Japan from World War II to present. Examines Japanese experience of several key moments: Japan’s defeat in Pacific War, reconstruction during U.S. occupation, rise to economic prominence during 1960s and 1970s, and cultural and international identity crisis during 1980s and 1990s.

358 The Rise of the South (1–3:0:0) Study of historical topics of special interest. Topics announced in advance. May be repeated for credit when topic is different.

359 Topics in World History (3:3:0) Study of historical topics or periods of special interest in global, Latin American, African, Asian, or Middle Eastern history. Topics announced in advance. May be repeated for credit when topic is different.

360 Topics in Global History (3:3:0) Study of historical topics or periods of special interest. Topics announced in advance. May be repeated for credit when topic is different.

361 Topics in History (3:3:0) Study of historical topics or periods of special interest. Topics announced in advance. May be repeated for credit when topic is different.

362 Topics in European History (3:3:0) Study of historical topics or periods of special interest. Topics announced in advance. May be repeated for credit when topic is different.

363 Topics in Latin American History (3:3:0) Study of historical topics or periods of special interest. Topics announced in advance. May be repeated for credit when topic is different.

364 Revolution and Radical Politics in Latin America (3:3:0) Prerequisite: 6 credits of history or permission of instructor. During 20th century, Latin America has witnessed both peaceful political movements and violent revolutions aimed at achieving social justice. Considers several of these movements in comparative perspective: Mexican Revolution, Arbenz government in Guatemala, Allende regime in Chile, Cuban and Nicaraguan revolutions, and Brazilian Worker’s Party.

365 Conquest and Colonization in Latin America (3:3:0) Prerequisites: 45 credits or permission of instructor. Examines forms of conquest and colonization practiced by Aztec, Inca, Spanish, and Portuguese in what is now Latin America. Includes role of ideology and religion in imperial rule, use of warfare to create empires and colonies, and implementation of political and economic systems to rule subject people.

366 Comparative Slavery (3:3:0) Prerequisites: 45 credits or permission of instructor. Examines systems of slavery from ancient world to modern world, with special emphasis on Atlantic slave trade and slave societies in Latin America and Anglo America. Considers impact of slaves and slavery on cultural, economic, and political systems in Africa and Americas from 16th to 19th centuries.

367 History, Fiction, and Film in Latin America (3:3:0) Explores modern Latin American history through different types of texts: scholarly histories, historical novels, fictional films, documentary films, and oral history. Explores ways these texts produce knowledge about the past. What motivates different approaches? What counts as evidence? How do we know what really happened? How do we decide what mattered and what did not? Also introduces several important episodes in 20th century Latin American history.

370 War and American Society (3:3:0) Examines war and American society from the colonial period to the post-Cold War era, including how military institutions, war, and the preparation for war have affected American society, and how Americans have thought about military service, experience war, and made peace through their history. Special emphasis on civil–military relations and the role of war and militarism in American culture.

373 The Civil War and Reconstruction (3:3:0) Examines the history of the American Civil War from its origins in the late 18th century to the withdrawal of federal troops from the south in 1877. Examines the political, social, and economic issues that led to war; the home fronts, war leadership, diplomacy, combat motivation, and grand strategy; problems associated with reconstituting the nation’s political institutions; and the integration of millions of newly freed slaves.

386 Topics in History (3:3:0) Study of historical topics of special interest. Topics announced in advance. May be repeated for credit when topic is different.

387 Topics in Global History (3:3:0) Study of historical topics or periods of special interest in global, Latin American, African, Asian, or Middle Eastern history. Topics announced in advance. May be repeated for credit when topic is different.

388 Topics in European History (3:3:0) Study of historical topics or periods of special interest. Topics announced in advance. May be repeated for credit when topic is different.

389 Topics in U.S. History (3:3:0) Study of historical topics or periods of special interest. Topics announced in advance. May be repeated for credit when topic is different.

390 History of Virginia to 1800 (3:3:0) Discovery and settlement of Virginia. Colonial period with emphasis on development of representative government and race relations, Golden Age of Virginia dynasty, and coming of Civil War.

392 History of Virginia Since 1800 (3:3:0) Decision to secede, Civil War and Reconstruction, Readjustors and Populism, disfranchisement and Constitution of 1902, and rise of Senator Harry F. Byrd. Recent developments.

393 Topics in Film and History (3:3:0) Study of historical periods or topics from perspective of feature films and documentaries. Topics available in advance in History Department. May be repeated when topic is different. Maximum 6 credits may be applied to history major.

398 Historical Study Abroad (1–3:0:0) Intended for participation in formally organized course offered by Center for Global Education during intersession or spring break. May be repeated for credit.

399 Internship (1–9:0:0) Prerequisite: history majors with permission of undergraduate coordinator. Approved work-
study programs in cooperation with specific organizations including area museums; archives; historic sites; and local, state, and federal agencies. Credit determined by department.

401 Colonial America (3:3:0) Intensive study of colonial American history from European origins through Revolutionary War.

403 Revolutionary Era in American History, 1763–1812 (3:3:0) Study of formative years of new republic from Treaty of Paris of 1783 to election of 1820.

404 Jacksonian America, 1812–1854 (3:3:0) Study of age of Andrew Jackson. Emphasizes democratic institutions that emerged as dominant influences in American society.

409 Between the Wars: The United States, 1919–1941 (3:3:0) Intensive study of political, social, economic, and diplomatic developments in 1920s and 1930s.

417 History of Metropolitan Washington (3:3:0) Examines urban and suburban growth in Washington, D.C., and its suburbs in Maryland and Virginia since 1790, in context of U.S. urban history.

418 Ethnic Groups in America (3:3:0) Explores ethnicity and race in American urban society by comparing experiences of different ethnic groups as migrants to American cities.

426 The Russian Revolution (3:3:0) Prerequisite: 45 credits or permission of instructor. Era of revolutionary activity from 19th century to end of 1920s, with emphasis on Russian Revolutions of 1917. Explores why revolutionary situation developed; political, social, and cultural issues at stake; why it took various forms; and revolution’s contribution to nature of Soviet state and post-Soviet problems.

431/ENGL 431/FREN 431 Medieval Intellectual Topics (3:3:0) Selected topics in intellectual history of Middle Ages. Topics vary, depending on discipline of instructor. May be taken for credit by English or history majors.

435 Society and Culture in Early Modern Europe (3:3:0) Examines social and cultural lives of Europeans from end of Middle Ages to Industrial Revolution. Emphasizes popular and elite culture, and bridges and interrelationships between them. Focuses on religious, artistic, literary, and recreational behavior. Covers political activity and riots, strikes, royal receptions, and rituals.

436 European Society and Culture: 19th and 20th Centuries (3:3:0) Examines major cultural trends in Europe since French Revolution. Major themes include romanticism; socialism; Marxism; and social effect of modernization, science, and societies.

455/COMM 455 History of Print Journalism (3:3:0) Prerequisite: 3 credits in COMM or HIST courses. Development of print journalism from inception to present, with emphasis on interaction of technology, audience, and government intervention. Topics include birth of press; development of modern newspaper and American development, including Revolutionary and Civil wars; rise of independent press; and yellow journalism.

460 Modern Iran (3:3:0) Prerequisite: 45 credits or permission of instructor. Modern Iran, from 1800 to present, in context of several broad themes: institutional structure of state; role of great powers in Iran and Iranian response to economic, military, technological, and ideological challenge posed by West; interaction of religion and other ideologies and politics; economic development and impact on politics and society; and ways historians have sought to understand and interpret modern Iranian history.

461 Arab-Israeli Conflict (3:3:0) Prerequisite: 45 credits or permission of instructor. Some knowledge of history of Middle East since World War I strongly advised. Overview of history of Arab-Israeli conflict. Examines conflict from various perspectives: conflict over land and between competing nationalisms and identities; in terms of national interests of various states, including Israelis and Palestinians as well as other Arab governments and great powers; and in terms of peace making and conflict resolution.

462 Women in Islamic Society (3:3:0) Prerequisite: 6 credits of history or permission of instructor. Surveys history of women in Islamic society from rise of Islam to present day. Examines historical processes that affected role and status of women in society, and specific topics around which issues of gender status and identity coalesced, especially in modern period.

465 The Middle East in the 20th Century (3:3:0) Prerequisite: 6 credits of history or permission of instructor. Political, social, and cultural history of Middle East since World War I. Emergence of Israel, Arab nationalism, and political and economic influence of Middle East in world affairs.

466 Origins of Conflict in Southern Africa (3:3:0) Explores historical origins of conflict in South Africa, focusing on themes of economic change, cultural interaction, and political consolidation during past five centuries.

480 Alexander the Great (3:3:0) Rise of Persia, Persian wars with Greece, subjugation of Greece by Philip II of Macedonia, and Alexander the Great and his conquest of Persian empire.

490, 491 Honors Directed Readings, Honors Directed Research (3:0:0), (3:0:0) Prerequisite: admission to history honors program and permission of instructor. Students must have completed at least one course in the field, or with the professor, chosen for these honors courses. The 3 reading credits should be taken before 3 research credits, though they may be taken concurrently. Either may be taken concurrently with HIST 499.Linked, individualized courses, usually given by same instructor. HIST 490 involves directed readings; HIST 491 culminates in research paper related to subject of readings.

498 Directed Readings/Research in History (1–3:0:0) Prerequisites: history majors with 90 credits and permission of instructor. Readings, research conducted on individual basis in consultation with instructor. Student may not present more than 3 credits for graduation credit.

499 Senior Seminar in History (3:3:0) Prerequisite: history majors with 90 credits, HIST 300, and completion or concurrent enrollment in all university general education courses. Research on specialized historical topic culminating in seminar paper and oral presentation. Synthesis course; students expected to integrate knowledge and skills acquired in general education courses. Subject determined by instructor. Student may present no more than 3 credits for graduation credit. Must receive passing grade to graduate with BA in history. Not offered in summer.
510 Approaches to Modern World History (3:3:0) Introduces historical study of world beyond Europe and United States. Students read major theoretical works and case studies of particular regions. Examines imperialism, national identity, and various forms of popular resistance; familiarizes students with range of scholarly approaches, including world systems theory and subaltern studies.

523 Issues in American History (3:3:0) Open to advanced undergraduates and graduates. Reading, analysis of selected problems. Topic determined by instructor. Course may be repeated when content differs.

524 Issues in European History (3:3:0) Open to advanced undergraduates and graduates. Reading, analysis of selected problems. Topic determined by instructor. Course may be repeated when content differs.

525 Problems in Latin American History (3:3:0) Analysis of selected problems. Emphasizes reading and discussion of historical interpretations, and development of bibliography. Course may be repeated when content differs.

535 Problems in Comparative World History (3:3:0) Investigates selected problems in global and comparative history, covering multiple countries or world regions. Course may be repeated when content differs.

537 Problems in Middle Eastern History (3:3:0) Prerequisite to 600-level courses: graduate standing. Analyzes selected problem. Emphasizes reading and discussion of historical interpretations, and development of bibliography. Course may be repeated when content differs.

585 Problems in Middle Eastern History (3:3:0) Survey of U.S. history prior to 1877. Designed for individuals entering the graduate program who need to strengthen preparation in area, or who seek to enhance knowledge of latest interpretations in field. Stresses factual knowledge and its interpretation.

601 Themes in U.S. History I (3:3:0) Survey of European history from 1500 to 1815. Designed for individuals entering graduate program who need to strengthen preparation in this area, or who seek to enhance knowledge of latest interpretations in field. Stresses factual knowledge and its interpretation.

602 Themes in U.S. History II (3:3:0) Continuation of HIST 601.

605 Themes in European History I (3:3:0) Survey of European history from 1500 to 1815. Designed for individuals entering graduate program who need to strengthen preparation in this area, or who seek to enhance knowledge of latest interpretations in field. Stresses factual knowledge and its interpretation.

606 Themes in European History II (3:3:0) Survey of European history from 1815 to present. Designed for individuals entering graduate program who need to strengthen preparation in this area, or who seek to enhance knowledge of latest interpretations in field. Stresses factual knowledge and its interpretation.

610 The Study and Writing of History (3:3:0) Methodology of the historian including techniques of research, use of documentation and other sources, development of bibliography, and synthesis of material.


615 Problems in American History (1–6:1–6:0) Readings and discussion of bibliographies, interpretations, and research trends in topics selected by instructor. Course may be repeated when content differs.

616 U.S. Westward Movement (3:3:0) Investigates continuity and change in American West. Topics include economic development, ethnicity, rural and urban life, and role of federal government.

617 Topics in the American Civil War Era (3:3:0) Joint project of instructor and students into various aspects of common topic in Civil War era, with emphasis on historiography and historical method.

618 The Age of Jackson, 1815–1854 (3:3:0) Survey of social, cultural, intellectual, economic, and political changes in United States during period of rapid growth and expansion. Topics include second-party system; growth of sectionalism, nationalism, and expansionism; industrialization and spread of market economy; rise of romantic reform and evangelical religion; and growth of abolitionist and proslavery movements.

619 The Constitution, Civil Liberties, and the Supreme Court (3:3:0) Investigates evolution of civil liberties in American history, and interaction of three branches of government in applying various constitutional guarantees. Students read extensively in Supreme Court decisions and secondary literature, and undertake independent research.

620 Development of the Early Republic, 1783–1815 (3:3:0) Investigates breakdown of Confederation, Constitutional Convention, and role of revolutionary ideology of republicanism. Discusses leadership and policies of republic in hostile international context. Students read extensively in monographic literature, and prepare research paper.

621 Virginia and the American Revolution (3:3:0) Detailed examination of Virginia society on eve of American Revolution, and role in events from 1750 to 1789. Combines lectures, discussion of major themes, ideas, and personalities.


623 Recent U.S. History, 1945 to Present (3:3:0) Selected political, social, economic, diplomatic, and cultural forces that shaped the post-World War II American experience.

624 U.S. Diplomatic History (3:3:0) Study of selected issues in American foreign relations, and changing historical interpretations of American diplomacy.
626 Approaches to American Culture (3:3:0) Focuses on various approaches historians have taken to history of American culture: questions they asked, assumptions they made, disciplinary tools they used, and types of materials they analyzed. Concentrates on patterns of culture, and what they say about American past and present.


628 Immigration and Ethnicity in the United States (3:3:0) Examines immigration and ethnicity in America since 1840. Considers why immigrants came, from where, under what circumstances, and how they adapted. Examines immigration policy and American attitudes toward immigration and ethnicity. Conducted as readings colloquium.

629 The Gilded Age and Progressive Era (3:3:0) Examines history of United States from 1877 to 1918, with attention to history of reform movements and politics, and social history of the period. Familiarizes with major issues and historical literature of the period.

630 U.S. Women’s History (3:3:0) Wide-ranging survey of burgeoning field of women’s history, emphasizing critical evaluation of sources and interpretation. Readings represent variety of approaches, which may include material culture studies, medical history, history of sexuality, political history, and social and cultural history.

631 Era of the American Revolution (3:3:0) Examines history and historiography of revolutionary era, with special emphasis on social and ideological interpretations of period. Includes events leading to War for Independence, war itself, and social and political effects of war on American society.

632 Reconstruction (3:3:0) Examines panoply of political, social, economic, and constitutional concerns from 1863 to 1880, as North and South struggled over outcome of Civil War. Addresses political institutions and power in postwar North and South, and place of former slaves in society, politics, and economy.

634 Interwar America: 1918–1939 (3:3:0) Considers issues of United States between the two world wars. Explores various ways issues complemented and contradicted each other in rich and complex historical era.

635 Problems in European History (1–6:1–6:0) Investigates selected problems. Readings, discussions, development of bibliographies. Primary sources used where possible. Course may be repeated when content differs.

636 Political Culture in Twentieth-Century Germany and Austria: Continuities and Discontinuities (3:3:0) Recent interpretations of key political events of 20th century. Asks if there were fundamental continuities in structure of German and Austrian society that can be observed throughout the period under review.


638 Western Europe in the Post-War Period (3:3:0) Examines process of reconstruction, reconciliation, and integration in Western Europe in 20 years after World War II. Conducted as readings colloquium.

639 Society and Politics in Western Europe, 1750–1914 (3:3:0) Focuses on changes in social conditions and ramifications in political life. Attention to urbanization of workers, changes in peasantry, growth of middle classes, decline of nobility, and major political developments and expansion of liberal reforms.

640 Metropolitan Cities of Europe in the Nineteenth and Twentieth Centuries (3:3:0) Studies individual cities, and investigates particular cities in depth. Considers economic, social, cultural, and political features of urban life.

642 Humanism and the Renaissance (3:3:0) The Renaissance as a unique period in European cultural history from ca. 1350 to 1520. Concentrates on Italian situation as standard, with consideration given to manifestations of Renaissance in northern Europe, especially Germany, until Reformation. Focuses on recent studies of political, social, intellectual, and religious changes. Students write class reports and a larger bibliographic paper.

643 Religion and Society in the Reformation Era (3:3:0) The Reformation, ca. 1500 to 1650, was a time of major religious, intellectual, social, and political upheaval in European history. Investigates reasons for changes, and effects on European society. First half focuses on Germany, but major events throughout Europe are studied.

644 Society and Culture in Early Modern Europe (3:3:0) Overview of most recent historical work on social and cultural history of premodern West, ca. 1400 to 1800. Uses theoretical approaches and empirical methodologies of other disciplines, especially social anthropology, sociology, and literary theory, to shed new light on popular culture, class, manners, taste, rituals, religion, language, gender, and the state. Formulates new topics of research and poses new questions, and suggests new approach to more traditional topics such as politics, religion, and ideas.

645 The Russian Revolution and the Origins of the Soviet State (3:3:0) Period between 1890 and 1924 with concentration on sources of Bolshevism, problems of old regime as they led to revolutions of 1905 and 1917, and establishment of new regime and its survival in environment of foreign and civil war.

689 Teaching and Learning History in the Digital Age (3:3:0) Prerequisite: graduate standing. Examines what happens when instructors integrate new media technology into history classroom. Includes consideration of learning theory, new media theory, and an in-depth examination of state-of-the-art in practice. In the final third of semester, students produce practicum that is either working history teaching web site or concept paper for site, depending on student’s degree of technical sophistication. No prior facility with information technology required. Course appropriate for graduate students working as teachers or planning career in teaching.

690 The Administration of Archives and Manuscripts (3:3:0) Prerequisite: 6 credits of U.S. history, or permission of department. Introduces principles and practices of managing records and administering archival and manuscript collections, public and private. Designed for graduate students with special interest in historical sources as well as for those specializing in applied history.
691 Museum Studies (3:3:0) Prerequisite: 6 credits of U.S. history or permission of department. General introduction to museums of history and museum studies in the United States, intended for interested citizen as well as for assistance to students in course and career choices. Explores development, present state, and future possibilities of U.S. museums, with some reference to international developments.

692 Historical Editing (3:3:0) Introduces fundamentals of historical editing of documents, including microform, word processing, and computer techniques. Designed for those seeking introduction to various areas of applied history, and those intending to edit historical documents for publication.

693 Historic Preservation (3:3:0) Prerequisite: 6 credits of U.S. history or permission of department. General introduction to historic preservation in the United States, intended for interested citizen and to assist students in course and career choices. Explores development, present state, and future possibilities of historic preservation in the United States, with some reference to international aspects of preservation.

695 History Symposium (3:3:0) Subject of academic and community interest pursued through discussions and lectures by distinguished guest instructors.

696 Clio Wired: An Introduction to History and New Media (3:3:0) Students with limited computer competency should consult department before enrolling. Introduces changes that new media and technologies are bringing to how we research, write, present, and teach about the past. Students explore theoretical and historical issues as well as learn hands-on skills in digital history.

697 Creating History in New Media (3:3:0) Prerequisites: HIST 696 or permission of instructor. Seminar; students create original historical projects in digital media.

711 Research Seminar in U.S. History (3:3:0) Prerequisite: HIST 610 or permission of department. Research in specialized topics using primary sources. Maximum 6 credits may be earned.

731 Research Seminar in European History (3:3:0) Prerequisite: HIST 610 or permission of department. Research in specialized topics using primary sources. Maximum 6 credits may be earned.

751 Research Seminar in Comparative World History (3:3:0) Prerequisite: HIST 610 or permission of department. Research seminar requiring comparative research and analysis. Organized around significant topic or theme in field of world history. Topics vary from year to year. Maximum 6 credits may be earned.

790 Comprehensive Readings in U.S. History (3:0:0) To be taken in final semester of program. Integrates past work in major field and fills gaps before comprehensive exam. After a review of graduate experience, student and instructor design reading list to round out preparation for exam.

791 Comprehensive Readings in Comparative World History (3:0:0) To be taken in final semester of program. Integrates past work in major field and fills gaps before comprehensive exam. After a review of graduate course work, student and instructor design reading list to round out preparation for exam.

792 Comprehensive Readings in European History Since 1500 (3:0:0) To be taken in final semester of program. Integrates past work in major field and fills gaps before comprehensive exam. After review of graduate experience, student and instructor design reading list to round out preparation for exam.

794 Internship in Applied History (3–6:0:0) Prerequisites: 3 credits of applied history in appropriate area and 12 credits in major field, or permission of internship director. All internship placements must be approved by the department to ensure suitability to student’s program. Introduces applied history through work and study at historical museum, site, library archive, editing project, or other approved agency.

796 Directed Readings (1–6:0:0) Independent reading on topic agreed to by student and faculty member. Maximum 6 credits may be earned.

798 Directed Research and Writing in History (3:0:0) Intended for students in department’s predoctoral track who are not writing master’s thesis. Goal is to produce substantial and original contribution to historical knowledge on model of article in scholarly journal.

799 Thesis (1–6:0:0) Master’s thesis research and writing under direction of faculty committee. May not be taken prior to successful completion of comprehensive exam. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study history. Program of studies designed by discipline director and approved by doctoral committee, which brings student to participate in research of discipline director and results in paper reporting original contributions of student. Enrollment may be repeated.

801 New Developments in History (3:3:0) Prerequisite: doctoral standing; or permission of instructor and HIST 610 or equivalent. Survey of current developments in historical analysis and methodology.

802 Readings for Doctor of Arts in Community College Education (variable credit) Prerequisite: admission to doctor of arts in community college education program to study history. Intensive reading of recent scholarship in broad areas of historical study. With advisor, students develop readings list and define at least three areas in which to prepare readings courses. May be repeated.

803 Doctoral Readings for Major Field (3:0:0) Independent readings for PhD students on topic agreed on by student and instructor, taken in preparation for completing major field exam. Should be broadly comprehensive of field, and cover major historical themes and historiographical debates.

804 Doctoral Readings for Minor Field (3:0:0) Prerequisite: doctoral standing. Independent readings for PhD students on topic agreed on by student and instructor, taken in preparation for completing minor field statement. Designed to help student master literature of subfield that is subject of field statement.

810 History Doctoral Colloquium (1:1:0) Prerequisite: doctoral standing. Introduces array of scholars and scholarship through discussions of innovative historical events, important theories, and significant methodological breakthroughs in history. May be taken for credit 6 times. Graded S/NC.
811 Doctoral Research Seminar (3:0:0) Prerequisite: doctoral standing. Students pursue research projects in their areas of specialization.

998 Doctoral Dissertation Proposal (1–6:0:0) Prerequisite: advancement to candidacy. Work on research proposal that forms basis for doctoral dissertation. May be taken for maximum 6 credits. Graded S/NC.

999 Doctoral Dissertation Research (1–12:0:0) Prerequisite: completion of HIST 998. Doctoral dissertation research and writing under direction of student’s dissertation committee. Graded S/NC.

Honors Program in General Education (HNRS)

College of Humanities and Social Sciences

Only students enrolled in the Honors Program are eligible to take HNRS courses. HNRS 110 must be taken in the first semester.

110 Introduction to Research (4:3:1) Prepares students in humanities and social sciences research practices. Offers students the opportunity to learn about research practices in the natural sciences, mathematics, economics, management, and law. Students learn how to choose and focus a research question, find and analyze sources, organize evidence in an essay shape by an original these, write clearly, and address an audience of scholars.

122 Reading the Arts (3:3:0) Prerequisite: HNRS 110. Explores relationship of parts to whole in work of art, connections among different art forms, and links between art and its historical context.

125 A Liberal Arts Approach to Calculus (3:3:0) Assumes understanding of basic algebra and functions. Studies exponential models and develops mathematical concepts of limit and infinity including the topic of derivatives.

130 Conceptions of Self (3:3:0) Drawing from appropriate works in social sciences, arts, and humanities, examines different conceptions and definitions of the self from diverse cultures and historical contexts.

131 Contemporary Society in Multiple Perspectives (3:3:0) Prerequisite: HNRS 110, 130. Explores methods and perspectives in social sciences and humanities to evaluate contribution of different disciplines to understanding significant social issues and their global ramifications and our responsibilities as citizens of the world.

226 Topics in Quantitative Analysis (3:3:0) Prerequisite: HNRS 125 or permission of Honors program. Studies selected topics of special interest to honors students with suitable preparation. For students who have taken calculus in high school. HNRS 226 is an alternative to HNRS 125.

227, 228 Scientific Thought and Processes I, II (4:3:3) Prerequisite: HNRS 227 is prerequisite for HNRS 228. Explores and integrates principles of classical and modern science through study of such topics as cosmology, evolution, ecology, mechanics, relativity, and quantum physics. Includes a weekly lab session.

230 Cross-Cultural Perspectives (3:3:0) Prerequisite: HNRS 110. Enables students to broaden cultural horizons and understand human behavior by studying societies in depth and in comparison.

240 Reading the Past (3:3:0) Prerequisite: HNRS 110. Considers constructions of historical narratives by examining significant current topics such as revolution, race, empire, and religion over time. Considers how public narratives about history are constructed. Provides context for HNRS 353.

353 Technology in the Contemporary World (3:3:0) Prerequisite: HNRS 110, 240. Analyzes emergence and impact of specific technologies on contemporary cultures. Explores television, automobile, newspapers, Internet, and computer games from historical, scientific, political, economic, and global perspectives.

Information Security and Assurance (ISA)

Computer Science

522 Information Security Essentials (3:3:0) Prerequisites: an introductory information systems class or permission of instructor. This course covers basic concepts and techniques in applied information security. The course begins introducing the student to basic concepts of security including confidentiality, integrity, availability, and current concerns of anonymity, privacy and safety of web-based transactions, forensics investigations etc. It also covers the main safeguards available in security such as authentication, authorizations, network security. The course shows how these techniques are applied to the concerns of business, health care, nursing, sociology and law. This course does not count for MS programs in the Computer Science Department.

562 Information Security Theory and Practice (3:3:0) Prerequisites: INFS 501, 515, 519, and SWE 510, or permission of instructor. This course is a technical introduction to the theory and practice of information security. It serves as the first security course for the MS-ISA degree, is required as a prerequisite for all subsequent ISA courses (at the 600 and 700 levels) and subsumes most topics covered by the CISSP examination. It also serves as an entry-level course available to non-ISA students, including MS-CS, MS-ISE, and MS-SWE students.

563 Fundamentals of Systems Programming (3:3:0) Prerequisites: An intermediate programming language course or permission of instructor. Introduces systems and network programming for UNIX and Windows using lectures and hands-on Labs. Covers ANSI C programming, system libraries and APIs, forking and threads, inter-process communications, synchronization, Windows API, and code debugging.

564 Security Laboratory (3:3:0) Prerequisites: ISA 562 and ISA 563 or permission of instructor. This course provides hands-on experience in configuring and experimenting with commodity-networked systems and security software in a live laboratory environment, with the purpose of understanding real-world security threats. This course will take both offensive and defensive approaches and expose students to a variety of real-world attacks, including viruses, worms, rootkits, and botnets. Possible mitigation and defending mechanisms, such as firewalls and intrusion detection software, will also be covered.

640 Programming Language Security (3:3:0) Prerequisites: CS 540 and ISA 562 or permission of instructor. This course describes language-based techniques to provide security for executing code. Topics include a discussion on the need for and the advantages of language-based security, security...
principles and properties, memory and type safety, encapsulation and access control, certifying compilers and their verification methods, security types and information flow, and applying programming language-inspired techniques to enforce security in the semantic-web based languages.

650 Security Policy (3:3:0) Prerequisites: ISA 562 or permission of instructor. The course focuses on security policy and its management for information systems having national and international connectivity. Issues include legal, international, cultural, and local factors. Students are expected to participate regularly in presenting material, in discussion of recent security issues, and by writing short papers on major current issues.

652 Security Audit and Compliance Testing (3:3:0) Prerequisites: ISA 562 or ISA 532 or permission of instructor. This course presents the fundamental concepts of the IT-security audit and control process that is being conducted in a plethora of environments, including government, financial industry, and healthcare industry. The goal of this course is to enable the students to structure and perform audits based on the specifications of Sarbanes-Oxley, HIPAA, and FISMA audit programs. The course covers all the CISA certification requirements in depth and the students completing the course are encouraged to attempt the certification exam on their own.

656 Network Security (3:3:0) Prerequisites: ISA 562 and CS 555 or permission of instructor. This course is an in-depth introduction to the theory and practice of network security. It assumes basic knowledge of cryptography and its applications in modern network protocols. The course studies firewalls architectures and virtual private networks and provides deep coverage of widely used network security protocols such as SSL, TLS, SSH, Kerberos, IPSec, IKE, and LDAP. It covers countermeasures to distributed denial of service attacks, security of routing protocols and the Domain Name System, e-mail security and spam countermeasures, wireless security, multicast security, and trust negotiation.

673 Operating Systems Security (3:3:0) Prerequisites: CS 571 and ISA 562 or permission of instructor. This course covers fundamentals and advanced topics in operating system (OS) security. It includes OS-level security mechanisms and policies in investigating and defending against real-world attacks on computer systems, such as self-propagating worms and large-scale botnets. Basic OS security techniques, such as logging, system call auditing, and memory protection, will be discussed. Recent advanced techniques, such as honeypots and honeyfarms, system randomization, vulnerability fingerprinting, and virtualization, will also be introduced.

674 Intrusion Detection (3:3:0) Prerequisites: ISA 562 and 650 or permission of instructor. Studies methodologies, techniques, and tools for monitoring events in computer system or network, with the objective of preventing and detecting unwanted process activity and recovering from malicious behavior. Topics include types of threats, host-based and network-based information sources, vulnerability analysis, denial of service, deploying and managing intrusion detection systems, passive vs. active responses, and designing recovery solutions.

681 Secure Software Design (3:3:0) Prerequisite: SWE 619 or permission of instructor. Theory and practice of software security, focusing in particular on some common software security risks, including buffer overflows, race conditions and random number generation, and the identification of potential threats and vulnerabilities early in the design cycle. The emphasis is on methodologies and tools for identifying and eliminating security vulnerabilities, techniques to prove the absence of vulnerabilities, and ways to avoid security holes in new software and on essential guidelines for building secure software. Explores how to design software with security in mind from the ground up and integrate analysis and risk management throughout the software life cycle. This course is also cross-listed as SWE 781.

697 Topics in Information Security (3:3:0) Prerequisite: permission of instructor. Special topics in information security and assurance not occurring in regular ISA sequence. May be repeated for credit when distinct offerings of course differ in subject.

763 Security Protocol Analysis (3:3:0) Prerequisites: ISA 650 or permission of instructor. This course teaches how to design, understand, verify, and test communication protocols so that they meet their objectives of recognizing the basic components of a communication protocol; specifying security properties accurately; modeling actors and mal-actors against which a protocol ought to be secure; discussing verification and testing methods and their limitations by ensuring that the specified protocol satisfies stated security objectives in the presence of intended mal-actions; designing a medium-sized protocol that satisfies a specification of requirement; using existing tools to specify and verify security protocols; and testing protocols for satisfying their security objectives.

764 Security Experimentation (3:3:0) Prerequisite: ISA 562, ISA 564, ISA 674, or permission of instructor. This course teaches how to conduct security experiments and how to empirically demonstrate, validate, and evaluate security vulnerabilities, exploits, and defense mechanisms. By the end of the course, students will gain a deeper understanding and first-hand experience on capturing packets of interests from both wired and wireless networks, and replaying interested network flows and how shellcode various buffer overflows attacks, worms, spyware, rootkits, botnets, anonymous communication and traceback mechanisms work.

765 Database and Distributed Systems Security (3:3:0) Prerequisites: INF 614 and ISA 562, or permission of instructor. Science and study of methods of data protection: discretionary and mandatory access controls, secure database design, data integrity, secure architectures, secure transaction processing, information flow controls, inference controls, and auditing. Covers security models for relational and object-oriented databases; security of databases in distributed environments; statistical database security; and survey of commercial systems and research prototypes.

767 Secure Electronic Commerce (3:3:0) Prerequisites: ISA 562 and 656, or permission of instructor. Cryptography review, cryptographic protocols, secure electronic transactions, public key certificates and infrastructures, authentication and authorization certificates, secure credential services and role-based authorization, mobile code security, security of agent-based systems, electronic payment systems, intellectual property protection, secure time stamping and notarization.

785 Digital Forensics (3:3:0) Prerequisites: ISA 562, CS 571 and CS 555 or permission of instructor. This course provides an in-depth introduction to the principles, techniques and tools in digital forensics. While it covers current established techniques, tools and practice of digital forensics, it...
focuses on the following fundamental aspects of digital forensics: (1) fundamental and practical limitations of current forensics techniques; (2) countermeasures against digital forensics; and (3) open problems in current digital forensics.

796 Directed Readings in Information Security (3:3:0)
Prerequisite: graduate standing in information security and assurance, with at least 12 prior credits in MS. To register, students must complete independent study form, available in department office. It must be initiated by faculty sponsor and approved by department chair. Research and analysis of contemporary problem in information security. Prior approval required by faculty sponsor who supervises student’s work. Written report also required. Maximum 6 credits may be earned.

797 Advanced Topics in Information Security (3:3:0)
Prerequisite: permission of instructor. Special advanced topics not occurring in regular ISA sequence. May be repeated for credit when distinct offerings of course differ in subject.

798 Research Project (3:3:0)
Prerequisite: 18 credits applicable toward MS. To register, students must complete independent study form, available in department office. It must be initiated by faculty sponsor and approved by department chair. Research project chosen under guidance of full-time graduate faculty member, resulting in written technical report. Prior approval required by faculty sponsor who supervises student’s work.

799 Thesis (6:3:0)
Prerequisite: 18 credits applicable toward MS or permission of instructor. To register, students must complete independent study form, available in department office. It must be initiated by faculty sponsor and approved by department chair. Original or expository work chosen and completed under supervision of graduate faculty member, which results in technical report accepted by three-member faculty committee. Report must be defended in oral presentation.

Information Systems (INFS)

Computer Science

310/IT 308 Program Structure and Design for Business Applications (3:3:0)
Prerequisite: computer programming course in high school or college. Teaches structured programming and design using high-level language. Focuses on program design, coding, debugging, and documentation.

311/IT 314 Database Management (3:3:0)
Prerequisite: computer programming course in high school or college. Studies logical and physical characteristics of data and their organization in computer processing. Emphasizes data as resource in computer applications; examines database management system (DBMS) software and its design, implementation, and use.

312 Computer Architecture and Operating Systems (3:3:0)
Prerequisite: INFS 310 or CS 112. Introduces computing system hardware components, architecture, organization, and operating system software concepts. Provides basic experience in assembly language programming for modern microprocessors, and examines techniques for system evaluation and selection.

315 High-Level Programming Languages (3:3:0)
Prerequisite: INFS 310 or CS 112. Studies structure and application of high-level languages by stressing design and implementation of data types, data structures, and algorithms. Includes computing lab. Credit does not count toward requirements for major in computer science.

316 Software Systems Engineering (3:3:0)
Prerequisite: INFS 310 or CS 211. Studies programming environments, including software tools and control of software development for large information systems engineering projects.

462/IT 462: Information Security Principles (3:3:0)
Prerequisite: IT 212 or equivalent. Studies security policies, models, and mechanisms for secrecy, integrity, availability and usage controls. Topics include models and mechanisms for mandatory, discretionary and role-based access controls; authentication technologies; control and prevention of viruses and other rogue programs; common system vulnerabilities and countermeasures; privacy and security policies and risk analysis; intellectual property protection; and legal and social issues.

498 Independent Study in Information Systems Engineering (1–3:0:0)
Prerequisite: 60 credits; must be arranged with instructor and approved by department chair before registering. Directed self-study of special topics of current interest in INFS. May be repeated for maximum 6 credits if topics substantially different.

499 Special Topics in Information Systems Engineering (3:3:0)
Prerequisites: 60 credits, and permission of instructor. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics are substantially different.

501 Discrete and Logical Structures for Information Systems (3:3:0)
Prerequisites: one programming course, and 6 credits of college math. Relational database management systems. Covers logical and physical database design, query languages, and databases programming, and examines commercial systems. Computing lab.

514 Database Design and Management (3:3:0)
Prerequisites: one programming course, and 6 credits of college math. Relational database management systems. Covers logical and physical database design, query languages, and databases programming, and examines commercial systems. Computing lab.

515 Computer Organization (3:3:0)
Prerequisite: undergraduate courses or equivalent knowledge in structured programming in a high-level language. Computer hardware organization: arithmetic and logical operations; combinational and sequential logic; machine representation of numbers, characters, and instructions; addressing techniques; microprogramming; reduced instruction set computers. Also covers symbolic assembly language and interrupts and input/output organization. Credit cannot be applied to any graduate degree in IT&E or the BS degree in computer science.

519 Program Design and Data Structures (3:3:0)
Prerequisite: SWE 510 or equivalent knowledge of object-oriented programming in Java. Studies fundamentals of data structures and algorithms applied in programming solutions to application problems. Stresses programming in modern high-level language. Laboratory required. Credit cannot be applied to any graduate degree the Volgenau School.
524 Database Management Essentials (3:3:0) Prerequisites: one programming course and six credits of college math. Relational database management systems. Covers logical and physical database design; query languages and database programming; and examines commercial systems. Computing lab. This course does not count towards MS programs offered in the Computer Science Department.

565 Database and Distributed System Security Principles (3:3:0) Prerequisite: permission of instructor. Introduces information and distributed system security fundamentals. Topics include notions of security, threats and attacks; legal-ethical issues; security evaluation; data models, concepts, and mechanisms for database and distributed system security; inference in statistical databases; basic issues in operating system, application and network security.

612: Principles and Practices of Communication Networks (3:3:0) Prerequisites: INFS 501, 515, 519, and SWE 510, or equivalent. Introduces principles of computer networks and applications to Internet. Discusses details of layering, protocols, performance, resource allocation, management, security and other contemporary issues related to networks. Examples of course material are protocols such as HTTP(S), DNS, TCP/IP, RSVP, SNMP, algorithms such as Dijkstra’s link state routing, security measures such as firewalls and encryption, principles behind them and analysis of performance. No substitutions can be made for this class.

614 Database Management (3:3:0) Prerequisites: INFS 501, 515, 519, and SWE 510, or equivalent. Introduces database systems, emphasizing study of database models and languages and practice of database design and programming. Topics include Entity-Relationship model, relational model and its formal query languages, SQL, theory of relational database design, and object-oriented and logic-based databases. Requires computing lab. No substitutions can be made for this class.

622 Information Systems Analysis and Design (3:3:0) Prerequisites: INFS 501, 515, and 519, or equivalent. Integration of computing technologies, systems analysis, system design practices, and management criteria in the design of large-scale information management and decision support systems. Includes cases, computing lab.

623 Classical and Web Information Retrieval (3:3:0) Prerequisites: INFS 501, 515, and 519, or equivalent. Study of models and methods for storage and retrieval of unstructured information, such as documents. Topics include information retrieval models, automatic indexing, document clustering, statistical thesauri, search techniques, performance measurement, answer visualization, and search engines for retrieval from the web.

640 Introduction to Electronic Commerce (3:3:0) Prerequisites: INFS 501, 515, and 519; and SWE 510 or equivalent. Studies electronic commerce from both managerial, technical perspectives. Topics include e-commerce models and concepts; Internet and web protocols and infrastructure; e-commerce marketing and branding; security protocols and standards; e-commerce payment systems; and case studies of business-to-consumer, business-to-business, consumer-to-consumer, and e-government.

650 Development Frameworks for Information Systems Applications (3:3:0) Prerequisites: INFS 501, 515, and 519; and SWE 510 or equivalent. Principles and methods of building commercial applications within high-level framework. Tools for system construction are considered, along with variety of programming languages, component integration, and design methods. Applications investigated through program construction in varied settings, such as database systems, graphical user interfaces, and prototyping. Requires programming projects.

697 Topics in Information Systems (1–6:1–6:0) Prerequisite: permission of instructor. Presents special topics in information systems not occurring in regular INFS sequence. May be repeated for credit when distinct offerings of course differ in subject.

740 Database Programming for the World Wide Web (3:3:0) Prerequisite: INFS 614. Information systems accessible through web and Internet are becoming prevalent. Course focuses on technologies and industry standards for accessing and manipulating persistent data that are suitable for web applications.

750 Application Frameworks for Windowed Information Systems (3:3:0) Prerequisites: INFS 650. Studies use of object-oriented visual application frameworks in building event-driven windowed systems. Topics include windowed systems as event-driven systems; central architecture of windowed systems and encapsulation of windowed architectures by object-oriented frameworks; and analysis and design of windowed applications. Illustrates various features of visual application frameworks using variety of information systems applications. Programming projects.

755 Data Warehousing and Mining (3:3:0) Prerequisite: INFS 614 or equivalent. Covers techniques for designing and maintaining large data warehouses. Topics include OLAP, star schemas, data integration, data cleaning, maintenance of views in presence of updates to sources, and query processing of warehouses. Second part of course focuses on mining data from warehouses. Topics include data mining techniques such as classification, clustering, association rules, mining of time-series and complex data. Emphasizes scalability over large data sets.

760 Advanced Database Management (3:3:0) Prerequisite: INFS 614. Study of advanced database models and languages, database design theory, transaction processing, recovery, concurrency, distributed database, and security and integrity. Discusses recent developments and research directions.

764 Object-Oriented Database Systems (3:3:0) Prerequisite: INFS 614 or CS 650, or permission of instructor. Knowledge of object-oriented programming language such as C++ highly desirable. Studies concepts and systems of object-oriented (OO) databases. Topics include OO design, data models, query languages, new data types, and implementation. Also includes detailed case study and project performed on OO-DBMS. Surveys various prototypes, commercially available systems, and emerging standards.

770 Knowledge Management for E-Business (3:3:0) Prerequisite: INFS 622 or permission of instructor. Addresses knowledge management (KM) from managerial, technical viewpoints in context of large organizations doing business over web and Internet. Topics include KM life cycle for knowledge creation, aggregation, dissemination, and sharing; ontology modeling, design, and engineering; role of standards such as XML, RDF, web services, and semantic web for e-business; business rules and reasoning engines; and digital rights management for e-business.
772 Intelligent Agents and the Semantic Web (3:3:0)  
Prerequisite: INFS 614. Course covers the role of intelligent agents in cooperating to access, harvest, sift and winnow information and knowledge from the Semantic Web. Topics include agent architectures, practical reasoning and deductive agents, Beliefs-Desires-Intentions (BDI) framework for agent reasoning, commitments and actions; Semantic Web ontology languages, description logics, reasoning and rule languages; agent communication languages, protocols and standards.

774/IT 874 Enterprise Architecture (3:3:0)  
Prerequisite: INFS 622 or permission of instructor. This course presents the basic concepts and methodologies for the discipline known as Enterprise IT Architecting within a framework, structure, and methodology. Enterprise IT Architecting is a necessary step for designing and developing a system of information systems. It includes the definition of the business, work, functional, information and technical perspectives. As such, it is the enabling approach for the system development process that builds complex information systems.

785 Data Mining for Homeland Security (3:3:0)  
Prerequisite: INFS 755. Covers analytic techniques for investigative analysis. Topics include small world graphs as way to model groups and organizations, relational data mining with emphasis in predictive models, alias discovery techniques, and profiling.

790 Information Systems Policy and Administration (3:3:0)  
Prerequisite: completion of all core courses. Should be taken in final semester before graduation. Capstone course integrating technical and executive policy issues of information systems. Examines critical executive issues through case studies and comprehensive individual project. No substitutions can be made for this class.

795 Special Topics in Data Mining Applications (3:3:0)  
Prerequisite: INFS 755. Focuses on interdisciplinary applications of data mining. Topics selected from following: web and text data mining, e-commerce, bioinformatics, security and intelligence analysis, data mining of economical data. Each topic analyzed in depth; state-of-the-art techniques in application of data mining to field extensively covered.

796 Directed Readings in Information Technology (3:3:0)  
Prerequisite: graduate standing in information systems, with at least 12 prior credits in MS. To register, students must complete independent study form available in department office. It must be initialed by faculty sponsor and approved by department chairman. Research and analysis of contemporary problem in information system development. Prior approval required by faculty sponsor who supervises student’s work. Written report required. Maximum 6 credits may be earned.

797 Advanced Topics in Information Systems (3:3:0)  
Prerequisite: permission of instructor. Special advanced topics not occurring in regular INFS sequence. May be repeated for credit when distinct offerings of course differ in subject.

798 Research Project (3:3:0)  
Prerequisite: 18 credits applicable toward MS. To register, students must complete independent study form available in department office. It must be initialed by faculty sponsor and approved by department chairman. Research project chosen under guidance of full-time graduate faculty member, resulting in written technical report. Prior approval required by faculty sponsor who supervises student’s work.

799 Thesis (1–6:0:0)  
Prerequisite: 18 credits applicable toward MS. To register, students must complete independent study form available in department office. It must be initialed by faculty sponsor and approved by department chairman. Original or compilatory work evaluated by a committee of three faculty members.

Information Technology (IT)  
The Volgenau School of Information Technology and Engineering

101 Introduction to Information Technology (3:3:0)  
Introduces fundamental concepts that provide technical underpinning for state-of-the-art applications. Presents perspective on range of information technology. Historical development and social implications of efforts in information technology integral to course.

103 Introduction to Computing (3:1:2)  
Prerequisite: knowledge of high school algebra. Through lecture and laboratory practice, introduces nature and uses of computers. Studies widely used applications including word processing, spreadsheets, databases, and presentation software; laboratory projects required in these areas. Additional lectures address computer systems organization, computer communications and networking, legal and ethical considerations (including privacy, intellectual property, and appropriate uses of technology), effective presentation of information, computer security, artificial intelligence, and future of computing and the Internet.

108 Programming Fundamentals (3:2:1)  
Prerequisite: IT 103. Introduces programming fundamentals and presents software development process. Students learn to write programs in high-level, object-oriented language.

207 Applied IT Programming (3:3:0)  
Prerequisite: IT 108 or CS 112, or permission of instructor. Building on fundamentals of structured and object-oriented programming, this course covers client and server side scripting languages and an SQL database management system. Students will use open source software tools to develop database-enabled web applications.

208 Program Design and Data Structures (3:3:0)  
Prerequisite: IT 108, or permission of instructor. Fundamentals of data structures and analysis of algorithms. Large programs written in a modern, high-level programming language. Stresses abstraction, modular design, code reuse, and correctness.

212 Computer Hardware Fundamentals (3:3:0)  
This course explains the basic principles of how computers work. It provides a comprehensive understanding of the essential components associated with computers with a focus on PCs. Topics include history of computers, the microprocessor, motherboard, memory, graphics and sound adapters, input and output devices, and storage media. An overview of operating systems and other software, as well as the various methods used to connect computers to each other and the Internet, are presented. The course also addresses recent advances in computer architectures and computer hardware and how they affect computer performance. Presentations of actual hardware are included so that students can gain experience in identifying the various internal and external components of a PC.
213 Multimedia and Computer Graphics (3:2:1) Prerequisites: IT 103 and 108. Through lecture, class demonstration, class discussion, and hands-on lab experience, introduces multimedia and web computer graphics. Focuses on development of web-enabled multimedia applications from practical business perspective. Introduces and discusses technological, aesthetic, and human factors.

214 Database Fundamentals (3:3:0) Prerequisite: IT 103. Introduces relational database management systems and their applications. Students learn about types of databases, data modeling, designing relational databases, normalization and relationships, and recent trends in database management, including web applications. Students apply learned concepts using modern database application to create tables, queries, forms, and reports.

223 Information Security Fundamentals (3:3:0) Prerequisite: IT 103 or equivalent. Students cannot receive credit for both IT 221 and 223. Introduces concept of information security. Discusses need for organizational policy to define required services such as confidentiality, authentication, integrity, nonrepudiation, access control, and availability; and mechanisms to implement those services. Covers different types of security including physical security, computer security, and network security; common threats to and attacks against information systems, including accidental damage, identity theft, malicious software, and “spam”; and defensive measures.

300 Modern Telecommunications (3:3:0) Prerequisites: IT 101 or permission of instructor. Comprehensive overview, including current status and future directions. Topics include review of evolution of telecommunications; voice and data services; basics of signaling, digital transmission, network architecture, and protocols; local area, metropolitan, and wide area networks and narrow band ISDN; asynchronous transfer mode and broadband ISDN; and satellite systems, optical communications, cellular radio, personal communications systems, and multimedia services. Provides examples of real-life networks to illustrate basic concepts and gain further insight.

304 IT in the Global Economy (3:3:0) Prerequisite: IT 103 or equivalent. Students cannot receive credit for both IT 304 and CS 306. Explores how IT changed nature of society and contributed to evolution of global economy. Examines changing nature of work, education, and communication, and ethical issues such as intellectual property rights, computer-related crime, privacy concerns, and public policy issues.

308/INF5310 Event-Driven Programming (3:3:0) Prerequisite: IT 108 or CS 112 or permission of instructor. Building on the programming concepts covered in IT 108, this course focuses on graphical user interfaces. Students will design, develop, and document event-driven programs using an object-oriented language.

314/INF5 311 Database Management (3:3:0) Prerequisite: computer programming course in high school or college. Studies logical and physical characteristics of data and their organization in computer processing. Emphasizes data as resource in computer applications, and examines database management system (DBMS) software and design, implementation, and use.

331 Web I: Web Development (3:3:0) Prerequisites: IT 103, 207, and 213; or permission of instructor. Introduces the principles and techniques necessary for successful client-side web development. Topics such as XHTML, Cascading Style Sheets, JavaScript, DOM, XML, RSS, AJAX are presented. Students will learn to develop attractive and interactive web pages and applications and use client-side web-scripting languages to solve problems both with a text editor and more powerful WYSIWYG HTML editor.

332 Web Site Administration (3:3:0) Prerequisites: IT 331 and 341, or permission of instructor. Covers web server administration and web security, property sheets related to these sites and security features, hosting multiple web sites on same web server, associated performance issues, and application-level password security.

341 Data Communications and Network Principles (3:3:0) Prerequisites: IT 101, 108, and 212, and MATH 108; or permission of instructor. This course focuses on the primary aspects of data communications networking, including a study of the Open Systems Interconnection (OSI) and Internet models. Students will start at Layer 1 with the study of various Layer 1 interface and cabling configurations. They will construct and test various cables with connectors. Moving up the OSI layers, students will focus on IP network addressing, network design, and enhanced hands-on router and port configurations. They will also learn security protocols and do static routing, EIGRP, RIPv2, and OSPF configurations. Students will also develop Access Control Lists (ACLs) used in modern day networks as a prime method of controlling network security and implement the ACLs on laboratory networks. Concentration on layers 4 through 7 include studying TCP, UDP, data reliability, and error correction methods, on the ladder to the FTP, HTTP, SMTP, DNS, and TFTP protocols of Layer 7. This course is 50 percent lab work of configuration of routers and network design, implementation, and testing.

342 Operating Systems Fundamentals (3:3:0) Prerequisites: IT 101, 108, 212, and 341, or permission of instructor. Practices and procedures for installing and configuring modern operating systems, including user accounts, file, print, and terminal servers, mobile computing, and disaster recovery. Through practical lab sessions, students receive real-world experiences with multiple operating systems.

343 IT Resources Planning (3:3:0) Prerequisite: junior standing in BS in information technology program, or permission of instructor. Provides essential strategies and procedures for planning, organizing, staffing, monitoring, and controlling design, development, and production of system to meet stated IT-related need in effective and efficient manner. Fulfills writing-intensive requirement for BS in Information Technology.

353 Information Defense Technologies (3:3:0) Prerequisites: IT 101 (or equivalent), IT 103 (or equivalent), and IT 223. This course will examine and assess the role of information technology as a tool of warfare and civil defense. Topics will be discussed from both defensive and offensive perspectives and will include asset tracking, asymmetric warfare, network centric warfare, physical attacks, cyberterrorism, espionage, psycop, reconnaissance and surveillance, space assets, and applications of GPS and cryptographic technology. Students will research and write about the social, ethical, and political effects of such technology.

357 Computer Crime, Forensics, and Auditing (3:3:0) Prerequisites: IT 103 and 223. Students cannot receive credit
for both IT 222 and 357. Covers computer crime, relevant laws, agencies, and standards. Presents auditing, logging, forensics, and related software. Explores legal principles such as chain of evidence, electronic document discovery, eavesdropping, and entrapment. Students get hands-on experience with forensics tools.

362/STAT 362 Introduction to Computer Statistical Packages (3:3:0) Prerequisite: IT 250/STAT 250 or equivalent. Covers use of computer packages in statistical analysis of data. Topics include data entry, checking, and manipulation; and use of computer statistical packages for regression and analysis of variance.

366 Network Security I (3:3:0) Prerequisites: IT 108 or equivalent, and IT 223. Examines information security services and mechanisms in network context. Topics include symmetric and asymmetric cryptography; message authentication codes, hash functions and digital signatures; digital certificates and public key infrastructure; access control including hardware and biometrics; intrusion detection; and securing network enabled applications including e-mail and Web browsing.

413 Digital Media Editing (3:3:0) Prerequisite: IT 213. Examines three areas of digital media editing—tools for editing, content and logic decision process, and information technology used by major corporations for development and distribution—through video examples from entertainment industry and corporate productions as well as hands-on editing experience.

414/INF 414 Advanced Database (3:3:0) Prerequisite: IT 214 or equivalent. Explores advanced concepts of database modeling using enterprise-level database management system. Topics include object-oriented database processing, data integrity, transactions, locks, concurrency control, backup, recovery, optimization, data mining, Internet databases, server programming, and security.

415 Information Visualization (3:3:0) Prerequisite: IT 213. Provides an overview of information visualization applications in intelligence analysis, decision support systems, and network monitoring. Covers human factors, human interface with information, and current and future trends in information visualization. Students also learn to develop a rudimentary visualization application.

431 Web II: Advanced Web Development (3:3:0) Prerequisites: IT 108 and 331, or permission of instructor. Continuation of Web I. Rapid Application Development (RAD), client- and server-side scripting for user and database interaction. Students build skills in web application development using different technologies and frameworks. Topics such as session tracking/cookie management, privacy and integrity issues, and web services are also covered.

435 Applied Knowledge Technologies for the Semantic Web (3:3:0) Prerequisites: IT 331 or permission of instructor. Methods, languages, and tools related to the knowledge technologies for semantic web from an applied perspective. Combines survey lectures with indepth presentation of relevant issues and hands-on experience with existing technologies.

441 Network Servers and Infrastructures (3:3:0) Prerequisites: IT 341, MATH 108 and either 112 or 125, and junior-level standing; or permission of instructor. Covers IP networking concepts and practices for using DHCP, DNS, secure communication, routing, remote address services, web servers, and network connectivity between operating systems. Students learn TCP/IP, routing architecture, and understand application level services used in Internet.

Through networking lab sessions, students focus on using switches and routers connected in LANs and WANs. Term project.

445 Advanced Networking Principles (3:3:0) Prerequisite: IT341. This course focuses on Layer 2 and 3 of the OSI model and WAN technologies, Frame Relay and ISDN, complex router configurations of Variable Length Subnet Masking (VLSM), Classless Inter-Domain Routing (CIDR), Address Translation (NAT), Dynamic Host Configuration Protocol (DHCP), and study of Network Management Systems available for Data Communications Networks. Layer 2 involves Ethernet-switching components, including detailed hands-on configuration covering all aspects of switches using the command-line interface method.

455 Wireless Communications and Networking (3:3:0) Prerequisites: IT 300 and IT 341. This course covers the fundamental principles underlying wireless communications and networking. Topics include wireless transmission principles, protocols, satellite communications, cellular wireless networks, cordless systems, the wireless local loop, mobile IP, and wireless networking technologies, including IEEE 802.11 and Bluetooth standards.

462/INF 462 Information Security Principles (3:3:0) Prerequisite: IT212 or equivalent. Studies security policies, models, and mechanisms for secrecy, integrity, availability, and usage controls. Topics include models and mechanisms for mandatory, discretionary, and role-based access controls; authentication technologies; control and prevention of viruses and other rogue programs; common system vulnerabilities and countermeasures; privacy and security policies and risk analysis; intellectual property protection; and legal and social issues.

466 Network Security II (3:3:0) Prerequisites: IT 108 or equivalent, IT 223, 341, and MATH 112 or 125; or permission of instructor. Detailed study of certain symmetric and asymmetric cryptographic schemes; analysis of network data (including “packet sniffing”); security at different network layers (including IPSec, SSL/TLS, Kerberos); and secure e-commerce. Teaches principles of designing and testing secure networks, including use of network partitioning, firewalls, intrusion detection systems, and vulnerability assessment tools.

468 Cyber Security Capstone (4:4:0) Prerequisites: IT 108 or equivalent, IT 223, 341, and MATH 112 or 125; or permission of instructor. In-lab course on defending computer networks against accidental or deliberate damage. Examines hardening tools including firewalls, intrusion detection systems and network scanning devices; and protection against denial of service attacks, e-mail bombs, buffer overflow attacks and root kit attacks. Students harden a network and protect it against attack. Discusses ethical, legal implications of network attacks.

471 Applications of Digital Technologies (3:3:0) Prerequisites: IT 208 and 212, and high school algebra. Technologies and applications of digital components used in modern IT systems. Topics include microelectronics, including chip manufacturing and chip design, microprocessors on a chip, other digital components such as light emitting diodes (LED) and light sensor infrared technology, and
481 Concepts of Multimedia Processing and Transmission (3:3:0) Prerequisites: IT 108 and 213, or permission of instructor. Fundamentals of signal and image processing, including algorithms for signal processing that have applications to multimedia (voice and streaming video applications). Presents topics in voice coding and recognition, CD and DVD technology, streaming video, WANs and LANs, and videoconferencing technology.

484 Voice Communications Technologies (3:3:0) Prerequisites: IT 300 and IT 341. Examines current and emerging technologies for transmission of voice signals over telecommunications systems. Highlights significant differences between the requirements for voice and other forms of data. Topics provide a balance between traditional voice technologies and those that use data networks. Real-world implementations are analyzed to determine reliability, quality, and cost effectiveness. Includes lab experiments with analog and digital technologies.

488 Fundamentals of Satellite Communications (3:3:0) Prerequisites: MATH 108, and IT 300 and 341; or permission of instructor. Offers appreciation for space environment and implications for space-based operations. Discusses engineering, scientific, political, and legal aspects of space for exploration and exploitation. Presents different uses of space communications and future trends.

492 Senior Design Project I (3:3:0) Prerequisites: senior standing in BS information technology program, IT 343, and completion or concurrent enrollment in all other required general education courses. First of two capstone courses. Students work in teams on project proposals that demonstrate preparedness as practicing IT professional. Students must prepare business plan, software and hardware requirements, schedule and organizational plan, documentation plan, quality control, and testing strategy. Environmental impact and social implications of project must be evaluated. Students must show they have researched relevant laws, treaties, and ethical implications. Oral and written reports evaluated during and at completion of proposal. Final presentation made before business panel.

493 Senior Design Project II (4:4:0) Prerequisite: senior standing in BS in information technology program, and IT 492 taken previous semester. Second of two capstone courses. Students work in teams to complete projects that demonstrate preparedness as practicing IT professional. Includes ethical challenges. Status reports and engineering notebooks evaluated during project. Required readings include case studies. Teams, with contributions by each individual, present final written reports and final presentations before review panel comprising at least two business leaders.

495 Turning Ideas into Successful Companies (3:3:0) Prerequisite: senior standing or permission of instructor. This is a practical course in entrepreneurship. Each class session will focus on specific topics associated with building a business: team creation, business planning, market research, product development, financial planning, funding, people and organizations, competitive strategies, operations, growth and exit strategies, and more. Students will have reading assignments and will participate in competitive team assignments.

498 Independent Study in Information Technology (1–3:0:0) Directed self-study of special topics of current interest in IT. Topics must be arranged with instructor and approved by department chair before registering. Maximum 3 credits.

499 Special Topics in Information Technology (1–3:0:0) Prerequisites: permission of instructor; specific prerequisites vary with nature of topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics are substantially different.

500 Quantitative Foundations for Information Systems Analysis (3:3:0) Prerequisite: MATH 108 or equivalent. Provides common background in basic quantitative areas focused on decision making, information processing, and telecommunications. Topics include review of precalculus, introduction to matrix algebra, problems in optimization, and introduction to probability and statistics. Does not fulfill any VSITE graduate degree requirement.

557 Introduction to Network Science (3:3:0) Prerequisites: bachelor’s degree in math, science, or engineering; Math 114 and 351. First of a sequence providing broad treatment of principles and technologies of modern telecommunications, combined with computing, that create computer networks. Provides sufficient breadth and depth to allow technical professional to function as effective entry-level network engineer. Includes modules in telecommunication principles, telecommunications carrier systems, data communications, local area networks, and wide area network protocols.

665 Managing Information Technology Programs in the Federal Sector (3:3:0) This case study-grounded seminar introduces student team members to the unique complexities of the federal sector, including congressional and executive branch oversight and the reporting, justifying, and sustaining annually very large IT programs.

685 Capstone Seminar (3:3:0) Faculty-facilitated, student teams analyze business cases from perspectives of IT, management and analysis, as well as leadership and ethics.

688 Pattern Recognition (3:3:0) Prerequisites: CS 580 or equivalent. Explores statistical pattern recognition and neural networks. Pattern recognition topics include broad treatment of classification and decision theory, density (parametric and non-parametric) estimation, linear and nonlinear discriminant analysis, dimensionality reduction, feature extraction and selection, mixture models and EM, and vector quantization and clustering. Neural networks topics include feed-forward networks and back-propagation, self-organization feature maps, and radial basis functions. Course emphasizes experimental design, applications, and performance evaluation.

735/OR 735 Advanced Stochastic Simulation (3:3:0) Prerequisite: OR 635 or permission of instructor. Special topics and recent developments in Monte Carlo simulation methodology for discrete-event stochastic systems. Contents vary; possible topics include statistical analysis of simulation output data, random number and random ariate generation, variance reduction techniques, sensitivity analysis and optimization of simulation models, distributed and parallel simulation, object-oriented simulation, and specialized applications. May be repeated for credit when topics are distinctly different.

746/CSI 776 Calculus of Random Signals (3:3:0) Prerequisites: STAT 652 or CE 630 or 632. For graduate students...
in information technology, electrical engineering, mathematics, operations research, and statistics. Introduction to modern theory of stochastic calculus such as stochastic integrals, martingales, counting processes, diffusion processes, and Ito-type processes in general. Presents applications of methods to engineering and biology. Focuses on developing necessary concepts rather than mathematical proofs.

750/CS 750 Theory and Applications of Data Mining (3:3:0) Prerequisite: CS 681, 687, or 688; or permission of instructor. Concepts and techniques in data mining and their multidisciplinary applications. Topics include databases; data cleaning and transformation; concept description; association and correlation rules; data classification and data mining in advanced database systems including text, audio and images; and emerging themes and future challenges. Term project and topical review.

758/CS 758 Networked Virtual Environments (3:3:0) Theory and practice of advanced distributed simulation via networks using highly realistic graphic environments. Includes networked virtual environment principles, networking technology for distributed simulation, networked multimedia concepts, virtual simulation concepts, efficiency and performance issues, and online conferencing and virtual classrooms. Requires term project.

776/CSI 778 Real Analysis and Statistics (3:3:0) Prerequisite: STAT 652; or ECE 620, 621, and 630. Advanced calculus and linear algebra needed for doctoral work in statistics and related fields. Topology, vector spaces, atrices, continuity, differentiation, sequences and series of real numbers and real-valued functions, Riemann and Riemann-Stieltjes integrals, and multidimensional calculus. Presents applications in probability and statistics including response surface methodology.

778/CS 778 Biometrics (3:3:0) Prerequisite: CS 688 or permission of instructor. Basic principles and methods for automatic authentication of individuals. Technologies include face, fingerprint and iris recognition, and speaker verification. Additional topics cover multimodal biometrics, system design, performance evaluation, and privacy issues. Term project required.

796, 797 Directed Reading and Research (1–3:0:0) Reading and research on specific topic in information technology under direction of faculty member. May be repeated as needed.

803, 804/CS 803, 804 Doctoral Tutorial in Information Technology (3:3:0) Individualized intensive study of particular aspects of information technology. May be repeated as needed.

809/CS 809 Scaling Technologies for E-business (3:3:0) Prerequisites: at least one operating systems and one networking course, and admission to VSITE doctoral program. From quantitative point of view, discusses characteristics of most important technologies used to support implementation of e-business sites. Includes topics such as hardware and software architectures of e-business sites, authentication, and payment services, understanding customer behavior, workload characterization, scalability analysis, and performance prediction. Term paper and project required.

811/CS 811 Research Topics in Machine Learning and Influence (3:3:0) Prerequisites: CS 680 and 681, or permission of instructor. Presentation of unifying principles that underlie diverse methods, paradigms, and approaches to machine learning and inference. Reviews most known learning and inference systems, discusses strengths and limitations, and suggests most appropriate areas of application. Students get hands-on experience by experimenting with state-of-the-art learning and inference systems, and working on projects tailored to research interests.

814/CSI 801 Foundations of Computational Science (3:3:0) Prerequisite: CS 735 or equivalent. Investigation methods for scientific questions in presence of teraops computation, gigabyte memory, and gigabit transmission. Mapping of mathematical models to parallel algorithm and architectures, associated data structures, languages, operating systems, networks, and global change demonstrate important scientific accomplishments enabled by computation. Working in teams with scientists and information technologists, students learn mathematical models, abstract algorithms, and concrete algorithms; and conduct experiments and simulations.

815/CS 815 Parallel Computation (3:3:0) Prerequisite: CS 635 or CSI 801. Topics illustrating contemporary thinking on architectures, application, development environments, algorithms, operating system related issues, language requirements, and performance for parallel computation.

817/CS 817 Neural Networks (3:3:0) Prerequisite: CS 688; or permission of instructor. Study of adaptive and competitive principles used in distributed and parallel computation. Topics include background from statistics, control, adaptive signal processing, and neurosciences. Basic models, such as those suggested by Grossberg, Hopfield, and Kohonen, are discussed in terms of analytical characteristics and applications. Neural networks assessed as universal approximators. Presents connections to fuzzy approach established through radial basis function approach. Presents applications to perception, knowledge-based systems, and robotics.

818/CS 818 Topics in High Performance Computer Systems Discussion of current research topics in computer systems. Topics vary according to faculty interest. Possible topics include peer-to-peer computing, high-performance distributed computing, sensor and ad hoc networks, autonomic computing, virtualization, and web services and middleware.

819 Computational Models for Probabilistic Inference (3:3:0) Prerequisite: SYST 664 or 652. Graphical models for encoding conditional independence assumptions in a multivariate discrete probability distribution. Includes computational methods for updating probabilities when evidence is observed on some variables in model. Algorithms for finding most probable instantiation of network. Applications in expert systems and decision analysis.

821 Software Engineering Seminar (3:3:0) Prerequisite: SWE 621. Study of application of software engineering principles, design methods, and support tools through real-life problems extracted from faculty and industry projects. May be repeated with change in topic.

822/CS 732 Software Maintenance and Reuse (3:3:0) Prerequisites: CS/SWE 621 or equivalent, data structures, principles of modern programming, and discrete mathematics; or permission of instructor. Perfective maintenance,
reuse of software components and patterns, evolving software systems, principles of object-oriented analysis and development. Presents issues regarding technologies supporting pervasive software maintenance and reuse.

823 Software for Critical Systems (3:3:0) Prerequisites: SWE 620 and STAT 534. Study of software for systems in which failure can be catastrophic. Presents techniques to construct and analyze software for critical applications and examination of inherent limitations of such techniques, and interaction between techniques used during development and behavior of software during operation. Topics include tolerance of software faults, design redundancy, data redundancy, software safety, formal methods, statistical testing, design for analyzability, and design for testability.

824 Program Analysis for Software Testing (3:3:0) Prerequisite: CS 540 or CS/SWE 637, or permission of instructor. Different methods for analyzing software, primarily for purpose of testing. Analysis techniques, specific algorithms, tools, and applications. Goals are to explore current research issues, learn how to build software analysis tools, and understand how these techniques can be applied to software development activities. Focuses on applications for testing software, including automatic test data generation, object-oriented testing, and testing client-server applications. Also considers analysis techniques for other software-related activities such as maintenance, reuse, object-oriented development, metrics, and optimization.

825/SWE 825 Special Topics in Web-based Software (3:3:0) Prerequisite: SWE 642 Software Engineering for the World Wide Web. Advanced topics in specifying, designing, modeling, developing, deploying, testing, and maintaining software written as web applications and web services. May be repeated with change in topic.

830/ECE 734 Detection and Estimation Theory (3:3:0) Prerequisites: ECE 528, or permission of instructor. Introduction to detection and estimation theory with communication applications. Topics include M-hypotheses, Bayes, minimax, Neyman-Pearson criterion, detection of signals in AWGN and ACGN, Bayes estimation, ML estimation of signal parameters in AWGN and ACGN, estimation of Gaussian waveforms in Gaussian noise, linear MSE estimation, and Kalman and Wiener filters.

832/ECE 735 Data Compression (3:3:0) Prerequisite: ECE 528, or permission of instructor. In-depth study of lossy data compression techniques based on vector quantization with application to speech, image, and video signals. Covers vector quantization of both signal’s waveform and commonly used parametric statistical models such as the autoregressive model. Topics include scalar quantization, predictive quantization, transform coding, entropy coding, and variations on basic vector quantization such as constrained vector quantization and variable rate vector quantization.

833/ECE 739 Satellite Communication (3:3:0) Prerequisite: ECE 631. Introduces theory and applications of modern satellite communications. Topics include satellite channel characterization, channel impairment and transmission degradation, link calculations, modulation, coding, multiple access, broadcasting, random access schemes, demand assignment, synchronization, satellite switching and onboard processing, integrated service digital satellite networks, and satellite transponder, ground stations, packet switching, and optical satellite communications.

834/ECE 742 Telecommunications Networks (3:3:0) Prerequisites: ECE 528 and 642, or permission of instructor. Open systems interconnection reference model, analysis and modeling of layered network architectures including transport and higher layers, performance evaluation of system network architecture, DEC network architecture, and other telecommunication architectures. Protocols and standards for local, metropolitan, and wide area networks are also discussed. Topics include high-speed packet switching, broadband multimedia protocols, and congestion control in broadband integrated networks.

835/CS 835 Computational Vision (3:3:0) Prerequisites: CS 682 and 686, or permission of instructor. Study of recent advances in development of machine vision algorithms and knowledge-based vision systems. Topics include scalespace; Gabor and wavelet processing; distributed and hierarchical processing using neural networks; motion analysis; active, functional, and selective perception; object and target recognition; expert systems; data fusion; and machine learning. Emphasizes system integration in terms of perception, control, action, and adaptation. Presents applications to robotics, intelligent highways, inspection, forensic, and data compression.

836/ECE 836 Special Topics in Detection and Estimation Theory (3:3:0) Prerequisite: ECE 734. Advanced topics in detection, estimation, and signal processing in areas of current research interest. Topics may include spectral estimation, speech recognition, array processing, SAR, underwater acoustics, or higher order spectra.


838/ECE 638 Signal Processing Algorithms and Architectures (3:3:0) Prerequisite: ECE 635 or permission of instructor. Study of recent advances in development of fast signal processing algorithms and parallel architectures. Topics include fast transforms, multirate processing of digital signals, adaptive filtering, high-resolution spectral analysis, parallel computational arrays, and mapping of signal processing algorithms into array processors.

840/CS 685/ECE 750/SYST 672/CS 840 Intelligent Systems for Robots (3:3:0) Prerequisites: SYST 611, ECE 650, CS 580, and SYST 555, or equivalent. Reviews recent developments in intelligent autonomous systems. Studies applications of artificial intelligence, control theory, operations research, decision sciences, computer vision, and machine learning to robotics as well as correspondences between various fields. Topics include analysis and design of methods, algorithms and architecture for planning, navigation, sensory data understanding, visual inspection, spatial reasoning, motion control, learning, self-organization, and adaptation to environment.

841/ECE 722 Kalman Filtering with Applications (3:3:0) Prerequisites: ECE 521 and 528 or equivalent, or permission of instructor. Detailed treatment of Kalman Filtering Theory and applications, including some aspects of stochastic control theory. Topics include state-space models with random
inputs, optimum state estimation, filtering, prediction and smoothing of random signals with noisy measurements, all within framework of Kalman filtering. Additional topics are nonlinear filtering problems, computational methods, and various applications such as Global Positioning system, tracking, and system control. Stochastic control problems include linear-quadratic-Gaussian problem and minimum-variance control.

842 Models of Probabilistic Reasoning (3:3:0) Prerequisites: STAT 544 and OR 681. Survey of alternative views about how incomplete, inconclusive, and possibly unreliable evidence might be evaluated and combined. Discusses Bayesian, Baconian, Shafer-Dempster, and Fuzzy systems for probabilistic reasoning.

843/ECE 720 Multivariable and Robust Control (3:3:0) Prerequisite: ECE 620, or permission of instructor. Eigenstructure assignment for multivariable systems, the Smith-McMillan form, internal stability, modeling system uncertainty, performance specifications and principal gains, parametrization of controllers, loop shaping and loop transfer recovery, and the H methodology.

844 Advanced Pattern Recognition (3:3:0) Prerequisite: CS 688 or permission of the instructor. Course covers model selection, statistical learning theory, structural risk minimization, support vector machine and regression, semisupervised learning and transduction, change detection, and mixtures of experts such as AdaBoost. Applications related to link analysis for social networks and forensics, collaborative filtering and recommendation systems, and document analysis.

845/ECE 780 High-Frequency Electronics (3:3:0) Prerequisite: ECE 520. Study of devices and circuits used in high-speed communication systems. Topics include microwave bipolar transistors, GaAs MOSFETs, and high-speed integrated circuits; and design of linear and power amplifiers using S-parameter techniques and computer simulation.

846/ECE 721 Nonlinear Systems (3:3:0) Prerequisite: ECE 521. Nonlinear dynamical systems. Motivating examples. Analysis techniques include basic fixed point theory, implicit function theorem, dependence of trajectories on initial data and parameters. Also covers computational simulation techniques; stability theory, including Lyapunov’s direct method; and nonlinear control systems input-output stability, absolute stability, and strong positive real transfer functions. Includes feedback linearization of nonlinear systems; nonlinear canonical forms; nonlinear decoupling; sliding control; and applications to adaptive control, neural networks, and robotics.

847/ECE 847 Topics in Photonics (3:3:0) Prerequisite: ECE 565 or permission of instructor. In-depth discussion of specific topics in photonics. Topics include optical storage (disks, holographic, 3D), digital optical computing, integrated optics, photonic switching networks, and optoelectronic devices. May be repeated when covering different topics.

848/ECE 743 Digital Video Communications (3:3:0) Prerequisites: ECE 535 and 642. Coding, transport, and modeling of digital video signals; digital coding of waveforms with emphasis on compression techniques for video signals; transform coding including DCT and rate distortion theory for images; subband/wavelet coding of images; treatment of video signals for different television formats; colorimetry and motion estimation/compensation; general characterization of video traffic; modeling of variable bit rate video codecs; transport protocols for video and multimedia; network-delay compensation for video over ATM; VBR video flow control; and discussion of applications such as HDTV/TV over ATM, digital HDTV for terrestrial broadcast, and videoconferencing/desktop multimedia over LAN/WAN.

850 Systems Integration Engineering (3:3:0) Prerequisite SYST 510 or 520. Covers lifecycles; large systems comprised of heterogeneous components; human, organizational, and technological basis for integration; societal and cultural basis; conceptual frameworks; structure, function, and purpose of industry; risk management; user requirements and functional specifications; bid and proposal process; systems integration and federal government; standards; integration of systems and federations of systems; integrated process and product development; architectures; systems management and cost estimation; reengineering; quality management; increasing returns to scale, network effects, and path dependency issues; and systems integration ecology and evolutionary systems integration.

851 Seminar: Topics in Software Requirements (3:3:0) Prerequisite: SWE 620 or 624, or CS 624. Emphasizes latest research ideas in requirements engineering domain. Discusses state-of-the-art and state-of-the-practice. Focuses on most critical problems and discusses how resolutions might further the requirements research knowledge base and enhance quality and productivity of real software and system developments in industry. May be repeated when topic is different.

852/CS 852 Graphical Real-Time Simulation (3:3:0) Prerequisite: CS 652 or IT 875. Current research in advanced computer graphics and its applications in realistic real-time simulations. Topics include physically based modeling, computer graphics and its applications in realistic real-time systems, rendering technologies. Includes term project in design and analysis of complex, real-time software system.

860 Software Analysis and Design of Real-Time Systems (3:3:0) Prerequisite: SWE 623. Background for students who want to conduct research in software engineering of real-time systems. Provides understanding of key real-time software system analysis, design concepts and methods, and how they are used in developing large-scale, real-time software systems. Also explores potential impact of emerging technologies. Includes term project in design and analysis of complex, real-time software system.

861 Distributed Database Management Systems (3:3:0) Prerequisite: INFS 614 or equivalent. Topics in include transaction management, concurrency control, deadlocks, replicated database management, query processing reliability, and surveys of commercial systems and research prototypes.

862 Computer Security Models and Architectures (3:3:0) Prerequisite: INFS 767 and 780. Covers large-scale distributed systems, including cross-enterprise systems; models for role-based and lattice-based access control; and delegated administration with respect to formal and pragmatic criteria. Studies architectures to implement these models based on public-key infrastructure, trusted servers, and other components.

863 Empirical Methods in Information Technology (3:3:0) Prerequisite: STAT 654. Examines alternative paradigms of scientific research and their applicability to research
in information technology. Topics include fundamental elements of scientific investigation, basic principles of experimental design and statistical induction, philosophy of science and its relation to the information technology sciences, and case studies of information technology research.

864 Scientific Databases (3:3:0) Prerequisite: INF6 614. Studies database support for scientific data management. Covers requirements and properties of scientific databases; data models for statistical and scientific databases; semantic and object-oriented modeling of application domains; statistical database query languages and query optimization; advanced logic query languages; and case studies such as the human genome project and Earth orbiting satellite.

865 Networks and Distributed Systems Security (3:3:0) Prerequisite: INF6 612 or equivalent. Detailed study of network and distributed systems security. Reviews basic cryptography and threats and vulnerabilities in distributed systems. Covers security services and confidentiality, authentication, integrity, access control, nonrepudiation, and their integration in network protocols. Topics also include key management, cryptographic protocols and their analysis; access control, delegation, and revocation in distributed systems; and security architectures, multilevel systems, and security management and monitoring.

867 Intelligent Databases (3:3:0) Prerequisite: INF6 760, or permission of instructor. Studies models and techniques that empower database systems with intelligent and cooperative behavior, with emphasis on subjects such as knowledge-rich databases, logic databases, epistemological queries, intentional answering, and knowledge discovery. Topics include user interfaces, cooperative query interfaces, interactive query constructors, graphical interfaces, and browsers; uncertainty representing, manipulating, and retrieving uncertain, imprecise, or incomplete information; and formulating and interpreting vague or incomplete queries.

870 Organizational Informatics (3:0:0) Prerequisite: doctoral status, or permission of instructor. Examines effects of informatics on national and international policy; setting of international policy on informatics; ethical and social change in governments and organization; shaping of national policy in informatics; industry growth; and research methods from various scientific discipline.

871/STAT 871 Statistical Data Mining (3:3:0) Prerequisite: STAT 554 or 663, or permission of instructor. Covers basic concepts, computational complexity, data preparation and compression, databases and SQL, rule-based machine learning and probability, density estimation, exploratory data analysis, cluster analysis and pattern recognition, artificial neural networks, classification and regression trees, correlation and nonparametric regression, time series, and visual data mining. as

874 Analysis of Complex Surveys (3:3:0) Prerequisites: STAT 656, 665, and 674; or permission of instructor. Presents current theory and methods of statistical analysis of data from complex surveys of finite populations. Includes contingency table analysis and regression analysis; modeling structured populations by multilevel models; and loglinear, logistic, and regression models for stratified and multistage cluster samples. Case studies illustrate methodology. ir

875/CSI 803/STAT 875 Scientific and Statistical Visualization (3:3:0) Prerequisite: CS 652, STAT 554, STAT 663, or STAT 751; or permission of instructor. Presents visualization methods to provide new insights and intuition concerning measurements of natural phenomena and scientific and mathematical models. Presents case study examples from variety of disciplines. Topics include human perception and cognition, introduction to graphics laboratory, elements of graphing data, representation of space-time and vector variables, representation of 3D and higher dimensional data, dynamic graphical methods, and virtual reality. Students required to work on visualization project. Emphasizes software tools on Silicon Graphics workstation, but other workstations and software may be used.

876/CSI 876 Measure and Linear Spaces (3:3:0) Prerequisite: IT 776/CSI 778. Measure theory and integration; convergence theorems; and theory of linear spaces and functional analysis, including normed linear spaces, inner product spaces, Banach and Hilbert spaces, Sobolev spaces, and reproducing kernels. Topics include wavelets, applications to stochastic processes, and nonparametric functional inference. af

877/CSI 877/STAT 877 Geometric Methods in Statistics (3:3:0) Prerequisite: STAT 751, or permission of instructor. Develops foundations of geometric methods for statistics. Topics include n-dimension Euclidian geometry; projective geometry; differential geometry including curves, surfaces, and n-dimensional differentiable manifolds; and computational geometry including computation of convex hulls, and tesselations of 2-, 3-, and n-dimensional spaces. Examples include applications to statistics and scientific visualization. af

880 Queuing Modeling of Computer-Communication Networks (3:3:0) Prerequisite: OR 645 or 647, or ECE 542; or equivalents. Studies analytical modeling of computer and communication networks and performance evaluations. Topics include Markovian systems, open networks, closed networks, approximations, decomposition, simulation, sensitivity analysis, and optimal operation of systems. Presents local area networks, manufacturing systems, and other applications.

882 Advanced Topics in Combinatorial Optimizations (3:3:0) Prerequisites: OR 641 and 642. Studies problems using most recent developments. Topics include cutting plane procedures based on polyhedral combinatorics; column-generation procedures for large, complex problems; heuristic approaches such as genetic algorithms, simulated annealing, and tabu search; study of special structures; reformulation techniques; and bounding approaches. Topics stress most recent developments in field. May be repeated for credit when topics are distinctly different.

884 Advanced Topics in Nonlinear Programming (3:3:0) Prerequisite: OR 644. Studies theory and algorithms for solving nonlinear optimization problems. Contents vary; possible topics include large-scale and parallel-unconstrained optimization, theoretical issues in constrained optimization, duality theory, Lagrangian and sequential quadratic programming methods. May be repeated for credit when topics are distinctly different.

885/ECE 752 Spectral Estimation (3:3:0) Prerequisite: ECE 528 or STAT 652, or permission of instructor. In-depth study of spectral analysis and its application to statistical signal processing. Topics include classical Fourier analysis
of deterministic signals, and Wiener theory of spectral analysis for random processes; spectral estimation using Periodogram and window approaches; maximum entropy spectral estimation and its relation to autoregression modeling; signal subspace approaches for frequency estimation; and wavelet transform and its relation to short-time Fourier transform.

886/ECE 751 Information Theory (3:3:0) Prerequisite: ECE 630 or STAT 644 or equivalent, or permission of instructor. Introduces the mathematical theory of communication systems. Topics include entropy; relative entropy and mutual information; Shannon-McMillan-Breiman theorem and applications to data compression; entropy rate and source coding theorem; Huffman, arithmetic and Lempel-Ziv codes; method of types; channel capacity and channel-coding theorem; joint source-channel coding theorem; differential entropy; Gaussian channel; rate distortion theory; and vector quantization.

888/ECE 753 Distributed Estimation and Multisensor Tracking and Fusion (3:3:0) Prerequisite: ECE 734 or SYST 611. Centralized and distributed estimation theory, hierarchical estimation, tracking and data association, multisensor multitarget tracking and fusion, distributed tracking in distributed sensor networks, track-to-track association and fusion, and Bayesian networks for fusion.

890 Special Topics in Urban Transportation (3:3:0) Prerequisites: CEIE 560 and 660 or equivalent; or permission of instructor. Includes traffic safety analysis, simulation in transportation, intelligent transportation systems, advanced public transportation systems, congestion and travel demand management, geographic information systems and information technology, and innovative refinancing and public-private partnerships. May be repeated for credit when topics distinctly different.

891 Special Topics in Applications of Information Technology to Urban Systems Engineering (3:3:0) Prerequisites: CEIE 670, or permission of instructor. Topics include inventive engineering, design engineering, network computing, building and using intelligent agents in engineering, and proactive design. May be repeated for credit when topics distinctly different.

892 Special Topics in Environmental and Water Resource Systems Engineering (3:3:0) Prerequisite: CEIE 601. Possible topics include studies in waste minimization; pollution prevention; hazardous waste management; wastewater management; air pollution control; solid waste management; environmental decision making; sustainability; water resource and environmental economics; wetlands management, design and construction; groundwater contamination modeling; stochastic hydrology; river basin planning and management; and water quality modeling. May be repeated for credit when topics distinctly different.

894 Design and Inventive Engineering (3:3:0) Prerequisite: SYST 573, CEIE 670, or OR 681; or permission of instructor. Topics include evolution of engineering, design engineering, inventive engineering, general design methodology, conceptual versus detailed design, axiomatic and inferential design theories, engineering method in design, design paradigms, case-based and proactive design, design evaluation, virtual design studio, Internet and browsers in design, creative problem solving, and computer tools to support design creativity.

901/CS 910 Research Topics in Artificial Intelligence (3:3:0) Prerequisite: graduate course in artificial intelligence. Special topics not occurring in regular computer science sequence. Requires substantial student participation. Subject matter may include continuation of existing 600- or 700-level courses in artificial intelligence. May be repeated for credit when subject matter differs.

915/CS 915 Research Topics in Parallel Computation (3:3:0) Prerequisite: IT 815. Discusses current research topics in parallel computation. Topics vary according to student and faculty interest. Possible topics include formal models of concurrency, specification and design of parallel programming languages, logic programming in parallel environment, and parallel distributed processing (neural networks).

922 Concurrent Object-Oriented Systems (3:3:0) Prerequisite: IT 822. Comparative study of existing concurrent object-oriented approaches to problem analysis and software construction. Introduces current research issues in concurrent object-oriented systems, concurrency models, and concurrent object-oriented programming languages and development tools.

932/ECE 737 Spread Spectrum Communications (3:3:0) Prerequisite: ECE 731. Fundamentals of spread spectrum communications. Major topics include pseudonoise spread spectrum systems, acquisition, synchronization, timehopping, frequency hopping, and multiple access communication.

933/ECE 755 Optimum Array Processing II (3:3:0) Prerequisite: IT 837. Includes adaptive beamformers; SMI and RLS estimators; spatial smoothing and FB averaging; QR decomposition; LMS algorithm; optimum detection; parameter, UML, and CML estimation; Cramer-Rao bounds; IQML; weighted subspace fitting; subspace algorithms such as MUSIC and ESPRIT; root-versions; beam-space algorithms; and sensitivity, robustness, and calibration.

940/CS 884 Advanced Topics in Computer Vision and Robotics (3:3:0) Prerequisite: CS 682 or 685, or permission of instructor depending on topics offered. Covers recent developments. Topics motivated by applications to autonomous robotic systems, mobile robot navigation, multirobot systems, human-computer-environment interaction, image/video search and analysis, content discovery, and visual surveillance. Topics include 3D structure and motion recovery, motion understanding, map building and localization, object detection and recognition, and target tracking. Projects and experimental evaluation emphasized. Course may be repeated with change of topic.

941 System Identification and Adaptive Control (3:3:0) Prerequisite: ECE 621, or permission of instructor. Advanced treatment. Topics include identification algorithms, their convergence and accuracy, and computational aspects; model reference and self-tuning adaptive control, transients, stability, and robustness; and intelligent schemes to improve robustness. Students required to study literature and complete computer project.

944 The Process of Discovery and Its Enhancement in Engineering Applications (3:3:0) Prerequisite: IT 842, or permission of instructor. Studies ingredients of imaginative reasoning as it concerns efficient discovery of new ideas and valid evidential test of them. Topics include different interpretations of Peirce’s theory of abductive reasoning and other forms of reasoning, Hintikka’s analysis of process of
inquiry, and current attempts to design systems that provide assistance in discovery-related or investigative activities.

945/ECE 945 Advanced Topics in Microelectronics (3:3:0)  
Prerequisite: IT 845. Current topics of advanced research in microelectronics. Topics include very high-speed integrated circuits, monolithic microwave integrated circuits, optoelectronic integrated circuits, novel device structures, and advances in semiconductor device technology. May be repeated with change in topic.

950 Design and Management Aspects of Information Systems (3:3:0)  
Prerequisite: INFS 790 or equivalent. Impact of organizations and management of information systems (IS) and vice versa. Topics include problems of introducing IS; effect on organizational, economic, and political framework; participative design and new techniques for specification, analysis, design, and implementation of IS; rapid prototyping and expert systems; possible conflicts; methods in life-cycle management; and economic analysis.

958 Basic and Applied Decision Support Systems Technology (3:3:0)  
Prerequisite: SYST 642. Analyzes tools, techniques, and methods that contribute to design, development, application, and evaluation of interactive computer-based decision support systems. Analyzes state-of-the-art and state-of-the-expectation of basic and applied decision support systems technologies.

962 Advanced Topics in Computer Security (3:3:0)  
Prerequisite: IT 862 or 865, or permission of instructor. Current topics of advanced research. Content varies depending on faculty interests, research developments, and student demand. Requires substantial student participation. May include formal models for computer security, multilevel data models, multilevel database management system architectures, secure concurrency control protocols, distributed secure system architectures, integrity models and mechanisms, security policy, and requirements analysis.

971 Probability Theory (3:3:0)  
Prerequisite: IT/CSI 876 or equivalent. Reviews measure theory concepts needed for probability. Includes expectation, distributions, laws of large numbers and central limit theorems for independent random variables, characteristic function methods, conditional expectations, martingales, strong and weak convergence, Markov chains, and stationary processes. as

972/CSI 972 Mathematical Statistics I (3:3:0)  
Prerequisite: STAT 652 or equivalent. Focuses on theory of estimation. Includes method of moments, least squares, maximum likelihood, and maximum entropy methods. Details methods of minimum variance unbiased estimation. Topics include sufficiency and completeness of statistics, Fisher information, Cramer-Rao bounds, Bhattacharyya bounds, asymptotic consistency and distributions, statistical decision theory, minimax and Bayesian decision rules, and applications to engineering and scientific problems. as

973/CSI 973 Mathematical Statistics II (3:3:0)  
Prerequisite: IT 972. Continuation of IT 972. Concentrates on theory of hypothesis testing. Topics include characterizing decision process, simple versus simple hypothesis tests, Neyman-Pearson Lemma, uniformly most powerful tests, unbiasedness and invariance of tests, and randomized and sequential tests. Applications of testing principles made to situations in normal distribution family and other families of distributions. as

976/CSI 976 Statistical Inference for Stochastic Processes (3:3:0)  
Prerequisite: IT 746/CSI 776. Modern theory of parameter estimation and hypothesis testing for stochastic processes, counting processes with random intensities, and solutions to stochastic differential equations driven by martingales. Considers applications to engineering, biology, and economics. as

978/CSI 978 Statistical Analysis of Signals (3:3:0)  
Prerequisites: STAT 544 and 638, or equivalent. Advanced course in analysis of discrete- and continuous-time signals using methods of stochastic differential equations and time series. Presumes familiarity with methods of harmonic analysis and times series modeling. Topics include state-space modeling and eigen-value processing, nonlinear modeling of signals, non-Gaussian stochastic process structure, detection and estimation of vector-valued signals, robust signal detection, with applications to array processing and target tracking.

979/CSI 979 Topics in Statistical Aspects of Information Technology (3:3:0)  
Prerequisite: STAT 652 or equivalent. Studies statistical science and body of methods and techniques that convert raw data into information. Contents vary. Topics include high-interaction statistical graphics, stochastic methods for parallel computing, cryptography and covert communications, order-restricted inference, treatments of imprecision, and foundations of inference. May be repeated when topics distinctly different.

980 Advanced Topics in Applied Probability (3:3:0)  
Prerequisites: OR 645 and 647, or permission of instructor depending on semester topics. Special topics and recent developments in field of applied probability. May include computational probability, stochastic point processes, advanced queuing theory, traffic and transportation models, percolation, processes of random aggregation and coagulation, and Markov decision processes. May be repeated for credit topics distinctly different.

981 Advanced Topics in Optimization (3:3:0)  
Prerequisite: IT 741, 750, 881, 882, or 884. Special topics and recent developments. Contents vary and may include topics in linear, nonlinear, combinatorial, network, global, or stochastic optimization. Requires active student participation. May be repeated for credit when topics distinctly different.

983 Advanced Topics in Network Optimization (3:3:0)  
Prerequisite: OR 645. Recent developments in solving optimization problems on networks. Prepares doctoral students to perform advanced research on network-related problems. Topics include linear, discrete, nonlinear, and stochastic problems. Several aspects of problems also studied, including computational complexity, exact algorithms, heuristics, solvable special cases, and computer implementation issues.

990 Dissertation Topic Presentation (1:0:0)  
Prerequisite: completion of all course requirements for PhD in IT, or permission of instructor. Opportunity for PhD students to present research proposal for critique. Covers presentation of research topic for PhD in information technology; required of all PhD students. Students complete dissertation research proposal. May be repeated with change in topic, but degree credit is given only once.
Courses

Teaching (IETT)

991 Engineer Project Presentation (1:0:0) Prerequisite: completion of all course requirements for engineer degree in information technology, or permission of instructor. Opportunity for engineer degree students to present project proposal for critique to interested faculty and students. Covers presentation of project topic for engineer degree in information technology, and is required of all engineer degree students. Students complete project proposal. May be repeated with change in topic, but degree credit is only given once.

996 Engineer Project Proposal (1–6:0:0) Work on project proposal that forms basis for dissertation for engineer degree. May be repeated. No more than 12 credits of IT 996 and 997 may be applied to engineer degree requirements.

997 Engineer Project Dissertation (1–6:0:0) Prerequisite: admission to candidacy. Formal record of commitment to engineer project dissertation under direction of advisory committee in information technology. May be repeated as needed.

998 Doctoral Dissertation Proposal (1–12:0:0) Work on research proposal that forms basis for doctoral dissertation. May be repeated. No more than 24 credits of IT 998 and 999 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1–12) Prerequisite: admission to candidacy. Formal record of commitment to doctoral dissertation research under direction of faculty member in information technology. May be repeated as needed.

Initiatives in Educational Transformation—Teaching (EDIT)

Graduate School of Education

750 Studies in Language and Culture I (3:3:0) Offers opportunity to view how language shapes realities, including perceptions of children as learners. Explores cultural constraints and transformative possibilities embedded in language.

751 Studies in Language and Culture II (3:3:0) Building on IETT 750, students investigate more closely academic discourses and ways they frame lived realities. Exploring theme of how language and culture shape and open interpretations of the world, students research language and culture in their practice.

752 Research in Practice: The Team Project (6:6:0) Concurrent with other courses, student teams refine research topics and develop projects to investigate those topics. Projects involve children as partners rather than subjects in research. Product is substantial piece of work submitted with plan for dissemination in school community.

753 Teaching and Learning (3:3:0) Capstone course to help teachers document and reflect on individual growth and transformation while participating in IETT school-based master’s program. Through developing portfolio, teachers provide evidence to demonstrate professional growth, and provide documentation about themselves as teachers and learners in the two years of the program. As part of documentation, teachers present team research projects in professional conference organized as third summer session.

Instructional Technology (EDIT)

Graduate School of Education

401 Introduction to Multimedia/Hypermedia (3:3:0) Provides an overview of the principles and tools used within the fields of e-learning, instructional design, and multimedia/hypermedia technologies. Students apply knowledge and skills learned by creating an e-learning module.

410 Introduction to Assistive Technology (3:3:0) Provides an understanding of assistive technology and application in instructional programs, career tasks, and life skills for persons with disabilities. Presentation and demonstration experiences enable students to better use assistive technology in education, work, community, and home environments. Knowledge and awareness components may be delivered via distance education.

412 Assistive Technology for Individuals with Sensory Impairments (2:2:0) Prerequisite: EDIT 410. Provides technology and resources available to enhance and improve the ability of individuals with visual and hearing impairments for success in school, daily living activities, and employment. Class components may be delivered via distance education.

413 Technology, Society, and the Culture of Learning (3:3:0) Prerequisite: EDUC 300. Explores the relationship between technological change and education reform initiatives. Emphasis will be placed on the ways in which technological and social changes influence and shape the goals and outcomes of the K–12 educational process.

423 Accessibility/Input Modifications (2:2:0) Prerequisite: EDIT 410. Explores accessibility/input devices and strategies used by individuals with disabilities for accessing computers, independent living aids, driving equipment, and communication devices. Class components may be delivered via distance education.

425 Software for Individuals with Special Needs (2:2:0) Prerequisite: EDSE 410. Provides software evaluation and design for individuals with disabilities. Students will create a software program using existing authoring tools for a person with a disability. Class components may be delivered via distance education.

426 Web Accessibility and Design (3:3:0) Provides instruction for accessible web design using HTML and existing authoring tools. Section 508 web accessibility standards and assistive technologies to access the computer will be explored. Class may be delivered via distance education.

428 Low-Technology Assistive Technology Solutions (1:1:0) Prerequisite EDIT 410. Provides functional application of low-technology solutions within the areas of self-care; mobility and transfer; communication; stability and support; sports, recreation, and leisure; and academic and work environments. Will include opportunities to create low-technology devices.

504 Introduction to Educational Technology (3:3:0) Examines uses of and issues in educational technology. Explores curriculum integration of technology, and focuses on learning and using commercially available applications software.

510/EDSE 510 Introduction to Assistive Technology (3:3:0) Provides an understanding of assistive technology and application in instructional programs, career tasks, and life skills for persons with disabilities. Presentation and
demonstration experiences enable students to better use assistive technology in education, work, community, and home environments. Knowledge and awareness components may be delivered via distance education.

522/EDSE 522 Assistive Technology for Individuals with Sensory Impairments (2–3:2–3:0) Focuses on professionals or students interested in serving visually impaired/blind or hearing impaired/deaf populations. Heightens awareness of participants to specific technology and resources available to enhance and improve ability of individuals with impairments to succeed in school, daily living activities, and employment. Knowledge and awareness components may be delivered via distance education.

523/EDSE 523 Accessibility/Input Modification (1–3: 1–3:0) Provides overview of accessibility/input modifications and strategies. Students explore various input devices and their application and use by individuals with disabilities. Opportunities for in-depth exploration of sophisticated access technologies available to those students who seek expertise in specific assistive technology devices. Knowledge and awareness components may be delivered via distance education.

524/EDSE 524 Assistive Technology for Individuals with Learning Disabilities (2:2:0) Focuses on strategies and techniques for implementing software and other technologies in lives of individuals, age 3 to adult, with learning disabilities. Students develop and implement plans for assistive technology. Requires practicum. Knowledge and awareness components may be delivered via distance education.

525/EDSE 525 Software for Individuals with Special Needs (1–2:–1–2:0) Focuses on software evaluation and design for individuals with disabilities. Explores existing software resources, and identifies design features to meet individual’s special needs. Students create software program for person with disabilities (credit 2). Knowledge and awareness components may be delivered via distance education.

526 Web Accessibility and Design (3:3:0) Develops understanding of principles of universal web design. Students apply this understanding by designing and developing accessible web site using web authoring tools.

529 Internet as an Assistive Technology Tool (2:2:0) Prerequisite: HTML experience. Overview of web and Internet as an educational tool for students with disabilities. Focuses on presentation of strategies, accommodations, assistive technology, and Internet resources for educators. Students review and evaluate web sites, and develop accessible Internet lesson plan or web site.

530 Scripting and Programming (2:2:0) Enables development of computer-based educational materials using widely known educational scripting language. Students explore basic authoring capabilities, and learn to apply those capabilities by designing and producing materials using commands, procedures, and functions of scripting language.

561 Teaching with Telecommunications (1:1:0) Develops expertise with various aspects of telecommunications tools, and models ways these tools can be used for personal learning and integration into teaching/learning process. Addresses e-mail, Internet, web, and online databases.

562 Teaching with Databases (1:1:0) Develops expertise with various aspects of databases, and models ways databases can be integrated into teaching and learning process. Focuses on strategies for searching, sorting, creating, and communicating with information, much of which is structured by variety of online and offline databases.

563 Teaching with Graphics (1:1:0) Explores various graphic programs available for constructing visual images. Addresses draw and paint programs, scanning and editing images, and using visual communication to support K–12 learning.

564 Teaching with TV/Video (1:1:0) Develops expertise with social, cognitive, and learning implications of film, video, and television. Engages students in process of planning, storyboarding, and filming with video.

565 Teaching with Educational Software (2:2:0) Explores variety of educational software, including simulations, problem-solving software, computational tools (calculators, probeware, LOGO, and spreadsheets), and drill-and-practice/ integrated learning systems. Emphasizes ways these programs support K–12 teaching and learning process.

566 Teaching with Multimedia/Hypermedia (2:2:0) Prerequisite: EDIT 563. Covers variety of hypertext/hypermedia and multimedia tools. Emphasizes students’ ability to use tools and then teach others. Covers the ways integration of tools in K–12 curriculum support learning, and difference between hypermedia and multimedia.

567 Teaching with Desktop Publishing (2:2:0) Prerequisite: EDIT 563. Explores variety of publishing tools, including word processors, desktop publishers, and idea processors. Emphasizes using tools to communicate. Covers design and layout principles, appropriate use of images to facilitate communication, and ways K–12 teachers can design opportunities for students to learn concepts.

571 Tools for Visual/Graphic Design (1–3:1–3:0) Teaches basic knowledge of tools available for integrating graphics and visual design into computer-based instruction. Exposes students to latest tools available for developing, integrating, and managing visual and graphic display.

572 Tools for Digital Video and Audio (1–3:1–3:0) Overview and exploration of using these tools in instructional design process. Offers rationale for using select tools and developing skills to use them.

573 Project Management Tools (1–3:1–3:0) Teaches students the principles of project management as it is applied to instructional design. Explores project management tools used to manage, plan, and track large-scale multimedia and hypermedia projects.

574 Networking Tools (1–3:1–3:0) Teaches basic knowledge of current networking and telecommunications devices used to enhance instructional design process. Covers local area networks, telecommunications, and teleconferencing and distance education technologies.

575 Authoring Tools (1–3:1–3:0) Introduces specific authoring tools through hands-on lab instruction, interaction with software interface, construction of instructional sequences, importing video and audio clips, resource management, and animation. Content customized to particular software tool presented.

575-A Authoring Tools: Authorware (1–3:1–3:0) Teaches fundamentals of Authorware program, which can be very complex. Only the essential functions are used for this course. Students develop basic, self-directed design module that
includes major components of software covered. Provides core foundations for developing computer-based instructions. Students can apply concepts to other authoring tools.

575-B Authoring Tools: Toolbook (1–3:1–3:0) Introduces object-oriented construction and authoring with Asymetrix’s Multimedia Toolbook. Through hands-on lab instruction, students learn Toolbook’s interface. Teaches advanced concepts of importing video and audio clips, resource management, object-linked and embedding, and path-based animation. Introduces basic scripting theories to prepare students for next level of Toolbook authoring. Students may apply concepts taught to other authoring tools.

590 Educational Research in Technology (3:3:0) Focuses on developing skills, insights, and understanding basics to performing research with emphasis on interpretation, application, critique, and use of findings in educational settings. Students develop expertise in action research methodology, design, and implementation.

593 Instructional Hardware Systems (3:3:0) Teaches basic technical features of computer-based hardware systems used in educational settings, including stand-alone computers, peripheral devices, and networking systems.

597 Special Topics in Education (1–6:1–6:0) Prerequisite: admission to program in GSE. Provides advanced study on selected topic or emerging issue in American or international education. May be repeated for credit with GSE permission.

601 Instructional Design and Development (IDD) Portfolio (1:1:0) To be taken at mid-degree program point with minimum 12 and maximum 15 credits. Enables students to create and publish electronic portfolio that demonstrates effective and meaningful integration and syntheses of instructional design and development concepts, principles, and competencies learned across program courses at mid-degree program point.

611 Innovations in Distance Learning (3:3:0) Explores educational opportunities through electronic networks and telecommunications. Hands-on activities focus on planning, implementation, and evaluation. Students discuss emerging applications, and how new approaches to learning can be integrated into today’s classrooms.

641 Understanding Virtual Schools (1:1:0) Develops knowledge about online learning for K–12 students. Examines history and trends of online learning, and characteristics of K–12 virtual learners.

642 The Online Academy (1:1:0) Prerequisite or corequisite: EDIT 641. Develops knowledge about Mason’s virtual high school. Focuses on design model with attention to representative problems, performances of understanding, communities of practice, and mentors.

643 Online Mentoring 1: Building Virtual Relationships (1:1:0) Prerequisite or corequisite: EDIT 642. Assists in developing online mentoring skills related to integral role that building relationships plays in success of online learning.

644 Online Mentoring 2: Promoting Self-Regulation (1:1:0) Prerequisite or corequisite: EDIT 643. Assists in developing online mentoring skills related to integral role that self-regulation plays in success of online learning.

645 Online Mentoring 3: Conceptual Learning (1:1:0) Prerequisite or corequisite: EDIT 644. Assists in developing online mentoring skills related to role of support of conceptual and content understanding in success of online learning.

646 Online Mentoring 4: Moderating (2:2:0) Prerequisite or corequisite: EDIT 645 or permission of instructor. Assists in developing expertise with moderating student learning—asynchronous and synchronous—in online environments including discussion boards, chat rooms, and general communication patterns.

701 Advanced Instructional Design and Development (IDD) Portfolio (1:1:0) Prerequisite: EDIT 601. To be taken in the last semester of course work. Enables students to create and publish electronic portfolio that demonstrates effective and meaningful integration and syntheses of instructional design and development concepts, principles, and competencies learned across program courses at end degree program point.

704 Instructional Technology Foundations and Theories of Learning (3:3:0) Reviews practical and pedagogical issues related to design and development of technological instruction. Emphasizes investigating instructional design as a field and community of practice, and reviewing core learning theory constructs applicable to design of instructional technology.

705/EDCI 705 Instructional Design (3:3:0) Prerequisite: teaching experience. Helps students analyze, apply, and evaluate principles of instructional design to develop education and training materials spanning a wide range of knowledge domains and instructional technologies. Focuses on variety of instructional design models, with emphasis on recent contributions from cognitive science and related fields.

711 Teaching with Technology I: Telecommunications and Databases (3:3:0) Corequisite: EDCI 710. Explores and develops expertise with various aspects of telecommunications and databases, and models how tools can be used for personal learning and integration into teaching and learning process. Addresses e-mail, Internet, and web, and online and multimedia databases. Also focuses on strategies for searching, sorting, creating, and communicating with information, many of which are structured by online and offline databases.

713 Teaching with Technology II: Graphics, TV and Video, and Simulations (3:3:0) Corequisite: EDCI 712. Explores and develops expertise with various graphic programs for constructing visual images, interpreting and creating video, and structuring and using simulations for learning. Addresses draw and paint programs, scanning and editing images, and using visual communication to support K–12 learning. Explores social, cognitive, and learning implications of film, video, and television, and engages students in planning, storyboarding, and filming with video. Also focuses on various categories of simulation, relationship between simulations and ways of knowing, and strategies for using simulations to promote K–12 learning.

715 Teaching with Technology III: Publishing and Computational Tools (3:3:0) Corequisite: EDCI 714. Explores and develops expertise with variety of publishing tools, including word processors, desktop publishers, and idea processors. Emphasizes use of tools to publish. Covers design and layout principles, appropriate use of images to facilitate communication, and ways K–12 teachers can design opportunities for students to learn these concepts. Also helps
students explore and develop expertise with tools commonly used as part of “computational science” and mathematical modeling. Tools include programming languages such as LOGO, calculators, spreadsheets, probeware, and graphing calculators.

717 Teaching with Technology IV: Hypermedia and Emerging Technologies (3:3:0) Prerequisite: EDIT 716. Develops expertise with hypertext/hypermedia and multimedia tools. Emphasizes ability to use tools and then teach others. Focuses on understanding difference between hypermedia and multimedia. Also examines educational technologies expected to become important applications soon, including virtual reality and distributed learning.

719 Tools 5: Web 2.0 and Digital Video Editing (3:3:0) Prerequisite: EDIT 717. Co-prerequisite: EDIT 716. Explores emerging Web2 tools (blogs, wikis, and podcasts) and digital video with attention to conceptual understanding and potential applications in K-12 settings. Culminates in the design and development of products and lesson plans for K-12 settings.

720 Leadership Issues in Educational Technology (3:3:0) Examines how educational technology can provide infrastructure for creating, managing, and evaluating innovative types of teaching and learning environments. Explores new assumptions about learning, instructional technology, and organizational development as foundation for planning how schools can use technology to evolve beyond conventional approaches.

725 Technology and Diversity (3:3:0) Focuses on technology to support learning needs of all students, including English-as-a-second-language, bilingual, and special-needs students. Emphasizes helping teachers use technology to support learning when faced with such diverse learners in one classroom.

730 Analysis and Design of Multimedia/Hypermedia Environments (3:3:0) Prerequisites: EDIT 732, and knowledge of authoring tool. Enables design, implementation, and evaluation of technology-based education and training materials using advanced computer-based authoring tools.

732 Advanced Instructional Design: Constructive Methods (3:3:0) Prerequisite: EDCI/EDIT 705. Capstone course of three-course sequence on theory and practice of instructional design. Helps students apply ideas developed in prior courses to complete major instructional design project. Covers leading-edge ideas in evolution of instructional design.

741 TIP 1 Technology Innovations Project (3:3:0) Students design and create technology enriched learning module that can be used in specific educational setting or learning environment. Students paired with instructional designers, providing real world context for project development within cognitive apprenticeship model.

742 Interactive Technologies: Gaming and Robotics (3:3:0) Project-based, hands-on course focusing on technology, science, and engineering. LOGOs, controlled by small microcomputers, used to show principles behind many technological innovations. Other technological advances explored.

743 Technology and Community Partnerships (3:3:0) Explores nontraditional community partnerships in role in learning. Emphasizes partnerships between these non-traditional learning environments.
Courses

792 Project Development Practicum (6:0:0) Designed for students in immersion concentration of Instructional Technology program. Allows students to join design team focusing on development and evaluation phase of instructional design process and development process.

797 Advanced Topics in Education (1–6:1–6:0) Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with CEHD approval.

895 Emerging Issues in Instructional Technology (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Covers selected emerging issues. Examines ways instructional technology provides infrastructure for creating, managing, and evaluating innovative types of teaching/learning environments.

Interdisciplinary Studies (MAIS)

Interdisciplinary Studies

797 Interdisciplinary Studies Proposal (1:0:0) Prerequisite: degree candidacy in MAIS, and completion of 21 credits of graduate course work, including any required research methodology course. Focused work on formulating and writing MAIS project or thesis proposal.

798 Individualized Studies Project (1–5:0:0) Prerequisites: MAIS 797 and prior approval of a project proposal by the faculty advisors, two committee members, and MAIS director. Individualized section form required. Research project related to student’s concentration taken under supervision of faculty advisor and project evaluation committee.

799 Individualized Studies Thesis (1–5:0:0) Prerequisites: MAIS 797 and prior approval of a thesis proposal by the faculty advisors, three committee members, and MAIS director. Individualized section form required. Original research endeavor related to student’s MAIS program concentration. Research must result in document meeting MAIS and university standards.

International Commerce and Policy (ITRN)

School of Public Policy

500 Approaches to International Commerce and Policy (4:3:0) First foundation course in ICP program. Introduces national economic policy and international trade, investment, and finance. Uses case-study method to teach basic economic concepts such as national income accounting, balance of payments, and factors affecting foreign exchange rates. Also provides practice in comparing national strategies for growth and development, and using political and economic analysis to assess choice of national economic strategy and relative effectiveness.

501 Methods of Analysis for International Commerce and Policy (4:3:0) Provides the skills necessary to conduct qualitative and quantitative research and analysis of issues related to international commerce and policy. Students obtain practical information on sources of data, their origins, strengths, and weaknesses. Helps develop tools for statistical analysis of data, and includes use of computers for analyzing and displaying information. It covers major data sources as well and literature and indices related to international policy, including trade data, economics and financial indicators, and development indicators.

503 Investment and Macroeconomics (4:3:0) Provides overview of basic concepts in macroeconomic theory, as well as mathematical skills, with emphasis on application to problems of contemporary global economy. Covers monetary systems, balance of payments, foreign exchange market, foreign investment and international institutions, and issues in world monetary arrangements.

504 Trade and Microeconomics for International Commerce (4:3:0) Provides foundation in international economics, and presents fundamentals of international trade, finance, and transactions. Focuses on alternative approaches to understanding international economic system. Topics include classical and neoclassical theories of trade, alternative theories of trade and their extensions, tariffs, customs unions, institutions, and economic development. Students learn to employ appropriate analytical approaches, including graphical analyses, and communicate the results concisely. Throughout, emphasizes relating theory to practical applications.

602 International Financial Institutions and Globalization (3:3:0) Examines nature and dynamics of financial interactions between public and private sectors worldwide. Covers aims and actions of international financial institutions in fostering trade and development, with emphasis on emerging economies. Policy issues include devolving political and economic structures, differing resource and cultural endowments, privatization, financial crises, sector imbalances, and equity. Reviews international and domestic financial markets and instruments.

603 International Trade Relations (3:3:0) Examines U.S. role in world economy and evolving global trading system. Analyzes regulatory framework for trade, and political dynamics of international trade relations. Particular attention to domestic trading institutions, and global and regional institutions such as the GATT/WTO, NAFTA, EU, and APEC. Examines debate between free and fair trade advocates, and prospects for U.S. trade policy.

604 International Trade and Technology (3:3:0) Examines science and technology policies and international trade, with emphasis on relationships and interactions. Assesses roles of science and technology as economic drivers, and explores strategies employed by companies and governments to link research and development to economic growth and competitiveness. Examines research and development systems and technology-related trade policies of United States, Japan, Europe, major developing countries, and selected newly industrialized economies, emphasizing policies affecting trade and technology. Explores specific cases involving interactions among science, technology, and international trade.

612 International Business Operations and the Multinational Corporation (3:3:0) Examines international business environment and challenges facing companies in conducting operations in increasingly interconnected global marketplace. Focuses on issues of management and organization, and resolution of conflicts that may arise between business organizations and home and host governments. Also focuses on role of multinational corporations in international environment, and impact on global trade, economic development,
and political system. Also studies trade and international investment theories and world financial environment. Explores broad issues such as sovereignty of decision making and global impact of business activities.

701 Special Topics in International Commerce and Policy (1–3:1–3:0) Offers specialized courses on various aspects of international commerce and policy.

702 Special Topics in International Commerce and Policy: Study Abroad (3:3:0) Provides opportunity for study abroad under supervision of Mason faculty. Course topics, content, and locations vary.

710 International Business Transactions: Finance and Investment (3:3:0) Focuses on techniques for financing trade and payment methods, including letters of credit, countertrade, and other approaches. Covers issues of direct concern in financing international business operations, such as preparing financing proposals, risk insurance, international taxation, pricing policies, and currency conversion and foreign exchange risk management. Introduces foreign direct investment, alliances and acquisitions, joint ventures, and other methods for investing overseas.

711 United States Law and Global Trade (3:3:0) Prerequisite: ITRN 603 or permission of instructor. Surveys types of regulations imposed by United States, foreign governments, and international institutions on transnational business activities. Reviews principal regulatory bodies in United States and overseas, and powers and authorities. Covers tariffs and customs regulations; product safety and environmental restrictions; intellectual property, copyright, trademark, and patent regulations; and licensing rules. Also covers special restrictions that may be imposed because of political considerations such as embargoes, munitions controls, and antibribery and antiboycott regulations.

712 World Trade Organization and Global Trade (3:3:0) Focuses on legal aspects of international trade regulation by studying international legal and political regime established under WTO, and assessing impact of domestic economic legislation on U.S. trade regulations.

713 U.S. Foreign and Economic Decision Making (3:3:0) Identifies and assesses approaches to foreign policy decision making within the United States and offices involved with political and trade issues. Examines congressional and executive processes and their interrelationship. Exercises involve historical and simulated cases; gives attention to conflicting interests of private and institutional entities. Assesses tension between political and economic issues within context of national security concerns.

715 Global Environment and the World Economy (3:3:0) Examines growing relationship between environmental interdependence and developing world economy. Assesses increased globalization of environmental and health issues with a focus on the impact on those issues on international transactions involving trade and development. Attempts to develop an understanding of relationship of scientific knowledge to global environment in context of existing political and economic institutions. Emphasizes formulating and assessing policies and structures for corporations, nations, regions, and international organizations. Tensions among free trade, international competitiveness, and regulatory responses are central. Gives attention to practices of nations and international organizations, emerging forms of regional and international cooperation and growing use of multilateral agreements.

716 European Union in the International System (3:3:0) Examines current developments in European market integration from global perspective. Emphasizes impact of single market, and proposed economic and monetary union of United States and other major trading partners. Examines European economic relations with Eastern Europe, former Soviet Union, and Lome Pact countries.

717 International Science and Technology (3:3:0) Examines U.S. science and technology policies (S&T) and structures, as well as those in other leading countries. Assesses functional links between S&T and international transactions focusing on trade, national security, finance, and development assistance. Considers emergence of multilateralism and international institutional arrangements as alternatives to traditional bilateral patterns of cooperation.

718 Global Economic and Human Development (3:3:0) Interdisciplinary examination of economic and human development in world economy. Introduces alternative concepts and theories of economic and human development, and analytical frameworks for assessing important issues that arise in development process. Topics include colonialism, economic growth, population, health, education, industrialization, and rural development.

720 Regional and Supranational Organizations (3:3:0) Assesses role of international organizations in international system today, and focuses on wide range of international and regional economic and political institutions. Emphasizes changing nature of these organizations in relation to nation states, and relationship of international organizations to U.S. national security and economic interests.

730 Information Technology Fundamentals for International Business and Trade (3:3:0) Deals with technology and issues relating to emergence of computing, information, and telecommunications technologies in mainstream of society. Aim is to provide general understanding and facility with technologies of contemporary interest.

731 Business-to-Business Marketing in International Commerce (3:3:0) Provides understanding of concepts of international marketing process, and international environment within which companies operate.

734 Pricing in International Commerce (3:3:0) Deals with theory and techniques of pricing that enable organizations to effectively pursue marketing and business strategies.

736 Sources of Growth in East Asia (3:3:0) Examines extraordinary economic success of East Asian NIEs and some of their problems. Focuses on understanding proximate sources of growth, role of technological development, and salient political issues.

737 World Trade in Semiconductors and Information Technologies (3:3:0) Examines bilateral and multilateral approaches to world trade in technology products. Compares U.S.-Japan Agreement on Semiconductors and its successor agreements with those of WTO. Also looks at effects of agreements on U.S. industry, their relevance to trade development, and commercial transactions.

738 Fundamentals of International Marketing (3:3:0) Offers working knowledge of principles and practices that enable managers to effectively market organizations, prod-
ucts, services, and brands. Emphasizes international dimensions of marketing where appropriate.

740 ABCs of Exporting and Importing (3:3:0) Acquaints students with legal, regulatory, and practical issues in importation and exportation of merchandise. Topics include theoretical framework for government oversight of international movement of goods; legal issues between parties and governments; and practical guidance concerning structuring of import and export transactions to avoid legal and tariff liability.

742 Technology Policy and International Strategies (3:3:0) Introduces opportunities and problems created for organizations and society by Internet, and policies affecting trajectory of Internet developments. Also covers technological factors in planning horizon; domestic policy and international treaty factors affecting Internet trajectory; and new horizons for Internet applications.

744 The Politics of International Competitiveness (3:3:0) Provides inquiry into governance problems of public managers and political leaders as they cope with global competitiveness in post-industrial era. Focuses on integrating public and private sectors worldwide, with special emphasis on U.S. role and how it influences such areas as technology transfer, national security, electronic commerce, trade policies, money flows, and human resources.

750 Trade and Politics in Eastern Europe and the Former Soviet Union (3:3:0) Examines background and recent developments in political, business, and cultural environment confronting American firms seeking to do business in Eastern Europe and former Soviet Union. Emphasizes international trade patterns and relations between these states and United States. Examines modes of doing business in these countries, and unique problems American firms confront. Focuses on privatization, joint ventures, and countertrade.

751 Trade, Investment, and Politics in the Western Hemisphere (3:3:0) Examines cultural, political, economic, and legal aspects of conducting business and trade with countries of Western hemisphere. Focuses on evolving pattern of inter- and intra-hemisphere trade, as well as on region’s global trade integration. Special attention given to NAFTA and other bilateral and regional agreements, and to potential for and implications of free trade area in hemisphere. Emphasizes manipulation and analysis of regional trade data to describe and project trade patterns.

752 International Business Lobbying in the United States, Europe, and Japan (3:3:0) Presents comparative overview of lobbying process and practices, and explores representation of foreign firms in United States, European Community and member states, and Japan. Examines contemporary problems relating to lobbying by multinational corporations in foreign political and cultural setting.

753 Role of States and Virginia in the Global Economy (3:3:0) Examines roles of states, especially Virginia, in the international marketplace. Focuses on formulating specific export marketing plans for particular Virginia firms and industries. Examines state economic development policies, structure of state agencies, services, and resources available to domestic exporter and foreign investors contemplating direct investment.

754 International Commercialization of Space (3:3:0) Identifies and analyzes problems and transactions concerning privatization and commercialization of transnational space activities, including launch and satellite operations. Emphasizes interplay of new technologies with existing legal, political, and business structures in formulating viable commercial satellite and launch operations. Focuses on planning and implementing private space actions in conjunction with various public and private international organizations. Sessions focus on interdisciplinary aspects of space commercialization involving technology, finance, tax, insurance, joint venture and business matters, and international legal and national regulatory issues. Guest lecturers include leading business executives engaged in space and satellite operations.

756 National Security and the Global Economy (3:3:0) Examines impact of globalization and changes in international economic and political systems on concepts of national security. Emphasizes nexus of economic and security concerns in post-Cold War era, with particular attention to emerging issues including trade and economic security, proliferation of advanced military technology and control of weapons of mass destruction, international drug trafficking, and defense conversion. Focuses on implications of changing security requirements on U.S. defense and economic policy and activities.

757 Global Corporate Business Planning and the Competitive Edge (3:3:0) Provides introduction to planning international business activities, including licensing agreements, joint ventures, acquisitions, and divestitures. Using step-by-step planning methodology, students learn to integrate marketing, financial, regulatory, legal, and cultural factors into management strategy and business plan.

759 Trade Licensing, Controls, and Documentation (3:3:0) Examines legislation and practices concerning regulation of trade. Reviews current customs and import-export control regulations and documentation requirements for international transactions. Designed for students who need practical and detailed understanding of rules and documentation for international business transactions.

760 International Environmental Politics (3:3:0) Examines growing concerns related to global environmental issues and problems they pose to domestic, foreign, and international political institutions. Covers major environmental issues including global warming, ozone depletion, cross-border flow of pollution, and threats to biodiversity. Assesses strengths and weaknesses of traditional political institutions in dealing with these issues and providing for sustainable economic development while limiting environmental damage.

761 European Political and Economic Union (3:3:0) Examines movement for European integration since World War II, focusing on political and institutional development of European Community/Union. Topics include theories of European integration, Treaties of Rome, Single European Act, Maastricht Treaty, European Union (EU) policies and programs, and EU’s external relations. Analyzes changing nature of U.S.-EU relations and prospects for EU enlargement into Central and Eastern Europe.
763 International Real Estate Transactions (3:3:0) Provides overview of real estate market in the United States with emphasis on commercial real estate and issues of importance to national and international investors. Reviews recent developments in valuation approaches, marketing strategies, and performance trends. Discusses increasing use of securitization along with implications for traditional originators of mortgage financing. Emphasizes government experience and practices in real estate management and disposition.

764 Trade, Investment, and Politics in East Asia (3:3:0) Examines issues related to international transactions involving Korea, China, Taiwan, and Hong Kong, with some attention to Japan. Focuses on trade and financial relations between these East Asian nations and United States. Assesses impact of culture and domestic political and economic institutions within these states, and roles in regional institutions and in international system.

765 Trade, Investment, and Politics in Sub-Saharan Africa (3:3:0) Examines role and potential of sub-Saharan Africa in international trading system. Emphasizes political, historical, cultural, and development factors. Focuses on perspectives of U.S. firms and on international institutions trading or investing in region.

766 Trade, Investment, and Politics in the Middle East and North Africa (3:3:0) Examines major economic, political, and cultural issues that influence trade and investment relations with Middle East and North Africa. Focuses on roles of international and regional institutions in economic development, and develops understanding of challenges facing region and their implications for formulating trade and investment strategies by U.S. firms.

767 Political Economy and Integration in Latin America (3:3:0) Examines contemporary political, economic, and cultural dynamics of Latin American and Caribbean regions. Emphasizes issues and trends that affect U.S.-Latin American political, business, and trade relations, particularly recent political and economic reforms. Examines roles of domestic interest groups and decision-making systems in individual countries, and evolution of regional integration arrangements and integration with international system.

768 Global Intellectual Property Rights and International Trade (3:3:0) Examines national and regional systems, international contractual relations (licensing), and the evolving global system for protecting intellectual property. Addresses current international treaty system and the ongoing multilateral efforts to strengthen worldwide intellectual property protection. Examines intellectual property regimes worldwide, including regional and bilateral challenges and opportunities, and relevant U.S. law and policy responses.

769 International Entrepreneurship (3:3:0) Introduces practical planning approach for small and medium-size entrepreneurial firms seeking to enter international marketplace. Focuses on key business and financial documents related to doing business overseas; and assesses role of language, technology, and information systems in formulating successful business strategy. Role playing and simulated negotiations provide opportunities for students to sharpen business skills.

770 International Contract Negotiation (3:3:0) Reviews growing role of arbitration in international transactions. Examines international, national, and government arbitration bodies, with particular emphasis on how differing cultural characteristics affect negotiating behavior and effectiveness of arbitration.

771 Trade, Investment, and Politics in South and Southeast Asia (3:3:0) Focuses on trade and finance issues in the most dynamic countries of South and Southeast Asia. Assesses cultural and political factors, regional trade patterns, and institutions, focusing on implications for regional development and business opportunities for U.S. firms.

772 International Telecommunications (3:3:0) Focuses on developments in international telecommunications and satellite regulation. Examines regulatory environment, and business and financial aspects of global telecommunications industry.

773 International Strategic Management (3:3:0) Presents comprehensive approach to international strategy formulation, implementation, and evaluation processes affecting policy and program development within multinational firms and government agencies. Integrates marketing, finance, accounting, and management. Covers techniques for forecasting international business, political, economic, technological, legal, and sociocultural forces.

780 Internship (1–3:3:0) Open to authorized graduate majors only; departmental and advisor approval required before enrolling. Provides practical work experience in state, federal, or international agencies or private sector. Requires written project integrating work experience and academic program.

790 Independent Study (1–3:3:0) Open to authorized graduate majors only; departmental and advisor approval required before enrolling. Provides opportunity to pursue intensive research in area of interest not covered by other courses. Note: Not all courses earn 3 graduate credits. Some courses may vary in length and thus, in credits earned. Some course requirements subject to change.

791 Advanced Trade Policy (3:3:0) Covers international trade theory, trade policy analysis, regional economic integration, and institutional arrangements governing world trade. Examines dispute settlement regimes, and relationship between trade and environment. Includes WTO and constituent agreements in the areas of goods, services, intellectual property, and trade-related investment measures.

795 Final Project (1–3:3:0) Includes writing 40-page capstone paper that draws together key themes of program.

Italian (ITAL)

Modern and Classical Languages

101 Elementary Italian I (3:3:1) Designed for students with no prior knowledge of Italian. Includes elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

102 Elementary Italian II (3:3:1) Prerequisite: ITAL 101 or permission of instructor. Continuation of ITAL 101. Lab work required.

110 Elementary Italian (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for ITAL 110 if they have received credit for ITAL 101 and 102. Lab work required.
201 Intermediate Italian I (3:3:1) Prerequisite: ITAL 102 or permission of department. Further development of skills in listening, speaking, and writing. ITAL 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate Italian II (3:3:1) Prerequisite ITAL 201 or permission of department. Application of language skills to reading, composition, and discussion.

210 Intermediate Italian (3:3:1) Prerequisite: ITAL 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Italian-speaking regions. Taught in Italian.

250 Gateway to Advanced Italian (3:3:0) Prerequisites: ITAL 210; appropriate placement score; or permission of department. Development of advanced intermediate-level language skills in the interpersonal, interpretive, and presentational modes of communication. Incorporates strong component of critical and comparative analysis of Italian cultural products, practices, and perspectives of the past and the present. Taught in Italian.


330 Advanced Reading and Speaking I (3:3:0) Prerequisite: JAPA 202, appropriate placement score, or permission of instructor. Courses must be taken in sequence. Designed for students to develop conversational proficiency and reading skills. Students work toward a mastery of linguistic and sociolinguistic rules by incorporating reading and speaking abilities through class discussions, reports, and presentations.

331 Advanced Reading and Speaking II (3:3:0) Prerequisites: JAPA 202, 330, and appropriate placement score; or permission of instructor. Courses must be taken in sequence. Designed for students to develop conversational proficiency and reading skills. Students continue to develop mastery of linguistic and sociolinguistic rules by incorporating reading and speaking abilities through class discussions, reports and presentations.

440 Integrated Study of Japanese Language and Society I (3:3:0) Prerequisites: JAPA 331, appropriate placement score, or permission of instructor. Integrated approach to study of Japanese language and society through grammar review, vocabulary and kanji development, intensive practice in spoken and written Japanese, and sociological and cultural readings and analysis. Includes class discussion, oral and written reports, and out-of-class direct interactions with native speakers.

441 Integrated Study of Japanese Language and Society II (3:3:0) Prerequisites: JAPA 440, appropriate placement score, or permission of instructor. Sequel to JAPA 440. Integrated approach to study of Japanese language and society through grammar review, vocabulary and kanji development, intensive practice in spoken and written Japanese, and sociological and cultural readings and analysis. Includes class discussion, oral and written reports, and out-of-class direct interactions with native speakers. More emphasis on actual use of Japanese language.

Japanese (JAPA)

Modern and Classical Languages

101, 102 Introduction to the Japanese Language (3:3:0), (3:3:0) Must be taken in sequence. Includes basic grammar, oral expression, listening comprehension, and reading and writing.


110 Elementary Japanese (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for JAPA 110 if they have received credit for JAPA 101, 102, or 109. Lab work required.

201 Intermediate Japanese I (3:3:0) Prerequisite: JAPA 102 or equivalent. Further development of skills acquired in JAPA 101 and 102, including grammar, oral expression, listening comprehension, reading and writing. Use of written language (katakana, hiragana, and kanji) emphasized. Lab work required. JAPA 201 and 202 must be taken in sequence.

202 Intermediate Japanese II (3:3:0) Prerequisite: JAPA 201 or equivalent. Continuation of JAPA 201.

209 Intensive Japanese II (6:6:0) Prerequisite: JAPA 102 or 109, or equivalent. Equivalent to JAPA 201, 202 taught in a single semester. May not be taken for credit in combination with JAPA 201 or 202.

210 Intermediate Japanese (3:3:1) Prerequisite: JAPA 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Japanese-speaking regions. Lab work required.

250 Gateway to Advanced Japanese (3:3:0) Prerequisites: JAPA 210, appropriate placement score, or permission of department. Development of advanced intermediate-level Japanese language skills in the interpersonal, interpretive, and presentational modes of communication. Incorporates strong component of critical and comparative analysis of Japanese cultural products, practices, and perspectives of the past and the present. Taught in Japanese.

Justice, Law, and Crime Policy (JLCP)

Public and International Affairs


510 Policing in a Democratic Society (3:3:0) Fundamental issues in policing a democratic society: police mission, subculture, performance measurement, moral hazards, discretion, impact on crime and disorder, legitimacy, community policing, and other reforms.
691 Justice Program Planning and Implementation (3:3:0) Prerequisite: JLCP 700 or PUAD 502, or permission of instructor. Examines challenges of adapting to, planning, and implementing change in justice organizations. Provides hands-on experience in conducting, planning, and implementing project.

700 Theories of Justice (3:3:0) Overview of ancient and modern theories of justice with application to contemporary issues involving justice system, and other social and political institutions.

702 Comparative Justice (3:3:0) Prerequisite: JLCP 700/GOVT 726, or permission of instructor. Survey of justice systems and their environments in different lands and cultures. Identifies commonalities and differences among justice systems, evaluates them, and considers policy implications.

703 Restorative Justice (3:3:0) Prerequisite: JLCP 700 or permission of instructor. Covers origins of restorative justice, its principles, implications for different justice organizations and processes, and application to a variety of problems, such as family violence, human rights, and reconciliation following mass victimizations.

720 Behavior of Law (3:3:0) Examines development of law and law’s effect on human behavior. Reviews theories of law’s meaning and aims. Examines construction of law and investigates consequences of law and legal decisions.

721 The Constitution, Criminal Procedure, and Security (3:3:0) Prerequisites: JLCP 720/GOVT 728 or permission of instructor. Focuses on understanding legal doctrines that form basis of U.S. constitutional procedural rights and how doctrines develop, why courts rule as they do, and evaluating strengths, weaknesses of rights.

722 Civil Justice (3:3:0) Prerequisite: JLCP 720/GOVT 728 or permission of instructor. Covers understanding civil justice system, rules that govern civil justice, origins and effects, strengths and weaknesses of civil law doctrines, and processes to understand power of law to order social behavior.

723 Law and Social Control (3:3:0) Prerequisite: JLCP 720/GOVT 728 or permission of instructor. Competing conceptions of law, political systems, and social control. Intellectual traditions behind social control, its definitions, and mechanisms for regulating public and private behavior, by both individuals and organizations in society.

730 Seminar in the Courts and Constitutional Law (3:3:0) Role, influence, and effects of U.S. courts in creating constitutional norms and interpreting them. Special attention to First and Fourteenth Amendments, Commerce Clause. Analyzes leading court cases.

740 Justice Organization and Administration (3:3:0) Examines organization and administration of justice and security organizations. Covers organization theory and behavior as applied to justice and security organizations.

741 Conduct of Justice Organizations at the Street Level (3:3:0) Prerequisite: JLCP 740/GOVT 790 or permission of instructor. How justice organizations behave at lowest levels, where service is delivered and discretion is greatest (suspects, victims, witnesses, parole officers, prison guards, parole officers, attorneys, and others who interact with the justice system).

742 Leadership in Justice and Security Organizations (3:3:0) Prerequisite: JLCP 740/PUAD 790 or permission of instructor. Examines leadership theories, and explores fundamental questions about leadership in justice and security organizations today.

743 Changing Justice and Security Organizations (3:3:0) Prerequisite: JLCP 740/PUAD 790 or permission of instructor. Examines challenges of changing justice organizations, how changes have been successfully and unsuccessfully implemented in the past, and what change strategies appear to be the most effective.

749 Issues in Justice Administration (1–3:1–3:0) Prerequisite: JLCP 509/PUAD 509 or JLCP 700/GOVT 726, or permission of instructor. Explores issues in justice administration, taking into diverse perspectives. Emphasizes using theory and evidence to evaluate different viewpoints. Course topics vary, focusing on controversial matters.

760 Crime and Crime Policy (3:3:0) Explores relationship between crime policy and empirical evidence about etiology of crime. Includes crime measurement and trends in crime over time, effectiveness of various policy interventions.

761 Politics of Crime Policy (3:3:0) Prerequisite: JLCP 760/GOVT 792 or permission of instructor. Explores political context of crime policy. Examines influence of public opinion, interest groups, scientific community, and other political forces. In-depth, case-study comparison of several crime policies.

780 Research Methods (3:3:0) Prerequisite: undergraduate course in social science research methods or statistics, or permission of instructor. Introduces logic and methods of scientific inquiry in justice, law, and crime policy. Includes conceptualization of research questions, observation, measurement, research design, and principles of causality. Evaluation of extant research according to scientific principles.

781 Justice Program Evaluation (3:3:0) Prerequisite: PUAD 611/612, JLCP 780, or two graduate-level statistics courses; or permission of instructor. Practical exploration of assessment techniques used in evaluating need for and consequences of justice programs and policies. Design and measurement, interpreting and presenting results.

782 Statistics I (3:3:0) Prerequisite: An undergraduate social science research methods course or an undergraduate statistics course. Focuses on descriptive and inferential statistical methods and theory with application to problems within the justice field. Explores the logic of inferential statistical methods in general and null hypothesis significance testing in particular. Covers widely used statistical procedures within the applied social sciences.

783 Statistics II (3:3:0) Prerequisite: JLCP 782 or a comparable course. Focuses on the theory and application of multivariate regression methods as applied within the justice field. Topics include tests for and consequences of violating assumptions of the generalized linear model, dummy coding of categorical variables, testing of interaction effects, logistic regression, ordered and multinominal logit, and missing data analysis.

790 Practicum in Justice, Law, Crime, and Security (1–6:9:0) Prerequisites: JLCP 780, and either STAT 510 and 535 or STAT 554 and 656; or permission of instructor. Student-initiated research project supervised by faculty.
member. Students must work with justice organization to conduct useful research.

795 Special Topics (3:3:0) Prerequisite to be determined by instructor. Recent developments in field, or topics not covered by regularly listed courses. Course content varies; may be repeated for credit.

796 Directed Reading (1–3:0:0) Prerequisite: successful completion of 12 JLCP credits. Independent reading at doctoral level on specific topic related to justice, law, or crime policy as agreed to by student and faculty member and approved by coordinator of JLCP program.

799 Master’s Thesis (1–6:0:0) Prerequisite: submission and approval of thesis proposal. Research on approved master’s thesis topic under direction of thesis committee with approval of chair. Graded S/NC.


Korean (KORE)

Modern and Classical Languages

110 Elementary Korean (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

210 Intermediate Korean (3:3:1) Prerequisite: KORE 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Korean-speaking regions. Lab work required.

Latin (LATN)

Modern and Classical Languages

Placement: See Academic Testing section of Admission chapter.

101, 102 Elementary Latin (3:3:0) Must be taken in sequence. Introduction including basic grammar, vocabulary, and development of reading skills, and introduction to Roman civilization.

109 Intensive Elementary Latin (6:6:0) Equivalent to LATN 101 and 102 and taught in a single semester. Recommended for students in minors of classical studies or Latin, and for students who want intensive introduction. May not be taken for credit in combination with LATN 101 or 102.

201 Intermediate Latin I (3:3:0) Prerequisite: LATN 102 or equivalent. Intensive review of elementary grammar. Introduces more advanced grammatical constructions and patterns of usage, continued development of reading proficiency, and vocabulary and readings in Latin literature.

202 Intermediate Latin II (3:3:0) Prerequisite: LATN 201 or equivalent. Study of advanced grammatical constructions, vocabulary, and patterns of usage. Reading of selections from Roman authors of late Republic and early Empire, and study of cultural and political backgrounds.

209 Intensive Intermediate Latin (6:6:2) Equivalent to LATN 201 and 202, and taught in single semester. May not be taken for credit in combination with LATN 201 or 202.

321 Latin Tutorial (1–3:0:0) Prerequisites: LATN 202 or equivalent, and permission of program chair. Latin readings drawn from classical or postclassical literature. Authors or genres selected by instructor in consultation with student. Meetings on tutorial basis. May be repeated once.

351 Roman Prose Literature (3:3:0) Prerequisite: LATN 202 or equivalent. Introduces major work of prose, themes, and literary qualities. Emphasizes interpretation and stylistic analysis. Concentrates on one complete work; topics, authors vary. May be repeated for credit.

352 Roman Poetry (3:3:0) Prerequisite: LATN 202 or equivalent. Introduces major work of poetry and themes, meters, and poetic techniques. Emphasizes interpretation, metrical and stylistic analysis, and poet’s role in society. Topics and authors vary. May be repeated for credit.

451, 452 Studies in Roman Literature (3:3:0, 3:3:0) Prerequisites: LATN 351/352 or equivalent, or permission of instructor. Focuses on single Latin author or literary genre. Approaches subject from variety of interpretive perspectives, and uses secondary literature as well as primary texts. Topics and authors vary. Sequence may be repeated for credit.

Latin American Studies (LAS)

Latin American Studies

100 Introduction to Latin American Studies (1:1:0) Weekly series of presentations by various Latin American Studies faculty. Short reading assignments and journal entries required. Graded pass/fail. Required for all Latin American studies majors.

490 Internship (1:1:0) Prerequisite: Latin American studies majors with permission of director. Approved work-study programs in cooperation with specific organizations including area museums; NGOs; and local, state and federal agencies. Credit determined by LAS program.

499 Research Seminar in Latin American Studies (3:3:0) Prerequisites: 90 credits and complete or concurrent enrollment in all other required general education courses. Research on specialized topic in Latin American Studies culminating in substantial paper and oral presentation. Students expected to integrate knowledge and skills acquired in general education courses. Must receive passing grade to graduate with a BA in Latin American studies.

Learning, Social and Organizational (LRNG)

School of Public Policy

596 Independent Study (1–12:0:0) Covers research, analysis, and implementation within realm of social and organizational learning. Students work with member of program faculty. May be repeated for credit.
601 Organizational Learning (3:3:0) Re-examination of organizations and role of management from interpretive standpoint. Develops process view of organizations that identifies differences in interests, perspectives, and cultures among groups and explains role of management in facilitating understanding to achieve effective cooperation in a dynamic work environment. Themes include organizational culture, decision-making, collaborative communities, and teamwork, and “reading” of organizational change. Case studies and experiential exercises reinforce learning process. Complements LRNG 672.

602 Group Dynamics and Team Learning (3:3:0) Using unstructured learning environments, participants learn how to facilitate team learning for organizational effectiveness by engaging in meaningful group interaction. Explores various aspects of group dynamics such as power, perception, motivation, leadership, and decision making.

672 Organizational Learning Laboratory (3:3:0) Focuses on creating learning and experimental environment to explore questions and concerns typically faced by managers in effort to build learning organizations. Analyzes questions using experiential learning and action research. Classroom group interactions and group projects simulate real-world organizations. Object is to acquire competence to diagnose and analyze organizations and develop skills to become better facilitators of organizational learning. Complements LRNG 601.

692, 792 Special Topics in LRNG (1–3:1–3:0) Covers topics in social or organizational change seen from economic, historical, philosophical, literary, organizational, and information technology perspectives. New courses that first appear under this heading include Teaching Practicum: Instructional Technologies, Building Learning Organizations for Global Business, Computational Modeling of Social Learning, and Strategic Knowledge Management. May be repeated for credit.

714 Ethnography of Corporate Culture (3:3:0) Corporate culture is not a simple byproduct of organizational charts and advertising images, but rather the web of meaning that endows organizational action with its deepest significance. Corporate cultures must be studied by ethnographic methods of “thick description.” After exploring conceptions of corporate culture, course examines exemplary ethnographies of various organizations, including those of different societies, to prepare students for their own ethnographic field work and writing.

762 Strategic Knowledge Management (3:3:0) Deals with theory and practices of leveraging and sharing knowledge to develop more effective organizations. Focuses on knowledge and communities of practice, and includes use of collaborative technology in managing interactions.

763 Technology and Learning in Organizations (3:3:0) Examines enormous potential of information technology to enhance the way organizations work and learn. Focus includes user interface design, and organizational processes that support effective use of this technology.

764 Learning Across Cultures (3:3:0) Focuses on ideas and practices involved in fostering learning, innovation, and new knowledge creation in the highly multicultural environments of knowledge intensive, global economies, and political systems.

781 Interpretive Social Theory (3:3:0) Advanced, philosophical study of interpretive school of economics sometimes known as the “Austrians.” Weaves together Austrian ideas, epistemology, and hermeneutics; organizing theme is reinterpretation of Austrian school as radically interpretive approach to social theory. Course material is in the form of Folio Views hyper-text, which lends itself to close analysis of text and provides practical way of demonstrating and appreciating value of interpretive social theory.

796 Independent Study (1–12:1–12:0) Requires research, analysis, and implementation within realm of social and organizational learning. Students work with member of program faculty. May be repeated for credit.

Linguistics (LING) English Department


326 General Linguistics (3:3:0) Introduces phonetics, phonology, morphology, and syntax.

450 Introduction to Sociolinguistics (3:3:0) Prerequisite: LING 326. Overview of the study of language variation and change. Topics to be covered include the interaction between language and social factors (age, sex, social class), dialects of English, speech communities, language contact, and language and gender.

485 Semantics and Pragmatics (3:3:0) Prerequisite: LING 326. Developments in theoretical linguistics that explore how language form is related to meaning and context. Topics include reference, lexical semantics, logic, quantification, truth conditions and sentential meaning, presuppositions, and speech acts.

486 Syntax I (3:3:0) Prerequisite: LING 326. Nature and form of syntactic theory, and examination and analysis of the properties of several major natural language syntactic structures.

490 Generative Phonology (3:3:0) Prerequisite: LING 326. Sound systems of English and other languages from perspectives of phonological theory. Topics include articulatory phonetics, distinctive features, nature of phonological representations, rhythm and stress, and phonological universals and constraints.

499 Independent Study (1–3:3:0) Prerequisites: LING 326 and 3 other LING credits, and permission of instructor. Intensive study of particular theoretical problem in linguistics conducted by student in close consultation with instructor. Student produces substantial piece of written work on research findings. With instructor permission, may be taken twice for total 6 credits.

507 Field Work in Applied Linguistics (3:0:0) Prerequisite: LING 326, 520, 521, or 582. Contact English Department one semester prior to enrollment. Field work providing working experience in language-teaching program or educational research organization.

520 Descriptive Linguistics (3:3:0) Introduces terminology and methodology of modern linguistic science, and detailed
structural analysis of English phonology, morphology, and syntax.

521 Applied Linguistics: Teaching English as a Second Language (3:3:0) Prerequisite: LING 520, 690, or 786. Theories and basic principles of teaching a second language, especially as they relate to English language. Introduces students to methods of teaching English to speakers of other languages.

522 Modern English Grammar (3:3:0) Prerequisite: one course in linguistics, or permission of instructor. Overview of structure of modern English beginning with word classes and ending with analyses of complex sentences. Most topics introduced as problems of language description; in solving them, principles of syntactic argumentation are demonstrated. Students learn to tap intuitions about English to analyze grammatical structure.

523 Descriptive Aspects of English Phonetics and Phonology (3:3:0) In-depth description and analysis of sound system processes of modern English. Topics include segmental phonetics, syllable structure, connected speech, and prosodic phenomena. Also addresses implications for language instruction.

525 Practicum in ESL (3:3:0) Prerequisite: LING 521. Involves preparation and presentation of lessons to adult English as second language (ESL) learners under guidance of mentor teacher and practicum professor. Field experience consists of observation and teaching in assigned ESL classroom.

581 Psycholinguistics (3:3:0) Prerequisite: LING 520, 690, or 786; or permission of instructor. Study of mental and psychological aspects of human language, including aphasia, association, autism, language acquisition, verbal concept formation, and perception.

582 Second Language Acquisition (3:3:0) Prerequisite: LING 520, 690, or 786; or permission of instructor. Examines second language (L2) acquisition from linguistic perspective. Compares first and second language acquisition. Examines factors contributing to L2 variation, including linguistic universals, transfer, age, input, and affective considerations.

Pending 650 Introduction to Sociolinguistics (3:3:0) Prerequisite: one of the following: LING 520, 523, 690. An overview of the study of language variation and change. Topics to be covered include the interaction between language and social factors (age, sex, social class), dialects of English, speech communities, language contact, and language and gender.

686 Special Topics in Linguistics (3:3:0) Prerequisite: varies with topic. Detailed advanced study of selected area of linguistics. Content varies. May be repeated once for credit with permission of department.

690 Generative Phonology (3:3:0) Sound systems of English and other languages from the perspective of phonological theory. Topics include articulatory phonetics, distinctive features, nature of phonological representations and processes, rule ordering, abstractness, role of external evidence, and nonlinear phonology.

691 Theories of Language (3:3:0) Prerequisite: LING 520, 690, or 786; or permission of instructor. Seminar in linguistic metatheory. Examines wide range of theories about language and linguistic theory, including those of Saussure, Bloomfield, Chomsky, and others. Readings from original sources.

692 Phonology II (3:3:0) Prerequisite: LING 690. Recent trends in phonological theory. Topics include stress assignment, tone spreading, and vowel harmony, from within nonlinear framework. Discusses segmental structure and underspecification.

770 Research Methods (3:0:0) Prerequisites: LING 582 and one of LING 690, 785, or 786; or permission of instructor. Conceptualizing and conducting second language research, including process of developing research questions, gathering data, obtaining permission from institutional review board, choosing data collection measures, and coding linguistic and nonlinguistic data.

782 Second Language Acquisition (3:3:0) Prerequisites: LING 582, or permission of instructor. Advanced course in second-language acquisition theory. Detailed analysis of internal and external constraints. Variation addressed from linguistic, psychological, and environmental perspectives.

785 Semantics and Pragmatics (3:3:0) Prerequisite: LING 520, 690, or 786; or permission of instructor. Developments in theoretical linguistics that explore how language form relates to meaning and context. Topics include reference, lexical semantics, logic, quantification, truth conditions and sentential meaning, presuppositions, and speech acts.

786 Syntax I (3:3:0) Nature and form of syntactic theory. Examines and analyzes properties of several major natural language syntactic structures.

787 Syntax II (3:3:0) Prerequisite: LING 786. Theoretical treatment of syntactic phenomena that have emerged as standard problems for syntactic analysis. Problems include binding, extraction, and quantification. Extensive reading in primary theoretical literature.

788 Semantics and Pragmatics II (3:3:0) Prerequisite: LING 785, or permission of instructor. Advanced course in semantic and pragmatic theory. Study of meaning under truth-conditional, model-theoretic framework explored and related to syntax and pragmatics.

798 Directed Reading and Research (1–3:0:0) Open only to students who have completed at least 18 credits of LING courses. Reading, research, and writing on specific project under direction of departmental member. Prior approval by faculty member required. Written report required. May be repeated once for credit with permission.

799 Thesis (1–6:0:0) Open only to students who have completed at least 18 credits of LING courses. Students who take LING 798 to develop thesis topic and then elect thesis option receive 3 credits after completing thesis. Students who do not take LING 798, or who take it to work on project unrelated to thesis, receive up to 6 credits after completing thesis. Graded S/NC.

882 Seminar in Language Acquisition (3:3:0) Prerequisite: LING 782 or permission of instructor. Advanced topics seminar in current language acquisition theory. Topics vary. May be repeated twice.

886 Advanced Syntax Seminar (3:3:0) Prerequisites: LING 786 or 787, or permission of instructor. Advanced course in current syntactic theory. Topics vary. May be repeated twice.
structures affect individual behavior. Topics include individual and societal phenomena relevant to issues of diversity. Prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

MGMT 301 Managing People and Organizations (3:3:0) Prerequisites: Sophomore standing. Explores how individuals behave in workplace, and how group and organizational structures affect individual behavior. Topics include individual differences, groups and teams, managing conflict, negotiation, stress, diversity, influence, leadership, and motivational theories and techniques. Half lecture, half lab; format provides opportunities to discuss and apply concepts throughout semester. Lecture, recitation format; requires attendance in weekly lecture and weekly recitation.

MGMT 312 Principles and Practices of Management (3:3:0) Prerequisites: C or higher in MGMT 301 and degree status. Builds on fundamental theories and concepts learned in MGMT 301 by examining nature of managerial work under range of business models and under rapidly changing business conditions. Managerial functions and activities such as planning, strategizing, organizing, controlling, and directing examined in depth and in context of current organizational examples and scenarios.

MGMT 321 Introduction to Human Resource Management (3:3:0) Prerequisites: C or higher in MGMT 301 and degree status. Human capital is the most important asset to most firms. Human resources field examines what can or should be done to make workers more productive and satisfied. Course builds on MGMT 301 by introducing key concepts and techniques that managers need to attract, retain, develop, compensate, and motivate quality talent. Also emphasizes legal and ethical considerations in human resource management.

MGMT 412 Diversity in Organizations (3:3:0) Prerequisites: C or higher in MGMT 301 and degree status. Builds on MGMT 301 by emphasizing intrapersonal, interpersonal, organizational and societal phenomena relevant to issues of diversity. Examines phenomena and processes in general and with regard to specific dimensions such as gender, race and ability. Designed to increase students’ knowledge of diversity in organizations, understanding others’ perspectives, and ability to work well with people who differ from themselves.

MGMT 413 Organizational Development and Management Consulting (3:3:0) Prerequisites: C or higher in MGMT 301; degree status. Introduces theory and practice of organizational development. Assumes some basic knowledge of organizational behavior, and addresses how to use knowledge about organizations to change them. Focuses on ways of understanding organizations with attention to theoretical underpinnings of field and diagnostic models, and processes for entering organizations. Later sessions focus on contracting, data collection, organizational diagnosis, data feedback, and change technologies.

MGMT 421 Advanced Human Resource Management (3:3:0) Prerequisites: C or higher in MGMT 301 and 321, and degree status. Builds on MGMT 321 by using case-based approach to deepen understanding of HRM best practices. Students conduct projects requiring application of important strategic human resource processes. In addition, advanced topics not thoroughly covered in MGMT 321 are discussed, such as international HRM. Relevant for management majors, particularly those seeking human resource management career. Helps prepare for Professional in Human Resources certification exam, which is affiliated with Society for Human Resource Management.

MGMT 431 Employee Relations (3:3:0) Prerequisites: C or higher in MGMT 301 and BULE 302; degree status. Focuses on employee relations issues from historical and current perspectives; for management majors interested in pursuing HRM career.

MGMT 451 New Venture Creation (3:3:0) Prerequisites: C or higher in MGMT 301 and degree status. Explains process of conceptualizing and creating new venture. Using central concepts of innovation, strategic opportunities, and globalization, students learn to evaluate new venture opportunities and consider external environment’s impact. Students gain greater understanding of entrepreneurial concepts by developing business plans that address critical issues, including management composition and structure, effective business and functional strategies, operational logistics, legal issues, financial projections, and financing options.

MGMT 461 Cross Cultural and Global Management (3:3:0) Prerequisite: C or higher in MGMT 301, and degree status. Explores theory and practice of managing culturally diverse organizations in domestic and international contexts. Topics include management customs and practices in different world regions, cross-cultural communication and learning, and the developing culturally and internationally sophisticated employees and managers.

MGMT 462 Honors Seminar in Management (3:0:0) Prerequisite: invitation by professor. Topic and format vary. In-depth study of topic of interest to managers and organizations. Enrollment limited and competitive.

MGMT 463 Negotiations in Organizations (3:3:0) Prerequisite: C or higher in MGMT 301 and degree status. Focuses on theory, processes, and practice of negotiation within and across organizations, including attention to ethical issues. Explores systematic ways to increase quality of negotiated agreements, including methods of preparation and use of rational assumption, bidding and decision criteria. Format includes negotiation exercises, lecture, and discussion.
464 Teamwork and Interpersonal Skills (3:3:0) Prerequisites: C or higher in MGMT 301 and degree status. Focuses on intensive development of high professional-level skill set for collaboration and leadership in contemporary environments. Builds on content introduced in MGMT 301, 312. Attention to developing personal leadership capabilities, collaborating in traditional and virtual environments, improving group processes, project management, tolerating ambiguity, improving communication, creative problem solving, time management, coaching, and empowering employees.

471 Competitive Strategy (3:3:0) Prerequisites: C or higher in MGMT 301 and degree status. Explores industry structures and competitive behavior of firms. Attention to how firms use tangible, intangible, and human resources to develop sustainable competitive advantage, and how competitors interact in marketplace. Introduces tools and concepts to analyze industry dynamics and competitive interactions of firms in these industries.

491 Current Topics in Management (3:3:0) Prerequisites: C or higher in MGMT 312 and degree status. Advanced study of management concepts and selected topics. Incorporates intensive analysis of management problems of long-term strategic significance or current urgency for organizational planning and operations. Includes significant contemporary research findings.

499 Independent Study (1–3:0:0) Prerequisite: Management majors with at least 9 credits of management major courses. Research and analysis of selected problems or topics in management must be arranged with instructor and approved in writing by associate dean for undergraduate programs. Written report required.

Management Information Systems (MIS)

School of Management

If a student takes noncore, upper-level business courses prior to acceptance to the School of Management, those courses will not count toward an undergraduate degree application for any major in SOM, except general elective credit. A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Course prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

102 Spreadsheet Applications for Business (1:0:1) Hands-on course using popular spreadsheet package. Business examples used to teach fundamentals of spreadsheets and their use in business applications. Graded as S/NC.

301 Introduction to Business Information Systems (3:3:0) Prerequisite: sophomore standing. Introduces fundamentals of hardware, software, networking, Internet, and technology components. Includes role of technology in contemporary business, basic relational concepts, hands-on experience in building business database applications and web sites. Projects required.

302 Introduction to Programming for Business Applications (3:3:0) IT 108 highly recommended but not required. Teaches design and implementation of program data structures and algorithms to solve business problems using structured programming techniques. Students become familiar with program development life cycle and programming tools through using standard programming language such as Visual BASIC.NET supported by a modern Integrated Development Environment (IDE) Teaches basic data types, strings, arrays, selection and looping statements, subroutines, and functions. One of the most important courses in MIS because it provides understanding of basic software development techniques and problem-solving skills via programming. Programming foundation prepares students for successfully completing advanced classes in MIS, including MIS 310, 330, and 412. Lectures and lab sessions; students complete several individual lab assignments to enhance understanding of programming concepts discussed in lectures, and provide opportunities to utilize acquired skills in context of developing real-life business application.

310 Database Management Systems (3:3:0) Prerequisites: C or higher in MIS 301 and degree status. SOM majors may not receive credit for both MIS 310 and IT 214. Introduces principles of designing, maintaining, and manipulating databases. Emphasizes relational databases. Applications are business oriented, such as accounts receivables, order entry, customer history. Requires hands-on implementation using software package.

320 Networks and Security (3:3:0) Prerequisite: C or higher in MIS 301, degree status. Teaches students how information is transmitted within and between organizational networks. It prepares students to address the improvement of processes and protection of resources used for the distribution of information, including data, voice, and video. The course also includes lab work and exercises.

330 Systems Analysis and Design (3:3:0) Prerequisites: C or higher in MIS 301, MIS 310, degree status, programming course recommended. Introduces life cycle of computer information system with emphasis on information requirements analysis, feasibility studies, economics, systems design, equipment selection, and implementation process. Requires team project and computer lab.

411 Management and Control of Information Systems (3:3:0) Prerequisite: C or higher in MIS 301, degree status. Economics perspective to study issues arising in managing and controlling information systems. Topics include cost and performance trends in information technology, software development cost estimation, systems project management, pricing computer services, and strategic use of information technology.

412 E-Business Systems Development (3:3:0) Prerequisites: C or higher in MIS 301 and degree status. Introduces development of web-based information systems for E-business. Emphasizes technologies, methods, and application development tools. Requires team project and computer lab.

430 Data Warehousing and Data Mining (3:3:0) Prerequisites: C or higher in MIS 301 and MIS 310, degree status. Technologies and methods to develop decision support systems. Data warehousing and data mining techniques. Includes lab session and exercises. Term project required.

435 Knowledge Management (3:3:0) Prerequisites: C or higher in MIS 301 and MIS 310, degree status. Focuses on new trends on how knowledge management works for organizations, best strategy for such transition, and what are knowledge management elements.

440 E-Commerce Business Models and Applications (3:3:0) Prerequisites: C or higher in MIS 301 and MIS 310, degree status. Discusses business models on Internet, and applications in B2B and B2C Commerce. Term project.
450 Internet Architecture and Industry (3:3:0) Prerequisites: C or higher in MIS 301 and MIS 310, degree status. Overview of elements of Internet architecture. Analyzes economic and regulatory issues. Internet technology and industry trends. Includes lab sessions and exercises.

491 Seminar in Management Information Systems (3:3:0) C or higher MIS 301, degree status. Analyzes selected topics that highlight latest developments in information resource management field, including contemporary research findings and case studies of information systems in business and other organizations.

499 Independent Study in Management Information Systems (1–3:3:0) C or higher MIS 301, degree status. Must be arranged with instructor and approved in writing by associate dean for undergraduate programs before registration. Research and analysis of selected problems or topics in information resource management.

Marketing (MKTG)

School of Management

If a student takes noncore, upper-level business courses prior to acceptance to the School of Management, those courses will not count on an undergraduate degree application for any major in the school, except as general elective credit. A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

301 Principles of Marketing (3:3:0) Prerequisites: Sophomore standing and C or better in ACCT 203 and ECON 103. Examines marketing principles, concepts, strategies, tactics, and analytical tools used by profit and nonprofit organizations to market ideas, products, or services to selected target groups. Emphasizes how to promote, distribute, and price firm’s offering in dynamic economic, social, political, and international environment.

311 Sales Management (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Familiarizes students with marketing-sales interfaces including sales force role and capabilities, personal selling strategies, organizational relationships, and responsibilities of sales managers including training, motivating, and evaluating sales force.

312 Consumer Behavior (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Marketing strategy implications of concepts and propositions that compose consumer decision processes. Emphasizes lifestyle, situation, and information processing. Lecture and case analysis.

313 Integrated Marketing Communications (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. In-depth study and application of advertising and other forms of marketing communication with emphasis on role in marketing planning. Study includes identification of relevant data to analyze marketing situation, development of product position, marketing and marketing communications objectives, creative strategy, media planning, and evaluation.

315 Internet Marketing (3:3:0) Prerequisites: C or higher in MKTG 301 and MIS 301, degree status. Explores impact of Internet technology on marketing strategy and practice. Topics include opportunities and challenges created by Internet in areas such as advertising and promotion, customer service, pricing, retailing (including electronic commerce), distribution channels, and customer relationship management.

322 Retailing and E-Commerce Management (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Comprehensive view of retailing as it relates to total marketing process. Emphasizes retail decision alternatives used when formulating retail strategies, particularly Internet.

333 Business to Business Marketing (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Examines unique challenges and opportunities of marketing systems among suppliers, manufacturers, resellers and government.

351 Marketing Research Techniques and Applications (3:3:0) Prerequisites: C or higher in OM 210 and MKTG 301, degree status. Study of concepts, theories, and principles underlying marketing research process. Focuses on development and evaluation of research designs for gathering marketing information.

407 International Marketing (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Multidisciplinary approach to international marketing from viewpoint of business management. Examines major marketing issues affecting companies operating in a global environment. Students achieve understanding of economic, political, and cultural differences among nations as they affect marketing opportunities and operations, and develop skills to identify and evaluate international marketing opportunities.

451 Competitive Intelligence and Information Security (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Develops understanding of benefits to commerce and society because of Internet-based commerce, escalating threats against Internet-based marketing initiatives, and protection of knowledge-based assets of firms.

471 Marketing Management (3:3:0) Prerequisites: Senior standing; C or higher in MKTG 301, 312 and 351; degree status. Emphasizes managerial aspects of marketing, including developing marketing strategies and plans, and integrating specific elements of marketing process. Emphasizes case analysis.

481 Marketing in the Nonprofit Sector (3:3:0) Prerequisites: C or higher in MKTG 301, degree status. Discusses unique problems of marketing in nonprofit organizations, including government, and their solution through applying traditional and innovative techniques. Explains how to market commercial ventures owned by nonprofits.

491 Special Topics in Marketing (3:3:0) Prerequisites: C or higher in MKTG 301, 9 credits of marketing, degree status. In-depth treatment in seminar format of contemporary topics in marketing. Culminates in preparation of substantial paper and oral presentation.

499 Independent Study (1–3:3:0) Prerequisite: 90 credits (senior class standing) and a minimum of 24 credits of business courses, including principles of marketing, finance, and management. Primary research proposal in marketing area. Requires prior approval from instructor and associate dean for undergraduate programs.
Courses

Master of Business Administration (MBA)

School of Management

603 Managerial Economics and Decisions of the Firm (3:3:0) Prerequisite: admission to MBA or MSA program. Provides fundamental understanding of applying microeconomics concepts to managerial decision making. Explores principles of microeconomic theory, including market supply and demand, production and cost functions, industry structure, and product and resource pricing.

612 Managing Costs and Evaluating Performance (1.5:1.5:0) Prerequisite: admission to MBA program and MBA 613. Examines impact of cost and cost allocation on performance and evaluation.

613 Financial Reporting and Decision Making (3:3:0) Prerequisite: admission to MBA program. Foundation course focusing on economics and analysis of business transactions and related financial reporting issues. Topics include introduction to accounting framework used in financial reporting; and analysis of financial statements, economic events and their impact on financial reports, and impact of accounting methods on financial reports.

623 Marketing Management (3:3:0) Prerequisite: admission to MBA program. Develops market-based knowledge and skills for effective marketing decision making, strategy design, implementation, and evaluation in wide variety of institutional and competitive situations. Emphasis on case studies, team work, and projects.

633 Statistics for Business Decision Making (3:3:0) Prerequisite: admission to MBA or MSA program. Uses statistical methods as analytical tools for understanding and solving business problems and supporting business decision making. Extensive use of applied business scenarios to illustrate concepts and computer software for data analysis.

638 Managing Operations and Technology for the Digital Enterprise (3:3:0) Prerequisite: admission to MBA or MSA program. Focuses on design, planning, and control activities to produce and deliver goods and services in modern organizations. Introduces wide range of operations management decisions, such as operations strategy, process analysis and design, capacity planning, supply chain management, total quality management, and project management. Uses quantitative modeling, case studies, and computer software to analyze and solve operations management problems.

643 Managerial Finance (3:3:0) Prerequisite: admission to MBA or MSA program. Introduces theory and practice of finance within corporations. Topics include intertemporal choice, valuation, capital budgeting and structure, working capital management, and risk and return analysis.

653 Organizational Behavior and Human Resource Management (3:3:0) Prerequisite: admission to MBA or MSA program. Emphasizes development of conceptual tools for understanding and analyzing individual and group behavior in organizations and organizational processes. Considerable focus on developing relevant skills for working in groups and teams. Lectures, discussions, case analyses, and class exercises.

673 Legal Environment for Management (1.5:1.5:0) Prerequisite: admission to MBA program. Examines fundamental legal concepts and doctrines from a variety of subject areas of the legal environment of business and examines how they can be applied to guide and enhance the decision-making processes of managers in the global economy. The importance of ethical behavior in business is also addressed. Lectures, class discussions, cases, and projects.

678 Strategy and Organizational Leadership (3:3:0) Prerequisite: admission to MBA program. Capstone course focusing on strategy development at business unit and corporate level. Cases, readings, and project format familiarize students with strategic management function and develop analytical, organizational, and formatting skills to analyze complex business situations. Provides opportunities to integrate knowledge gained in prior course work.

701 Business Analysis and Valuation (3:3:0) Prerequisite: completion of MBA or MSA core requirements, or permission of instructor. Applies theories and methods of corporate financial management to series of complex cases. Topics include capital projects as real options, cost of capital and capital structure, firm valuation, project finance, and merger and acquisition analysis.

703 Financial Markets (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Explores relationship among financial markets including global equity markets, U.S. Treasury securities, and exchange-traded and over-the-counter financial derivative instruments such as futures, options, swaps, and asset-backed securities.

704 Risk Management and Financial Innovation (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Considers how to identify, measure, and manage financial risk using innovative financial instruments and diversification strategies. Focuses on derivatives as tools in risk-management plans.

705 Venture Capital and Private Finance (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Considers market microstructure of venture capital and private finance: costs and benefits from employing private financing, interaction between the financiers and entrepreneurs, financial analysis of potential ventures, and investor exit strategies.

706 Investment Analysis (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Focuses on analyzing equity securities and debt instruments given implications of efficient market hypothesis and modern capital market theory.

708 Taxes and Business (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Provides framework for making managerial decisions in global tax environment. Examines business decisions such as location of facilities, employee compensation, mergers and acquisitions, capital and asset structure, and business form.

711 Entrepreneurship (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Considers fundamental aspects of entrepreneurship and process of
new venture creation. Draws on broad range of business disciplines including management, marketing, finance, and accounting to develop evaluation and execution skills.

712 Project Management (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Focuses on designing, planning, monitoring, and controlling projects. Involves practical examination of how projects should be managed from start to finish, including specific emphasis on how to avoid common pitfalls.

713 Human Resource Management (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. This course will approach strategic human resource functions from both a general manager and HR perspective. Students in this course will be acquainted with current talent management matters facing organizations in today’s business environment and will be challenged to generate and debate creative solutions to prevalent issues. Topics include hiring (recruiting/interviewing), firing, rewarding, compensating, managing performance, global HR issues, and security and health.

714 Managing Growth of Small Businesses (3:3:0) Prerequisite: completion of MBA core; MBA 711 recommended. Focuses on unique challenges faced by small and entrepreneurial firms that seek long-term growth. Builds on concepts and knowledge of creating start-up company, and introduces processes and strategies required to become significant player in industry segment. Designed for students interested in understanding opportunities and problems in their own businesses, employment in small or entrepreneurial businesses, or exploring corporate entrepreneurship within large firms.

715 Advanced Project and Program Management (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Examines advanced topics in project and program management with specific attention to issues and skills that managers need to effectively manage multiple projects and programs. Topics include project selection, multiple project resource allocation, and organization of project office.

716 International Business Strategy (3:3:0) Prerequisites or corequisites: completion of MBA core requirements. Focuses on the globalization of business activities, the strategic challenges faced by companies in global competition, and how companies strategically respond to these new competitive challenges.

717 International Finance (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Advanced analysis of managing firm’s international financial operations. Topics include currency risk, political risk, returns and funding of international projects, international markets and accounting, and cost of capital. Lecture, discussion, readings, and cases.

718 International Marketing (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Addresses marketing process for products and services within major international markets. Topics include marketing mix strategies using standardization, localization, or globalization approaches. Emphasizes the introduction of service innovations and new products in the global market.

719 Entrepreneurship Laboratory (1:0:1) Prerequisites: completion of MBA core requirements and permission of instructor. Permits MBA students to work with entrepreneurial community to gain first-hand knowledge of process of soliciting second-stage funding for new businesses, evaluating applications for second-stage funding, consulting for entities seeking funding, and negotiations for obtaining second-stage funding. May be repeated three times in different semesters.

721 Marketing Decision Systems (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Develops skills to plan and implement effective marketing research studies. Topics include research design, data collection, statistical analysis, and use of database systems. Offers perspective on how managers can use market data to develop successful product or service strategies.

722 Consumer Behavior (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Examines behavioral science concepts to understand and predict customer decision making, including demographics, psychographics, attitude formation and change, perception, and learning. Emphasizes applications of product and service strategies, focusing on customer segmentation, satisfaction, and loyalty.

723 Supply Chain Management (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Examines logistics of supply chain systems, including inventory management, distribution channels, and information systems. Emphasizes strategic alliances and international issues.

724 Marketing Communications (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Examines all forms of communication and sources of brand or company contacts as potential message channels in building relationship with customers. Focuses on integrated planning process for all communication elements, including consumer and trade advertising, public relations, direct and database marketing, promotions, and sales presentations to achieve synergy in communicating with various constituencies.

725 Leadership (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Overview of major conceptualizations of leadership and motivation in organizations. Integrates theory, research, and applications. Students apply principles of leadership and motivation to their own work situations and case evaluation.

726 Negotiations (3:3:0) Prerequisite: Completion of MBA core. Focuses on theory, processes, and practice of negotiation within and across organizations, including attention to ethical issues. Explores systematic ways to increase quality of negotiated agreements, including methods of preparation, effective communication, and various strategies to increase power. Format includes negotiation exercises, lecture, and discussion.

731 Business Systems Development (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Studies methods and tools for analyzing and designing business information systems with emphasis on business processes. Topics include data modeling, process modeling, interaction analysis, and user interface.

732 Knowledge Management (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Examines firms that use knowledge management principles
and approaches: intellectual capital, human capital, customer capital, tacit and explicit knowledge, new role of chief knowledge officer, leveraging of knowledge management.

733 Business Data Communications (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Introduces data communications and telecommunications technologies and application in business, including LANs, WANs, PBXs, voice services, network operating systems, corporate internetworking, and Internet. Analyzes data communications industry, and business applications in manufacturing and service sectors, along with regulatory issues and impact of globalization.

734 Electronic Commerce and E-Business (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Focuses on financial fraud such as bribery, contract rigging and kickbacks, embezzlement, fraudulent financial reporting, payroll fraud, and misappropriation of inventory and other assets.

735 Systems Thinking and Business Simulation (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Systems approach to design, analysis, and improvement of cross-functional business processes. Uses business-simulation software for modeling and analysis. Application areas include E-commerce, online services, and technology management.

737 Information Technology Governance and Policy (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Considers specific objectives of IT governance and policy, frameworks that help chart roadmap for this function, and tools and techniques used in specific areas of IT governance.

738 Business Intelligence and Data Management (3:3:0) Prerequisite: completion of MBA core requirements, or permission of instructor. Examines how data warehouses and data mining are used to help businesses successfully gather, structure, analyze, understand and act on relevant data, both operational and contextual.

741 Information Technology Auditing (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Introduces methodologies to assess security and control issues concerning computerized accounting and other information systems. Key feature of course is applying computer-assisted audit tools and techniques to test effectiveness of application.

742 Corporate Governance and Ethics (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Focuses on developing understanding of corporate governance issues and ethical decision-making. Topics include examination of internal and external and international governance issues, and ethical analysis in current business environment.

743 Corporate Financial Reporting (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Addresses contemporary issues in corporate financial reporting. Focuses on role of financial reporting in providing decision-useful information to participants of capital market, and theoretical and empirical assessments of performance.

744 Fraud Deterrence and Detection (3:3:0) Prerequisite: admission to MSA or MBA program, or permission of program director. Introduces strategies and techniques for fraud prevention and detection. Focuses on financial fraud such as bribery, contract rigging and kickbacks, embezzlement, fraudulent financial reporting, payroll fraud, and misappropriation of inventory and other assets.
meaning affect nature of organizational reality and professional’s practice. Special attention to developing skills for “double-loop learning,” and reflection in professional lives through journals, narrative, autobiography, and imaginative literature. Customized for each track; for detailed course content, contact appropriate program directors.

703 Technology and Learning in the New Professions (3:3:0) Examines enormous potential for enhancing the way organizations can learn, notably through developing Internet literacy, and skills in using differing Internet navigation tools. Focuses on applying technology to real-world problems in different professional work-sites, and offers in-depth training in use and development of groupware applications. Customized for each track; for detailed course content, contact appropriate program directors.

704 Research Methodologies in the New Professionalism (3:3:0) Corequisite: EDUC 597. Concentrates on understanding and using research methodologies from such varied sources as Friere, McKeon, and Janowitz, with a practical team activity in which students study organization or aspects of it, using ethnography, field study, or any appropriately defensible research methodology. Customized for each track; for detailed course content, contact appropriate program directors.

720 Learning Community (3:3:0) Only for MNPS in organizational learning degree candidates. Workshops, seminars, and reading groups involving at least 60 hours of contact time and culminating in two-day retreat during which candidates for MS in New Professional Studies (organizational learning) make presentations to class and faculty on research practica. Theme of module is communication, collaboration, and interaction in organizations. After initial one-and-a-half day workshop, MNPS candidates meet with all faculty once a month to give talks and presentations on application of ideas in their organizations, discuss issues in organizational learning, and provide feedback about using collaborative computing technology in learning process.

Master of New Professional Studies—Teaching (MNPE)

Graduate School of Education

700 The New Professionalism: Theory and Practice (3:3:0) Experientially explores personal philosophical and pedagogical assumptions, including ethical relationship between educators and children, ethical accountability and responsibility, ethos of institutions, professional’s role in sustaining ethical standards, and how these challenges guide our lives as citizens in a democracy.

702 The New Professional as a Reflective Practitioner (3:3:0) Examines central problems of epistemology, what is meant by “ways of knowing” and “reflective practitioner,” and what they imply for professional learning. Special attention to developing skills for reflective practice through journals, narrative autobiography, and imaginative literature; and to considering how personal and professional identity is influenced by personal intentions and commitments to learning and schooling.

703 Technology and Learning in the New Professions (3:3:0) Uses various technological modes to sustain and enhance learning community. By learning and using technology such as e-mail, electronic conferences, and Internet, teachers further develop computer literacy and develop sharpened critiques regarding possibilities and concerns brought about by using technology in learning environments.

704 Research Methodologies in the New Professionalism (3:3:0) Corequisite: EDUC 597. Introduces qualitative approach to research as individual school-based projects are undertaken. Draws on “action research,” which starts with participants describing reality as they see it, reflecting on it, and deriving theories and action strategies immediately applicable to concrete situations. Emphasizes understanding and using various research methodologies as innovative approaches to teaching and learning are developed.

Mathematical Sciences (MATH)

Mathematical Sciences

Knowledge of high school algebra is a prerequisite for all mathematics courses. In exceptional cases, the prerequisite for a course above the calculus sequence may be waived at the discretion of instructor.

105 Precalculus Mathematics (3:3:0) Prerequisites: high school algebra I, algebra II, and geometry, and specified score on Math Placement Test; or successful completion of self-paced algebra tutorial program offered by Math Literacy Center. Call Mathematical Sciences Department at 703-993-1460 for details. Reviews mathematics skills essential to studying calculus. Topics include equations, inequalities, absolute values, graphs, functions, exponential and logarithmic functions, and trigonometry. May not be used as credit toward BA or BS in mathematical sciences. This course does not satisfy the university’s quantitative reasoning requirement for the BA degree. May not be taken for credit after receiving grade of C or better in any MATH course numbered 113 or higher.

106 Quantitative Reasoning (3:3:0) Prerequisite: specified score on Math Placement Test, or successful completion of self-paced Basic Math Program offered by Math Literacy Center. Quantitative skills for real world. Topics include critical thinking, modeling by functions, graphs, growth, scaling, probability, and statistics.

108 Introductory Calculus with Business Applications (3:3:0) Prerequisite: specified score on Math Placement Test, or successful completion of self-paced algebra program offered by Math Literacy Center. Call Mathematical Sciences Department at 703-993-1460 for details. Functions, limits, derivative, and integral. Applications of differentiation and integration. Students who have received credit for MATH 113 or 114 may not receive credit for this course.

110 Introductory Probability and Statistics (3:3:0) Prerequisite: specified score on Math Placement Test, or successful completion of self-paced Basic Math Program offered by Math Literacy Center. Elementary set theory, probability, and statistics.

111 Linear Mathematical Modeling (3:3:0) Prerequisite: specified score on Math Placement Test, or successful completion of self-paced basic math program offered by Math Literacy Center. Matrix algebra, systems of linear equations, Markov chains, difference equations, and data fitting.
112 Discrete Mathematics for BSIT (3:3:0). Prerequisite: specified score on Math Placement Test, or successful completion of self-paced Algebra Tutorial Program offered through Math Learning Center. Introduces ideas of discrete mathematics including mathematical induction, sets, logic, graphs, trees, basic counting arguments, and discrete probability. Students who have received credit for MATH 125 may not receive credit for this course. Intended for BSIT students; does not count toward a major or minor in mathematics.

113 Analytic Geometry and Calculus I (4:4:1) Prerequisites: thorough understanding of high school algebra and trigonometry, and specified score on Math Placement Test; or grade of C or better in MATH 105. Functions, limits, the derivative, maximum and minimum problems, the integral, and transcendental functions.

114 Analytic Geometry and Calculus II (4:4:1) Prerequisite: grade of C or better in MATH 113. Methods of integration, conic sections, parametric equations, infinite series, and power series.

115 Analytic Geometry and Calculus I (Honors) (4:4:1) Prerequisite: placement or permission of department. More challenging version of MATH 113. Functions, limits, the derivative, maximum and minimum problems, the integral, and transcendental functions.

116 Analytic Geometry and Calculus II (Honors) (4:4:1) Prerequisite: successful completion of MATH 115, or grade of A in MATH 113 and recommendation of MATH 113 instructor. More challenging version of MATH 114. Methods of integration, conic sections, parametric equations, infinite series, and power series.

125 Discrete Mathematics I (3:3:0) Prerequisite: specified score on Math Placement Test, or successful completion of self-paced algebra program offered by Math Literacy Center. Introduces ideas of discrete mathematics and combinatorial proof techniques including mathematical induction, sets, graphs, trees, recursion, and enumeration.

203 Matrix Algebra (3:3:0) Prerequisite: MATH 114 or permission of instructor. Systems of linear equations, linear independence, linear transformations, inverse of a matrix, determinants, vector spaces, eigenvalues, eigenvectors, and orthogonalization.

213 Analytic Geometry and Calculus III (3:3:0) Prerequisite: grade of C or better in MATH 114. Partial differentiation, multiple integrals, line and surface integrals, and three-dimensional analytic geometry.

214 Elementary Differential Equations (3:3:0) Prerequisite: MATH 213 or 215. First-order ODEs, higher-order ODEs, Laplace transforms, linear systems, nonlinear systems, numerical approximations, and modeling.

215 Vector Calculus (3:3:0) Prerequisites: permission of instructor, and MATH 113 and 114. Vectors and vector-valued functions, partial differentiation, multiple integrals, line integrals, surface integrals, and transformation of coordinates.


271 Mathematics for the Elementary School I (3:3:0) Concepts and theories underlying elementary school mathematics, including problem solving, whole numbers and numeration, whole numbers operations and properties, number theory, fractions, decimals, ratio and proportion, and integers. Intended for school educators; does not count toward major in mathematics.

272 Mathematics for the Elementary School II (3:3:0) MATH 271 recommended before enrolling. Continuation of MATH 271. Topics include rational and real numbers, introduction to algebra, geometry, statistics, and probability. Intended for school educators; does not count toward major in mathematics.

290 Introduction to Advanced Mathematics (3:3:0) Prerequisite: MATH 114. Set theory; graphs; functions; equivalence relations and partitions; partially ordered sets; induction; construction of the natural, rational, real, and complex number systems; well-ordering principle; and cardinality. Primarily intended for mathematics majors.

301 Number Theory (3:3:0) Prerequisite: 6 math credits. Prime numbers, factorization, congruences, and Diophantine equations.

302 Geometry (3:3:0) Prerequisite: 6 math credits. Fundamental concepts of incidence. Axioms of Euclidean geometry and the resulting theory, and axioms and development of non-Euclidean and projective geometry.

313 Introduction to Applied Mathematics (3:3:0) Prerequisite: MATH 213. Vector differential calculus, vector integral calculus, Fourier analysis, and complex analysis.


315 Advanced Calculus I (3:3:0) Prerequisites: MATH 213 and 290. Number system, functions, sequences, limits, continuity, differentiation, integration, transcendental functions, and infinite series.

316 Advanced Calculus II (3:3:0) Prerequisite: MATH 315. Sequences of functions, Taylor series, vectors, functions of several variables, implicit functions, multiple integrals, and surface integrals.

321 Abstract Algebra (3:3:0) Prerequisites: MATH 290 and 213 or 215. Theory of groups, rings, fields.

322 Linear Algebra (3:3:0) Prerequisites: MATH 290 and 203. Abstract vector spaces, linear independence, bases, linear transformations, matrix algebra, inner product, and special topics.

325 Discrete Mathematics II (3:3:0) Prerequisite: MATH 125. Advanced counting, binomial identities, generating functions, advanced recurrence, inclusion-exclusion, and network flows.

351 Probability (3:3:0) Prerequisite: MATH 213 or 215. Random variables, probability functions, special distributions, and limit theorems.

352 Statistics (3:3:0) Prerequisite: MATH 351. Estimation, decision theory, testing hypothesis, correlation, linear models, and design.
382 Introduction to Stochastic Processes (3:3:0) Prerequisite: MATH 351. General notion of stochastic processes, finite and infinite Markov chains, discrete and continuous Markov processes, stationary processes, random walk problems, birth and death processes, waiting line and serving problems, and Brownian motion.

400 History of Math (3:3:0) Prerequisites: completion or concurrent enrollment in all other required general education courses, and completion of MATH 290. Explores internal controversies and dynamics of mathematics in larger intellectual and social settings. Topics vary but might include differential equations devised for mechanics and astronomy by Euler, Lagrange, and Laplace; foundation of mathematical analysis from Cauchy to Weierstrass; algebras of Galois and Boole; or creation of non-Euclidean geometry and Cantor’s transfinite sets. Credits may not be used toward “upper division” math hours required of math majors.

411 Functions of a Complex Variable (3:3:0) Prerequisite: MATH 214 or 216. Analytic functions, contour integration, residues, and applications to such topics as integral transforms, generalized functions, and boundary value problems.

413 Modern Applied Mathematics I (3:3:0) Prerequisites: MATH 203, and 214 or 216. Synthesis of pure mathematics and computational mathematics. Emphasizes interplay between discrete and continuous mathematics. Mathematical structure revealed from equilibrium models in discrete and continuous systems.

414 Modern Applied Mathematics II (3:3:0) Prerequisite: MATH 413. Continuation of MATH 413, which involves synthesis of pure mathematics and computational mathematics. Fourier analysis and its role in applied mathematics developed (differential equations and approximations). Discrete aspects emphasized in computational models.

431 Topology (3:3:0) Prerequisite: MATH 315. Metric spaces, topological spaces, compactness, and connectedness.

441 Operations Research I (3:3:0) Prerequisite: MATH 203 or 216, or permission of instructor. Survey of deterministic methods for solving real-world decision problems. Programming model and simplex method of solution, duality and sensitivity analysis, transportation and assignment problems, shortest path and maximal flow problems, project networks including PERT and CPM, introduction to integer and nonlinear programming, dynamic programming and game theory. Emphasizes modeling and problem solving.

442 Operations Research II (3:3:0) Prerequisite: MATH 351, or permission of instructor. Survey of probabilistic methods for solving real-world decision problems. Probability review, queuing theory, inventory theory, Markov decision processes, reliability, decision theory, simulation. Emphasizes modeling and problem solving.

446 Numerical Analysis I (3:3:0) Prerequisites: MATH 203 and CS 112. Significant figures, round-off errors, iterative methods of solution of nonlinear equations of a single variable, solutions of linear systems, iterative techniques in matrix algebra, interpolation and polynomial approximation.

447 Numerical Analysis II (3:3:0) Prerequisites: MATH 214 or 216, and 446. Numerical differentiation and integration, initial-value and boundary-value problems for ordinary differential equations, methods of solution of partial differential equations, iterative methods of solution of nonlinear systems, approximation theory.

491, 492 Reading and Problems (1–3:0:0), (1–3:0:0) For mathematical sciences majors only. Independent study in math. Must be arranged with instructor before registering.

493 Topics in Applicable Mathematics (3:3:0) Prerequisite: 6 credits of math at or above 310 level. Topics that have been successfully used in applications of mathematics. Subject determined by instructor.

494 Topics in Pure Mathematics (3:3:0) Prerequisite: 6 credits of math at or above 310 level. Topics of pure math not covered in other courses. Topics might include Galois theory, cardinal and ordinal arithmetic, measure theory, mathematical logic, and differential geometry. Subject determined by instructor.

Prior knowledge of linear algebra and single and multivariable calculus assumed in all math graduate courses. A double number separated by a comma (MATH 355, 556) indicates both graduate courses normally constitute a sequence, and the first semester is prerequisite to the second. The prerequisite may be waived by permission of department chair. See also STAT and OR courses.

551 Regression and Time Series (3:3:0) Prerequisites: MATH 352, STAT 652, SOA Exam P, or permission of instructor. Mathematics of regression, exponential smoothing, time series, and forecasting. Material included in this course constitutes Society of Actuaries Validation by Educational Experience (VEE) for applied statistics and corresponds to part of Casualty Actuary Society Exam 3.

554 Financial Mathematics (3:3:0) Prerequisite: MATH 113, corequisite: MATH 114. Simple and compound interest, annuities, present and future value, yield rates, capital budgeting, amortization schedules, mortgages, bonds. Material corresponds to the Society of Actuaries Exam: Financial Mathematics (FM). Not appropriate for graduate science and engineering majors not considering actuarial or financial career. Cannot be counted toward MS or PhD degree in mathematics.

555, 556 Actuarial Modeling I, II (3:3:0) Prerequisites: MATH 554 and either MATH 351 or STAT 344. Two-semester sequence covering portions of the material corresponding to the Society of Actuaries Exam M, Casualty Actuary Society Exam 3, and Joint Board Exam EA1. The remaining material for these exams is covered in MATH 551 and 653. Topics include survival distribution and life tables, life insurance, life annuities, net premiums, net profits, net premium reserves, multiple life and multiple decrement models, pensions, insurance models including expense, and nonforfeiture benefits and cash values.

600 Special Topics in Mathematics (1–6:1–6:0) Mathematical workshops, special courses, or other projects.

601, 602 Analysis I, II for Teachers (3:2:1) Open to in-service teachers of mathematics at middle or secondary level. Others may enroll with permission of instructor. Background in mathematics desirable but not necessary. Some topics from college algebra will be reviewed in class, but thorough understanding of high school algebra and trigonometry expected. Develops continuous ideas of calculus with particular emphasis on concepts as opposed to computational aspects of calculus. Specific topics include derivative representation of real numbers, sequences, series, and limits; differentiation to find speed, slopes of curves, and tangents; integration to find volumes and distances and
area under curves. Optimization problems including maximization of area and volume, and modeling of these concepts. Graphing techniques supported by theory of calculus and graphing utilities such as TI-83 calculator or computer software such as Maple.

604 Geometry for Teachers (3:2:1) Open to in-service teachers of mathematics at middle or secondary level. Others may enroll with permission of instructor. Background in mathematics desirable but not necessary. Thorough understanding of high school algebra assumed. Discusses finite mathematics in juxtaposition to continuous ideas of calculus. Topics may consist of elementary counting and combinatorics including recursion and difference equations and their analogy to calculus; thorough discussion of probability and central measures of statistics; and graph theory and its connection to geometry.

605 Discrete/Finite Mathematics for Teachers (3:2:1) Open to in-service teachers of mathematics at middle or secondary level. Others may enroll with permission of instructor. Background in mathematics desirable but not necessary. Thorough understanding of high school algebra assumed. Expands on customary operations on integers and rationals to discuss systems that mimic these operations. Emphasizes multiplicative and additive inverses and their corresponding identities as they occur in other systems. Topics might include permutation groups, rigid transformations, groups of symmetry of the plane and connection to geometry, and matrices treated as linear transformations and connections to solutions of systems of equations.

608 Problem Solving in Mathematics (3:2:1) Open to in-service teachers of mathematics at middle school level. Others may enroll with permission of instructor. Background in mathematics or science desirable but not necessary. Assumes exposure to most of topics covered in MATH 601, 604, 605, and 607. Introduces variety of challenging mathematical problems appropriate for middle school student to analyze, and solving problems using mathematics learned in previous courses. Also asks students to search for such problems and orally present solutions. Specific topics might be any course listed as prerequisites.

619 Topics in Mathematical Logic (3:3:0) Special topics in foundations of mathematics not included in regular mathematics curriculum. May be repeated for credit.

621 Algebra I (3:3:0) Prerequisite: familiarity with basic properties of groups and rings, or permission of instructor. Groups, linear algebra, and matrix groups.

625/CSI 740 Numerical Linear Algebra (3:3:0) Prerequisite: computer literacy, including some programming experience. Theory and development of numerical algorithms for solving variety of matrix problems: linear equations, least squares problems, eigenvalue problems, and singular value decomposition. Direct and iterative method, analysis of sensitivity to rounding errors, and applications.

629 Topics in Algebra (3:3:0) Special topics in pure or applied algebra not covered in regular algebra sequence. May be repeated for credit.

631 Topology I: Topology of Metric Spaces (3:3:0) Prerequisite: MATH 315 or equivalent. Covers definition and basic examples of metric spaces, open and closed sets, subsets and finite products, sequences and convergence, compactness and separability, continuous functions, uniform continuity, metric space C(X) and uniform convergence, and homotopy.

641 Combinatorics and Graph Theory (3:3:0) Prerequisite: MATH 321 or equivalent. Covers enumerative combinatorics, including partially ordered sets; Moebius inversion and generating functions; and major topics in graph theory such as graph coloring, Ramsey theory, and matching.

644 Convex and Discrete Geometry (3:3:0) Prerequisites: MATH 203 and 290, or equivalent. Basic properties of Euclidean space, convex sets and convex cones, convex hulls, extremal structure of convex sets, support and separation properties, polyhedra and polytopes, special classes of convex sets, Helly-type theorems, selected problems of discrete geometry.

653 Actuarial Modeling III (3:3:0) Prerequisite: MATH 351 or STAT 644 required. MATH 555 recommended but not required. Economics of insurance, individual risk models for short term, collective risk models for single period, collective risk models over an extended period, and applications of risk theory. Material included in this course corresponds to portions of the Society of Actuaries Exam M and Casualty Actuary Society Exam 3. The remaining material for these exams is covered in MATH 551, 555, and 556.

654 Construction and Evaluation of Actuarial Models (3:3:0) Prerequisite: MATH 556 or permission of instructor. Nature and properties of survival and loss models, methods of estimates from complete and incomplete data, tabular and parametric models, and practical issues in survival model estimation. Material included in this course corresponds to most of the Society of Actuaries Exam C and Casualty Actuary Society Exam 4.

655 Pension Valuation (3:3:0) Prerequisite: MATH 556, SOA Exam EA-1, or permission of instructor. Basic mathematics used in pension actuarial work without regard to pension law. Material included in this course corresponds to all of the Joint Board Exam EA-2A and portions of the Society of Actuaries Exam 8. This course cannot be counted toward the MS or PhD degree in mathematics.

661 Complex Analysis I (3:3:0) Topology of complex numbers, holomorphic functions, series, complex integration. Meromorphic, multivalued, and elliptic functions.

671 Fourier Analysis (3:3:0) Study of fundamental ideas in Fourier analysis. Topics include orthonormal systems, Fourier series, continuous and discrete Fourier transform theory, generalized functions, and introduction to spectral analysis. Uses applications to physical sciences, linear systems theory, and signal processing to integrate topics.

673 Dynamical Systems (3:3:0) Prerequisites: elementary courses in linear algebra and differential equations. Contemporary topics in dynamical systems illustrated in mathematical models from physics, ecology, and population dynamics. Traditional qualitative analysis of difference and differential equations provides background for under-
standing chaotic behavior when it occurs in these models. Topics include stability theory, fractals, Lyapunov exponents, and chaotic attractors.

674 Stochastic Differential Equations (3:3:0) Prerequisites: MATH 214 and 351. Introduces stochastic calculus and differential equations. Includes Wiener process, Ito and Stratonovich integrals, Ito formula, martingales, diffusions, and applications. Simulations and numerical approximations of solutions.

675 Linear Analysis I (3:3:0) Prerequisite: MATH 315 or equivalent. Metric spaces, normed linear spaces, completeness, compactness, continuous (bounded) linear transformations, Banach spaces, Hilbert spaces, and orthogonal series.


678 Partial Differential Equations (3:3:0) Prerequisite: elementary differential equations course. Physical examples, characteristics, boundary value problems, integral transforms, and other topics, such as variational, perturbation and asymptotic methods.

679 Topics in Analysis (3:3:0) Special topics not covered in regular analysis sequence. May be repeated for credit.

680 Industrial Mathematics (3:3:0) Takes examples from industry and goes through complete solution process: formulation of mathematical model of problem; solution, possibly by numerical approximation; and interpretation and presentation of results. Emphasizes working in groups, relating mathematics to concrete situations, and communication and presentation skills.

682/OR 641 Linear Programming (3:3:0) Prerequisite: OR 541, or permission of instructor. Takes in-depth look at simplex method. Includes computational enhancements such as revised simplex method, sparse-matrix techniques, bounded variables and generalized upper bounds, and large-scale decomposition methods. Also includes computational complexity of simplex algorithm, and Khachian and Karmarkar algorithms.

683 Modern Optimization Theory (3:3:0) Introduces basic mathematical ideas and methods for solving linear and nonlinear programming problems, with emphasis on mathematical aspects of optimization theory. Reviews classical topics of linear programming, and covers recent developments in linear programming including interior point method. Considers basic results in nonlinear programming, including very recent developments in this field. Literature review, project report, or other written product is list is normally submitted as part of the request for approval.

685 Numerical Analysis (3:3:0) Prerequisite: computer literacy, including some programming experience. Computational techniques for solving problems arising in science and engineering. Includes theoretical development as well as implementation, efficiency, and accuracy issues in using algorithms and interpreting results. Specific topics include linear and nonlinear systems of equations, polynomial interpolation, numerical integration, and introduction to numerical solution of differential equations.

686 Numerical Solutions of Differential Equations (3:3:0) Prerequisites: MATH 446 or 685, and elementary differential equations course. Finite difference methods for initial value problems, two-point boundary value problems, Poisson equation, heat equation, and first-order partial differential equations.

687 Variational Methods (3:3:0) Prerequisites: MATH 446 or 685, and elementary differential equations course. Weak formulation of partial differential equations, energy principles, Galerkin approximations, and finite element methods. Includes review and development of necessary analysis.

689 Topics in Applied Mathematics (3:3:0) Special topics in applied math not covered in the regular applied math sequence. May be repeated for credit.

697 Independent Reading and Research (1–6:0:0) In areas of importance, but with insufficient demand to justify a regular course, students may undertake a course of study under the supervision of a consenting faculty member. Written statement of the content of the course and a tentative reading list is normally submitted as part of the request for approval. Literature review, project report, or other written product is normally required. May be repeated as necessary.

721 Algebra II (3:3:0) Prerequisite: MATH 621. Rings, fields, Galois theory.

722 Algebraic Topology (3:3:0) Prerequisites: MATH 621 and 631, or equivalent. Covers simplices and simplicial complexes, cycles and boundaries, simplicial homology, homological algebra, homotopy and the fundamental group, cohomology.

723 Combinatorial Structures (3:3:0) Prerequisite: MATH 321 or equivalent. Studies structural properties of objects encountered in pure and applied combinatorics. Topics include partially ordered sets, codes, designs, matroids, buildings, symmetrical structures, permutation groups, and face lattices of polytopes.

724 Commutative Algebra (3:3:0) Prerequisite: MATH 621. Study of commutative rings and their ideals, and of modules over commutative rings and their homological properties. More specific topics include Noetherian rings, primary decomposition, completions, graded rings and dimension theory with applications to algebraic geometry.

732 Topology II: Set-Theoretic Topology (3:3:0) Prerequisites: MATH 631 or equivalent. Topics include review of basic set theory (including cardinal numbers products of sets, the Axiom of Choice), definition of topological spaces, bases for topological spaces, forming new topological spaces by taking subspace, quotients, and products, separation properties (Hausdorff, regular, Tychonoff, and normal spaces) compactness, the Lindelof property, separability, connectedness, continuity and homeomorphism, manifolds.

739 Topics in Differential Geometry and Topology (3:3:0) Prerequisite: MATH 631 or equivalent. Topics include geometry of curves and surfaces, curvature, isometries, the Gauss-Bonet theorem, geodesics, differential forms, manifolds, smooth maps, vector fields, the Euler characteristic, integration on manifolds, de Rham cohomology.

762 Complex Analysis II (3:3:0) Prerequisite: MATH 661. Harmonic functions, generalizations of the maximum prin-
63 Functions of Several Complex Variables (3:3:0) 
Prerequisite: MATH 661 and 762, or equivalent preparation in one complex variable. Covers the important results for analytic functions in several variables, including analyticity in several variables and the differences between the theory of one and the theory of several complex variables.

772/CSI 746 Wavelet Theory (3:3:0) 
Prerequisite: MATH 315 or equivalent. Study of the theory and computational aspects of wavelets and the wavelet transform. Emphasizes computational aspects of wavelets, defining the Fast Wavelet Transform in one and two dimensions. Developing the appropriate numerical algorithms. Includes developing the theory of wavelet bases on the real line, discussing multi-resolution analysis, splines, time-frequency localization, and wavelet packets.

776 Linear Analysis II (3:3:0) 
Prerequisite: MATH 675. Lebesque measure and integration. Theory of $L^p$ spaces with $p$ between one and infinity on the real line. Theory of linear operators on Banach spaces, including the Hahn-Banach Theorem, Open Mapping Theorem, Closed Graph Theorem and the Uniform Boundedness Principle.

795 Graduate Seminar (1:1:0) 
Prerequisite: admission to PhD program in mathematical sciences. Mandatory for all PhD students. Weekly seminar graded on presentations and attendance. Faculty presentations on potential thesis topics and presentations by students.

799 Thesis (1–6:0:0) 
Original or compulsory work evaluated by committee of three faculty members. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) 
Prerequisite: admission to PhD in education program to study in mathematical sciences. Program of studies designed by student’s discipline director and approved by student’s doctoral committee, which brings the student to participate in current research of discipline director and results in paper reporting the original contributions of student. Enrollment may be repeated.

998 PhD Thesis Proposal (1:1:0) 
Prerequisite: passing grade on qualifying exam. Work on research proposal that forms basis for doctoral dissertation. May be repeated for credit. No more than 24 credit hours of 998 and 999 may be applied to doctoral degree requirements. Graded S/NC.

999 PhD Thesis Credits (1:1:0) 
Prerequisite: advancement to candidacy. Formal record of commitment to doctoral dissertation research under the direction of a faculty member. May be repeated for credit. No more than 24 credit hours of 998 and 999 may be applied to doctoral degree requirements. Graded S/NC.

Medical Technology (MTCH)

Biology

200 Introduction to Medical Technology (1:1:0) 
Introduction to the profession of medical technology.

Prerequisite for the following courses: completion of requirements for BS with major in medical technology except for 30 credits of professional study, and admission to school of medical technology approved by National Accrediting Agency for Clinical Laboratories.

401 Orientation to the Problems and Practices of the Clinical Laboratory (1–2:0:0) 
Orientation to clinical lab; specimen collection and record keeping; management principles and problems; educational theories as they apply to the teaching of clinical laboratory procedures; and quality control principles. Not offered on campus.

402 Clinical Hematology and Coagulation (1–8:0:0) 
Morphology of blood cells in health and disease; theories of hematopoiesis and coagulation; techniques for measurement of hematologic parameters; and hematologic pathologies and their lab evaluation. Not offered on campus.

403 Clinical Microscopy (1–3:0:0) 
Methods for the routine examination of urine, feces, and certain other body fluids, especially the microscopic identification of normal and pathologic components. Includes a study of the kidney and theories of microscopy. Not offered on campus.

404 Serology and Immunohematology (1–7:0:0) 
Clinical lab procedures involving antigen-antibody reactions, and theoretical bases of such procedures. Includes both diagnostic and blood bank techniques. Not offered on campus.

405 Clinical Microbiology (1–8:0:0) 
Biology and pathology of bacteria, rickettsia, fungi, parasites, and viruses of clinical importance and their culture and identification. Not offered on campus.

406 Clinical Chemistry (1–10:0:0) 
Chemical reactions and procedures used in clinical determinations on blood, urine, and cerebral spinal fluid. Includes manual, automated methods of chemical analyses. Not offered on campus.

Military Science (MLSC)

ROTC

100 Leadership Skills I (0:2:2) 
Introduces leadership values and ethics; responsibilities of officership; the organization, customs, and traditions of the US Army; time management; and physical well-being. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

101 Leadership Skills II (0:2:2) 
Introduces leadership principles, dimensions, styles, and assessment, among other varied topics. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

200 Leadership Skills III (0:2:2) 
Prerequisite: MLSC 100 and 101, or approval of professor of military science. Covers leadership skills, such as values and ethics; how to influence, how to communicate, how and when to make decisions, how to engage in creative problem solving, and how to plan and organize. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

201 Leadership Skills IV (0:2:2) 
Prerequisite: MLSC 200. Builds on the leadership skills developed in Leadership Skills III with additional emphasis on communication, team building, and team leadership. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

300 Applied Leadership I (1:2:2) 
Prerequisites: MLSC 100, 101, 200, and 201; and credit or veteran status with approval from military science professor. Applied leadership with an introduction to the principles of physical fitness and healthy lifestyle; counseling as means of subordinate development; problem solving; operational analysis, development,
and execution; and methods for preparing and presenting instruction. Students are given an introduction to the Leader Development Program that is used to evaluate their leadership performance and provide students with developmental feedback. Some weekend training required. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

301 Applied Leadership II (0:2:2) Prerequisite: MLSC 300. Applied leadership covering the models of communications (verbal and non-verbal), technology to communicate, how to prepare and conduct formal briefings, an introduction to the Army branches, diversity and equal opportunity training, ethical decision making, and group cohesion and dysfunction. Some weekend training required. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

400 Leadership and Management (3:3:2) Prerequisites: MLSC 300 and 301. Considered the "transition to lieutenant" phase in which managerial theories are applied to personnel, training, and logistics management situations. Students have command and staff responsibilities for the George Mason cadet corps and receive hands-on experience operating as a management team. There are several briefing and writing requirements as well. Includes a laboratory in applied science, common military tasks, and physical fitness.

401 Leadership and Ethics (3:3:2) Prerequisite: MLSC 400, 300, or 301. Continuing the "transition to lieutenant" phase of ROTC, examines ethics of military environment to include customs, ethical codes and decision making, constraints, and appeals to moral principles. American military system is also examined, with emphasis on the Uniform Code of Military Justice. Command and staff responsibilities are assigned to students for hands-on experience operating as a management team for Mason cadet corps. Includes a laboratory in applied leadership, common military tasks, and physical fitness.

LAB 201 Leadership Laboratory (Lead Lab) (0:2:2) Students enrolling in any MLSC class for commissioning credit must enroll in this lab section. Meets as a combined course, common military tasks, and physical fitness.

Music (MUSI)
College of Visual and Performing Arts

Private Music Instruction

All private music instruction is by arrangement. Students must consult the director of applied music instruction in the Department of Music for teacher assignment and registration numbers. Private music instruction fee applies. Students who register for private music instruction must also register for an ensemble.

For music major, music minor, or jazz studies minor: half-hour lesson per week, 1 credit, $164.50; hour lesson per week, 2 or 3 credits, $329.

Private music instruction is offered in accompanying, bassoon, cello, clarinet, composition, conducting, euphonium, flute, classical guitar, jazz guitar, harp, harpsichord, horn, koto, oboe, organ, percussion, piano, saxophone, string bass, trombone, trumpet, tuba, viola, viola da gamba, violin, and voice.

324, 424, and 724 Junior, Senior, and Graduate Recitals (1:0:0) Corequisite: concurrent enrollment in appropriate 3-credit private music instruction course. Public recital by student during junior or senior year, or during graduate study. Junior recital must be at least 25 minutes long; senior recital must be at least 50 minutes long. Graduate recitals must be of the following lengths: composition, 30 minutes; conducting, 30 minutes; performance of single or multiple instruments, 50 minutes. All recitals by arrangement. Students must consult with director of applied music studies to register and schedule dates.

323 Music Education Recital (0:0:0) Prerequisite: minimum 8 credits in private music instruction in major instrument; corequisite: concurrent enrollment in appropriate 2-credit private music instruction course. Recital on major instrument given by student during junior or senior year. Recital must be at least 25 minutes long. All recitals by arrangement. Students must consult with director of applied music studies to register and schedule dates. Graded S/NC.

100 Fundamentals of Music (3:3:0) Cannot be applied toward degree in music. Study of musical notation, interval and triad construction, reading of treble and bass clefs, scale construction, rhythm, elementary sight singing and ear training, and application at keyboard. s

101 Introduction to Classical Music (3:3:0) Music majors may take only as free elective. Introduces art-music tradition of West. Techniques for expanding listening skills developed through study of musical elements, styles, and selected masterworks of musical literature. fs

102 Popular Music in America (3:3:0) Music majors may take only as free elective. Investigates popular music styles and development in the United States with particular emphasis on the past 50 years. Lectures, recordings, and video enhance critical listening skills and examine stylistic and social contexts of popular music. f

103 Musics of the World (3:3:0) For non-music majors only. Study and comparison of musical structure and expression in several world cultures, with special attention to social context and function. Studies selected Asian, Middle Eastern, African, and American (Latin, Native, African) cultures. fs

104 Introduction to Twentieth-Century Music (3:3:0) Music majors may take only as free elective. Survey of various styles found in 20th-century music. Tonal, atonal, serial, and experimental music.

105 Music in the United States (3:3:0) Music majors may take only as free elective. Study of music in the United States from colonial times to present. Through interaction with musical examples, traces significant African and European influences on emerging style and artistic activity in the United States.

107 The Development of Jazz (3:3:0) Music majors may take as free elective or part of jazz studies concentration. Historical, analytical, and aural survey of jazz from inception to present day. Looks at trends resulting from synthesis of jazz with other musical idioms.
113 Sight Singing and Ear Training I (2:3:0) Prerequisite: MUSI 115 and 171, or permission of instructor. Students taught to sing a line of music without accompaniment of instrument. Matching tones, major and minor scales, key signatures, intervals, rhythm, treble and bass clefs, rhythmic and melodic dictation. f,s

114 Sight Singing and Ear Training II (2:3:0) Prerequisite: MUSI 113, or permission of instructor. Continuation of MUSI 113. Alto and tenor clefs, modulation, various modes, melodic and harmonic dictation. f,s

115 Theory I (3:3:0) Prerequisites: Students must read music, pass fundamentals of music test administered during first week of classes, and have some proficiency on musical instrument or in voice. Music notation, scales, key signatures, intervals, chords, cadences, figured bass. f

116 Theory II (3:3:0) Prerequisite: MUSI 115, or permission of instructor. First- and second-inversion chords, modulation, nonharmonic tones, figured bass, seventh chords. Analysis of Bach chorales; composition of four-part chorales in 18th-century style. s

171 Keyboard Skills I (1:0:3) Prerequisite: nonmusic majors must have permission of instructor. Study of piano keyboard as it relates to various clefs in music. Emphasis on solution of basic stylistic and technical problems. f

172 Keyboard Skills II (1:0:3) Prerequisite: MUSI 171. Nonmusic majors must have permission of instructor. Study of piano keyboard as it relates to intermediate song and combined in various music forms. s

213 Sight Singing and Ear Training III (2:3:0) Prerequisite: Music 114, or permission of instructor. Continuation of Music 114. Emphasizes modulation, chromatic and non-tonal melodies, various modes, melodic and harmonic dictation, c clefs, and improvisation.

215 Theory III (3:3:0) Prerequisite: MUSI 116, or permission of instructor. Study of four-part chromatic harmony and analysis of 19th-century compositions. f

216 Form and Analysis (3:3:0) Prerequisite: MUSI 215, or permission of instructor. Analytical study of evolution of musical formal structures based primarily on harmonic and textural principles. s

221 Private Music Instruction I (1:0:0.5) Prerequisite: audition or portfolio. Private lessons in performance or composition. May be repeated for up to 8 credits.

222 PMI Keyboard (1:0:0.5) Prerequisite: audition. Private lessons in keyboard performance. May be repeated for up to 8 credits.

223 PMI Voice (1:0:0.5) Prerequisite: audition. Corequisite: MUSI 381, 384, or 385. Private lessons in vocal performance. May be repeated for up to 8 credits.

224 PMI Woodwind (1:0:0.5) Prerequisite: audition. Private lessons in woodwind performance. May be repeated for up to 8 credits.

225 PMI Brass (1:0:0.5) Prerequisite: audition. Private lessons in brass performance. May be repeated for up to 8 credits.

226 PMI String (1:0:0.5) Prerequisite: audition. Private lessons in string performance. May be repeated for up to 8 credits.
311 Jazz Studies (3:3:0) Prerequisite: MUSI 379. Musician-ship course integrating jazz improvisation, theory, composition, and arranging. Focuses on concepts unique to our time in style, form, and harmony.

319 Class Composition and Arranging (3:3:0) Prerequisite: MUSI 114 or 216, or permission of instructor. Students write original compositions for specified instruments, voices, or combinations. They then apply compositional principles to the creative arrangement of existing music of various styles.

323 Music Education Recital See beginning of Music course section.

324 Junior Recital See beginning of Music course section.

325, 326 Performance Seminar and Vocal Literature for Singers and Accompanists I, II (2:3:1) Prerequisite: audition. Students assigned vocal literature in Italian, English, German, and French from Baroque to 21st century, and perform in a weekly master class format. Designed for vocal performance and piano and accompanying majors; develops and improves artistic and performance skills, repertoire preparation and execution, diction, interpretation, style, and overall stage presence.

331 Music History in Society I (3:3:0) Prerequisite or corequisite: MUSI 215, or permission of instructor. Historical survey of Western music from Greek times through the late Baroque era, with emphasis on specific musical genres and composers who developed them. Musical developments are related to other aspects of society. Instruction conducted by lectures, recordings, and video. Learning process enhanced by reading, listening, writing, and analytical assignments.

332 Music History in Society II (3:3:0) Prerequisite: MUSI 216 and 331, or permission of instructor. Historical survey of Western music from the early Classical era through mid-19th century, with emphasis on specific musical genres and composers who developed them. Musical developments related to other aspects of society. Lectures, recordings, video. Learning process enhanced by reading, listening, writing, and analytical assignments.

341 Diction for Singers I: Italian Diction and English Diction (2:2:1) Increases proficiency in singing in Italian and English by teaching International Phonetic Alphabet (IPA), and strengthens performance of Italian and English art songs and operatic repertoire. Focuses on intensified, systematic study of phonetics as it applies to singing in Italian and English.

342 Diction for Singers II: German Diction and French Diction (2:2:1) Increases proficiency in singing in German and French by teaching International Phonetic Alphabet (IPA), and strengthens performance of German and French art songs and operatic repertoire. Focuses on intensified, systematic study of phonetics as it applies to singing in German and French.

351 Keyboard Pedagogy (3:3:0) Prerequisites: MUSI 114, 216 and 273, and 8 credits in piano, organ, or harpsichord; or permission of instructor. Investigates methods, theories, techniques, and materials to teach keyboard to children and adults in individual and group situations.

352 Vocal Pedagogy and Lab (3:3:1) Instruction in teaching of voice through systematic study of vocal physiology and its implications for pedagogical methods. Includes theoretical and systematic study of processes, procedures, and practices to develop art of singing. Offers technical, physiological, theoretical, and practical principals of the singing art, with emphasis on the importance of vocal health.

353 Instrumental Pedagogy and Literature (3:3:0) Prerequisite: junior standing in instrumental private music instruction, or permission of instructor. Instruction in teaching instrumental music techniques for all levels through study of pedagogical methods, standard literature, and musical instruments produced by present-day manufacturers.

361 Class Strings: Violin, Viola, Cello, and Bass (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of playing and teaching string instruments with emphasis on violin and cello through beginning method book. Study of fingerings and bowing techniques to teach and play viola and bass at beginning levels. Survey of string playing techniques to conduct rehearsals at intermediate-, advanced-, and artist-level ensembles. Three clock hours per week studying violin, viola, cello, and bass; one clock hour per week in laboratory ensemble.

363 Class Woodwinds: Flute and Clarinet (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of techniques of playing and teaching flute and clarinet. Survey of instructional materials, and mouthpiece and instrument selection. Three clock hours per week studying flute and clarinet; one clock hour per week in laboratory ensemble.

364 Class Woodwinds: Oboe and Bassoon (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of techniques of playing and teaching oboe and bassoon. Survey of instructional materials, instrument selection, and reed adjustment. Three clock hours per week studying oboe and bassoon; one clock hour per week in laboratory ensemble.

365 Class Brass: Trumpet and French Horn (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of techniques of playing and teaching trumpet and French horn. Survey of instructional materials, and mouthpiece and instrument selection. Three clock hours per week studying trumpet and French horn; one clock hour per week in laboratory ensemble.

366 Class Percussion (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of techniques of playing and teaching percussion instruments. Survey of instructional materials and instrument selection. Three clock hours per week studying percussion instruments; one clock hour per week in laboratory ensemble.

367 Class Guitar (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of techniques of playing and teaching guitar. Survey of instructional materials and instrument selection. Three clock hours per week studying guitar; one clock hour per week in laboratory ensemble.

368 Class Voice (1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of the human voice in artistic singing. Emphasizes practical application of basic principles. Three clock hours per week studying voice; one clock hour per week in laboratory ensemble.
369 Class Brass: Trombone, Euphonium, and Tuba
(1:0:4) Prerequisite: admission to music major program, or permission of instructor. Study of techniques of playing and teaching trombone, euphonium, and tuba. Survey of instructional materials and mouthpiece and instrument selection. Three clock hours per week studying trombone, euphonium, or tuba; one clock hour per week in laboratory ensemble.

371, 372 Techniques of Accompanying I, II (1:0:3) Prerequisite: successful audition on keyboard instrument for admission to music degree program; 4 credits in undergraduate private music instruction on a keyboard instrument; or permission of instructor. Development of accompanying skills through collaboration with solo singers, instrumentalists, and small ensembles. Students perform for each other, observe lectures, demonstrations, and performances by professionals, and participate in master classes. Each course may be taken two times for credit.

373 Advanced Accompanying and Musicianship Skills (3:3:0) Advanced study and techniques for accompanying choirs, vocal soloists, and instrumentalists. Additional instruction in keyboard reduction of orchestral scores for concerts, continuo/figured bass reading, lead-sheet reading, transposition, improvisation, transcription, and “playing by ear.”

379 Introduction to Jazz Improvisation (1:1:2) Prerequisite: MUSI 116, or permission of instructor. Study of improvisation techniques and styles, with emphasis on common practice period of jazz. Application on the student’s major instrument or voice to develop creativity and personal expression.

380 Wind Symphony (1:0:3) Prerequisite: audition. Highly selective group of instrumentalists perform works from wind symphony repertoire. Public concerts are given.

381 University Chorale (1:0:3) Prerequisite: audition. Performance of works from choral repertoire. Public concerts are given.

382 Piano Ensemble (1:0:3) Prerequisite: audition and 4 credits in private piano music instruction. Study and performance of original four-hand works for one and two pianos. Public performances.

383 Symphonic Band (1:0:3) Prerequisite: audition. Performance of works from band repertoire. Public concerts are given.

384 Symphonic Chorus (1:0:3) Prerequisite: audition. Performance of major works from the choral repertoire. Public concerts are given.

385 Chamber Singers (1:0:3) Prerequisite: audition. Discovery, interpretation, and performance of choral music for vocal chamber music ensemble from all historical periods. Emphasis on achieving a high level of artistic performance, and bringing to Mason and surrounding community musical compositions not readily accessible in regular concert repertoire.

387 Symphony Orchestra (1:0:3) Prerequisite: audition. Performance of works from symphony orchestra repertoire. Public concerts are given.

388 Fundamental Techniques of Stagecraft for Opera and Music Theater (2:2:1) Prerequisite: admission to music program, or permission of instructor. Study of basic to intermediate stage movement techniques necessary to the performance of opera and music theater roles. Emphasis on acting, improvisation, theater production, musical theater, and operatic role study.

389 Jazz Ensemble (1:0:3) Prerequisite: audition. Provides practical experience in various aspects of jazz performance: section work within a large aggregation, combo work, and improvisation. Public concerts are given.

391 Conducting I (2:0:3) Prerequisites: MUSI 114, 216, and 273; or permission of instructor. Study of basic techniques of conducting a musical ensemble.

393 Music Administration and Management (2:2:0) Prerequisite: MUSI 116, or permission of instructor. Prepares students to address aspects of administration and management of music programs in public and private schools. Investigates principles and concepts of management styles and planning. Covers curriculum, budget, student recruitment and retention, external relations of the music unit, and legal issues for music educators.

395 Teaching Internship (1–4:0:0) Prerequisite: MUSI 251. Internship with a professional individual or organization in teaching. Introduction to teaching or augmentation of teaching skills. Students develop individual contracts defining the learning and competencies to be gained from the experience. Maximum of 9 internship credits (MUSI 395, 495, 496) can be applied toward a degree.

396 Conducting II (2:0:3) Prerequisite: MUSI 391, or permission of instructor. Advanced conducting course emphasizing techniques for instrumental and choral conducting. Refining gestures, full score analysis and interpretation, rehearsal techniques, and changing meters.

401 Impact of the Arts on Civilization (3:3:0) Prerequisite: 30 credits, or permission of instructor. Analyzes how genres of art impact us intellectually, emotionally, and subliminally. Broadens aesthetic and historical perspective, exposes students to major strands of contemporary thought, and develops discursive abilities through role-playing in roundtable discussions.

415 Music in Computer Technology (3:3:0) Prerequisite: MUSI 319, or permission of instructor. Overview of ways computer is used in music. Topics include principles of musical instrument digital interface (MIDI); various kinds of synthesis; acoustics and sound processing; and musical composition using the computer. Explores music resources of Internet and surveys current multimedia applications in music history, theory, ear training, improvisation, and notation.

419 Orchestration (3:3:0) Prerequisites: MUSI 114, 216, and 319; or permission of instructor. Principles of combining and balancing instruments in orchestral and chamber contexts. Attention to orchestral terminology and general notation as well as timbre, range, clefs, transposition, special effects, and scoring procedures.

421 Private Music Instruction III (1:0:0.5) Prerequisite: audition or portfolio. Private lessons in performance or composition. May be repeated for up to 8 credits.

424 Senior Recital See beginning of Music course section.

431 Music History in Society III (3:3:0) Prerequisite: MUSI 216, 331, and 332; or permission of instructor. Studies contributions to the world of music in selected cultures such as India, Indonesia, China, Japan, Africa, Middle East, and Americas. Emphasizes comparative musical character-
istics as well as sociological function. Lectures, recordings, and video. Learning process enhanced by reading, listening, writing, and analytical assignments.

432 Music History in Society IV (3:3:0) Prerequisite: MUSI 216, 331, 332, and 431; or permission of instructor. Historical survey of Western music from late 19th century to present, with emphasis on specific musical genres and composers who developed them. Relates musical developments to other aspects of society, and considers interaction between world music. Lectures, recordings, and video. Learning process enhanced by reading, listening, writing, and analytical assignments.

441 Private Music Instruction IV (2–3:0:1) Prerequisite: audition or portfolio. Private lessons in performance or composition. May be repeated for up to 18 credits.

442 PMI Keyboard (2–3:0:1) Prerequisite: audition. Private lessons in keyboard performance. May be repeated for up to 18 credits.

443 PMI Voice (2–3:0:1) Prerequisite: audition. Corequisite: MUSI 381, 384, or 385. Private lessons in vocal performance. May be repeated for up to 18 credits.

444 PMI Woodwind (2–3:0:1) Prerequisite: audition. Private lessons in woodwind performance. May be repeated for up to 18 credits.

445 PMI Brass (2–3:0:1) Prerequisite: audition. Private lessons in brass performance. May be repeated for up to 18 credits.

446 PMI String (2–3:0:1) Prerequisite: audition. Private lessons in string performance. May be repeated for up to 18 credits.

447 PMI Percussion (2–3:0:1) Prerequisite: audition. Private lessons in percussion performance. May be repeated for up to 18 credits.

448 PMI Composition (2–3:0:1) Prerequisite: portfolio of recent compositions. Private lessons in music composition. May be repeated for up to 18 credits.

450 Jazz Improvisation I (2:2:1) Prerequisite: MUSI 379 or permission of instructor. Emphasizes improvisational materials and language developed in common practice period of jazz.

451 Keyboard Pedagogy II (3:3:0) Prerequisite: MUSI 351. Intensive study of methods, theories, techniques, and materials to teach keyboard to children and adults in individual and group situations.

452 Jazz Improvisation II (2:2:1) Prerequisite: MUSI 399 or permission of instructor. Emphasis on advanced improvisational techniques and contemporary tunes.

454 Jazz Arranging (3:3:0) Prerequisite: MUSI 311 or permission of instructor. Transcription, analysis, and scoring for small and large jazz ensembles.

461 The Teaching of General Music in the Elementary and Middle School (3:3:1) Prerequisites: MUSI 114, 216, 273; and acceptance into music education concentration. Corequisite: MUSI 391. For music majors only. Studies theory, methods, practice, and materials to teach general music in elementary and middle school. Students spend three hours per week in class, and one hour per week observing and teaching in laboratory ensemble. Students also participate in field observation of music classes in the public schools.

463 The Teaching of Vocal Music in the Secondary School (3:3:1) Prerequisites: MUSI 114, 216, 273, and 391; and acceptance into music education concentration. Corequisite: MUSI 396. For music majors only. Survey of repertoire and methods for teaching high school choral groups, small ensembles, and voice classes. Students spend three hours per week in class, and one hour per week observing and teaching in laboratory ensemble. Students also participate in field observation of music classes in public schools.

464 Instrumental Music Methods I (3:3:1) Prerequisites: MUSI 114, 216, and 273; and acceptance into music education concentration. Corequisite: MUSI 391. For music majors only. Prepares students to teach instrumental music in elementary, middle, and secondary schools. Students spend three hours per week in class, and one hour per week observing and teaching in laboratory ensemble. Students also participate in field observation of music classes in public schools.

465 Selected Topics in Music Education (1–3:1–3:0) Prerequisite: 90 credits in music degree program, or permission of instructor. Topics of practical interest to prospective and practicing music educators covering pedagogy, performance, and logistics of teaching music in schools, private studios, and communities. May be repeated for credit.

466 Instrumental Music Methods II (3:3:1) Prerequisites: MUSI 114, 216, 273, and 391; and acceptance into music education concentration. Corequisite: MUSI 396. For music majors only. Prepares students to teach instrumental music in elementary, middle, and secondary schools. Students spend three hours per week in class, and one hour per week observing and teaching in laboratory ensemble. Students also participate in field observation of music classes in public schools.

467 Instrumental Music Methods I: Orchestra (3:3:1) Prerequisites: MUSI 114, 216, 273, and 361; and acceptance into music education concentration. Corequisite: MUSI 391. For music majors only. Prepares students to successfully plan, organize, and administer marching band and jazz ensemble programs in secondary public school music curriculum. Students spend three hours per week in class, and one hour per week observing and teaching in laboratory ensemble. Students also participate in field observation of music classes in public schools.

485 Chamber Ensembles (1:0:3) Prerequisite: audition. Performance of works from chamber music repertoire. Public performances are given. f, s

490 Musical Communication in Context (3:3:0) Prerequisite: Students must be in senior year of BA program in music, and have completed all other general education requirements. Explains nature of musical communication in a variety of contexts, and combines knowledge gained in general education courses with knowledge and skills specific to the major to serve as a capstone course synthesizing both areas. How does music itself communicate, and how do musicians communicate about it with each other and with the world around them? Students address these through essays in the style of a
journal or portfolio, substantial paper, and oral presentation of paper before faculty and student panel.

491 Musical Communication in Performance (1:1:0)
Prerequisite: completion of all other required general education courses for BM performance concentration. Corequisite: concurrent enrollment in appropriate 3-credit private music instruction course and Music 424. Helps student conceive of musical performance as communication in a variety of contexts, and combines knowledge in general education courses with knowledge and skills specific to the major to serve as a capstone course synthesizing both areas. Students consider various aspects of musical communication to prepare senior recital. Students explore social, historical, analytical, and aesthetic aspects of the music they are to perform by composing essays in the style of a journal or portfolio. Students prepare a substantial paper on recital repertoire and present that paper before a faculty and student panel.

492/492H/492J/492N Selected Topics in Music (1–3; 1–3:0)
Prerequisite: 45 credits, or permission of instructor. Topics of practical interest to students in composition, music history and literature, world music, jazz studies, and performance practices. May be repeated for credit. 492H denotes a music history course, 492J denotes a jazz studies course, and 492N denotes a non-Western music course.

495 Internship in Music Education: Student Teaching (6:1:0) Prerequisite: completion of all other courses required for BM with concentration in music education. Full semester of intensive clinical experience in approved Virginia schools. Maximum of 9 internship credits (MUSI 395, 495, 496) can be applied to degree.

496 Internship: (1–6:0:0) Prerequisite: open to music majors with 90 credits. Contact the department one semester before enrollment. Internships are approved work-study programs with specific employers or agencies. Credit is determined by the department. Maximum 9 internship credits (MUSI 395, 495, 496) can be applied toward degree.

497, 498 Independent Study (1–3:0:0) Prerequisites: music majors with 90 credits, and permission of instructor and department chair. Individual research and study of selected subject in close consultation with instructor. Students may choose from the musicological, ethnomusicological, theoretical, compositional, or educational areas, and produce at least one major written work based on research.

501 Graduate Theory Review (3:3:0) Prerequisites: baccalaureate degree in music; graduate placement exam. Vocabulary and conceptual review of diatonic and chromatic harmony, part writing, form, harmonization, 20th-century techniques. Does not count toward required credits of a graduate music degree.

502 Graduate Aural Skills Review (3:3:0) Prerequisites: baccalaureate degree in music; graduate placement exam. Music reading and aural skills including intervals, dictation (melodic and harmonic), scales, chords, rhythms, and meter. Does not count toward required credits of a graduate music degree.

515 Music in Computer Technology (3:3:0) Prerequisite: baccalaureate degree in music, or permission of instructor. Overview computer use in music. Topics include principles of musical instrument digital interface (MIDI); synthesis; acoustics and sound processing; and musical composition using the computer. Explores music resources of Internet, and surveys multimedia applications in music history, theory, ear training, improvisation, and notation.

516 Keyboard Skills (3:0:4) Prerequisite: baccalaureate degree in music; graduate placement exam. Enhance keyboard skills for the non-keyboard major, including technique, harmonization, transposition, reading, and accompanying.

517 Score Reading Skills (3:0:4) Prerequisite: baccalaureate degree in music; graduate placement exam. Enhance score study and score reading skills for the conductor.

525, 526 Performance Seminar and Vocal Literature for Singers and Accompanists I, II (2:3:1) Prerequisite: audition. Advanced vocal literature and performance seminar. Students assigned art songs or operatic arias in Italian, German, French, and English, from Baroque to 21st century, and perform in weekly master class format. Develops and improves musical and artistic preparation and performance, increases repertoire, and establishes dependable methods for creating consistently high standards of artistic performance.

532 Music History Review I (3:3:0) Prerequisites: baccalaureate degree in music, graduate placement exam. Enhance understanding of music history and the context of musical style, chronologically through the mid-18th century. Does not fulfill courses requirements for graduate degrees in music.

533 Music History Review II (3:3:0) Prerequisites: baccalaureate degree in music, graduate placement exam. Enhance understanding of music history and the context of musical style—from the mid-18th century to today. Does not fulfill course requirements for graduate music degrees.

541 Diction for Singers I: Italian Diction and English Diction (2:2:1) Increases proficiency in singing in Italian and English by teaching International Phonetic Alphabet (IPA), and strengthens performance of Italian and English art song and operatic repertoire. Intensified, systematic study of phonetics as it applies to Italian and English.

542 Diction for Singers II: German Diction and French Diction (2:2:1) Increases proficiency in singing in German and French by teaching International Phonetic Alphabet (IPA), and strengthens performance of German and French art songs and operatic repertoire. Intensified, systematic study of phonetics as it applies to singing in German and French.

551 Keyboard Pedagogy I (3:3:0) Prerequisite: graduate status in applied piano, or permission of instructor. Intensive study of methods, theories, techniques, and materials to teach keyboard to children and adults in individual and group situations.

552 Vocal Pedagogy and Lab (3:3:1) Prerequisite: MUSI 352, or permission of instructor. Instruction in teaching voice through systematic study of vocal physiology and its implications for pedagogical methods. Includes theoretical and systematic study of processes, procedures, and practices to develop art of singing. Offers technical, physiological, theoretical, and practical principals of the singing art, with emphasis on vocal health.

553 Instrumental Pedagogy and Literature (3:3:0) Prerequisite: baccalaureate degree in music, or permission of instructor. Instruction in teaching of instrumental music techniques for all levels through the study of pedagogical
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
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<tr>
<td>501, 502, and 516, or appropriate score on the graduate placement examination.</td>
<td>Uses music analytical theories to examine repertoire from a given time period or style. May be repeated for up to 9 credits as topics change.</td>
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<tr>
<td>611 Analytical Techniques (3:3:0)</td>
<td>Prerequisites: MUSI 501, 502, and 516, or appropriate score on the graduate placement examination. Detailed formal and stylistic examination of music selected from the major style periods. Development of graduate-level analytical skills.</td>
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<tr>
<td>613 Graduate Orchestration (3:3:0)</td>
<td>Prerequisites: MUSI 501, 502, and 516, or appropriate score on the graduate placement examination. Intensive study of instrumentation through analysis and arrangement. Includes contemporary techniques and scoring for large forces.</td>
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<tr>
<td>555 Music as a Healing Art (3:3:0)</td>
<td>Prerequisite: basic proficiency with instrument or voice, and bachelor’s degree in music. Study of the relationship between musical vibrations and the natural rhythms of the body. Topics include history of music and healing, theory of sound, cymatics, toning, and performance practice as well as a survey of vibrational healing modalities and related therapies. Considers listening examples as they apply to healing with music. Students sing and play instruments in directed improvisatory performance.</td>
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<tr>
<td>563 Orff Schulwerk I (3:3:0)</td>
<td>Intensive introduction to Orff teaching philosophy with practical and theoretical instruction and immersion in the method itself. Students learn concepts of rhythm, harmony, solfege, modes, improvisation, and pedagogy. Students learn basic performance technique on soprano recorder, and learn to apply movement and dance in their teaching.</td>
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<tr>
<td>564 Orff Schulwerk II (3:3:0)</td>
<td>Prerequisite: MUSI 563, or permission of instructor. Continues intensive study of Orff teaching philosophy with practical and theoretical instruction and immersion. Teaches further concepts of rhythm and meter including asymmetrical patterns. Reviews pentatonic modes and their transpositions, studies pentachordal and hexachordal scales, and begins intensive work with diatonic modes. Students work with a variety of percussion instruments including body percussion, unpitched instruments, and barred instruments. They sing and play soprano, alto, tenor, and bass recorders. Movement studies continue with intensive study of vocabulary of dance and mime.</td>
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<tr>
<td>565 Orff Schulwerk III (3:3:0)</td>
<td>Prerequisites: MUSI 563 and 564, or permission of instructor. Continues intensive study of Orff teaching philosophy to complete certification process in Orff Schulwerk. Students continue intensive work in rhythm, melody, harmony, timbre, form, and pedagogy. Tenor, bass, and soprano recorders introduced. Movement and rhythmic studies concentrate on mixed meters and non-Western source materials and styles.</td>
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<tr>
<td>571, 572 Techniques of Accompanying I, II (1:0:3)</td>
<td>Prerequisite: admission to graduate-level private music instruction in keyboard instrument, or permission of instructor. Development of accompanying skills through collaboration with solo singers, instrumentalists, and small ensembles. Students perform for each other, observe lectures, demonstrations and performances by professionals, and participate in master classes. Each course may be taken two times for credit. Ay</td>
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<tr>
<td>573 Accompanying and Musicianship III (3:3:0)</td>
<td>Prerequisite: MUSI 572. Study of complex accompanying skills including open score reading and orchestral reduction. This course is for piano majors or persons with significant keyboard skills.</td>
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<tr>
<td>592 Topics in Music (1–6:1–6:0)</td>
<td>Prerequisite: baccalaureate degree in music. Intensive study of selected topics in performance, composition, or conducting. Individual research, group discussions, and participation in related activities. May be repeated for up to 12 credits as topics change.</td>
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<tr>
<td>610 Topics in Music Theory (3:3:0)</td>
<td>Prerequisites: MUSI 501, 502, and 516, or appropriate score on the graduate placement examination.</td>
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654 Graduate Conducting (3:3:0) Prerequisites: baccalaureate degree in music, graduate placement exam. Classroom study of conducting, including refining gestures, rehearsal leadership, and the communication of musical style. May be repeated for up to 9 credits.

660 Topics in Music Education (1–6:1–6:0) Prerequisites: baccalaureate degree in music, graduate placement exam. Examination of specific areas of concern to music educators. Individual research, group discussions, and participation in related activities. Repeatable for up to 9 credits as topics change.

661 Psychology of Music Teaching and Learning (3:3:0) Prerequisites: baccalaureate degree in music, graduate placement exam. Study of the learner’s musical behaviors (affective, cognitive, and psychomotor) in an effort to devise an empirically based teaching method founded on learning principles.

662 Introduction to Research in Music (3:3:0) Prerequisite: baccalaureate degree in music, or permission of instructor. Development of skills, attitudes, and understanding to do and report research in music, including philosophical bases, scope and organization, stylistic practices in writing research reports, study of materials and resources in music and music education, and proper use of library and other research services.

663 Aesthetics of Music Education (3:3:0) Prerequisite: baccalaureate degree in music, or permission of instructor. Study of philosophical foundations of contemporary music education, and critical examination of music programs and activities in aesthetic education and efforts by music education establishment to enhance them.

681 Graduate Choral Ensembles (1:0:3) Prerequisite: audition. Performance of works from the choral repertoire. Public concerts are given. May be repeated for up to 6 credits total.

682 Wind Symphony (1:0:3) Prerequisite: audition. Highly selective group of instrumentalists performing works from the wind repertoire. Public concerts are given. May be repeated for up to 6 credits.

683 Symphonic Band (1:0:3) Prerequisite: audition. Performance of works from band repertoire. Public concerts are given. May be repeated for up to 6 credits.

685 Graduate Chamber Ensemble (1:0:3) Prerequisite: audition. Performance of works from chamber music repertoire. Public concerts are given. May be repeated for up to 6 credits.

687 Symphony Orchestra (1:0:3) Prerequisite: audition. Performance of works from orchestral repertoire. Public concerts are given. May be repeated for up to 6 credits.

688 Opera and Musical Theater Ensemble (3:2:4) Prerequisite: audition. Solo-vocal, performance-oriented ensemble class that presents operatic works or excerpts from them, from baroque to 21st century, as well as works or excerpts from American musical theater. May be repeated for up to 12 credits.

689 Jazz Ensemble (1:0:3) Prerequisite: audition. Provides practical experience in aspects of jazz performance. Participation in section rehearsals and small and large jazz groups. Jazz improvisation expected. Public concerts given. May be repeated for up to 6 credits total.

690 Graduate Lecture Recital (1–3:0:0) Prerequisites: baccalaureate degree in music, audition. Corequisite: MUSI 621 (3-credit level). Combination of musical performance and scholarly presentation on a well-defined topic. Public presentation required. May be repeated for a maximum of 6 credits.

695 Teaching Internship (2:0:0) Prerequisite: MUSI 660. Teaching beginner, intermediate, and early advanced students in private or group lessons under faculty supervision. May be repeated for up to 4 credits.

699 Independent Study (1–3:0:0) Prerequisite: baccalaureate degree in music, and permission of department chair. Individual research and study a concentration available in the master of music. May be taken for maximum 6 credits.

710 Advanced Topics in Music Theory (3:3:0) Prerequisites: MUSI 501, 502, and 516, or appropriate score on the graduate placement exam. Advanced study of specific styles and repertoire from the perspective of various analytical approaches. May be repeated for up to 9 credits total as topics change.

712 Composition for Conductors and Performers (3:3:0) Prerequisites: undergraduate degree in music, graduate placement exam. Advanced study of new music for various media. This course is not for students in the composition concentration.

720 Advanced Topics in Applied Music (3:3:0) Prerequisite: baccalaureate degree in music, graduate placement exam. Advanced study of concepts in applied music. May be repeated for up to 6 credits total as topics change.

721 Private Music Instruction (2–3:0:1) Prerequisite: audition or portfolio. Private lessons in performance or composition. May be repeated for up to 18 credits.

722 PMI Piano (2–3:0:1) Prerequisite: audition. Private lessons in piano performance. May be repeated for up to 18 credits.

723 PMI Voice (2–3:0:1) Prerequisite: audition. Private lessons in vocal performance. May be repeated for up to 18 credits.

724 PMI Woodwind (2–3:0:1) Prerequisite: audition. Private lessons in woodwind performance. May be repeated for up to 18 credits.

725 PMI Brass (2–3:0:1) Prerequisite: audition. Private lessons in brass performance. May be repeated for up to 18 credits.

726 PMI String (2–3:0:1) Prerequisite: audition. Private lessons in string performance. May be repeated for up to 18 credits.

727 PMI Percussion (2–3:0:1) Prerequisite: audition. Private lessons in percussion performance. May be repeated for up to 18 credits.

728 PMI Composition (2–3:0:1) Prerequisite: portfolio of recent compositions. Private lessons in music composition. May be repeated for up to 18 credits.

729 PMI Conducting (2–3:0:1) Prerequisite: audition. Private lessons in conducting. May be repeated for up to 18 credits.

730 Advanced Topics in Music History (3:3:0) Prerequisites: MUSI 532 and 533, or appropriate score on the
graduate placement exam. Advanced study of specific genres, composers, or repertoire from an historically analytical perspective. May be repeated for up to 9 credits total as topics change.

760 Advanced Topics in Music Education (3:3:0). Prerequisite: baccalaureate degree in music, graduate placement exam. Advanced study of selected issues in music education. May be repeated for up to 9 credits total as topics change.

770 Advanced Topics in Pedagogy (3:3:0). Prerequisite: baccalaureate degree in music, graduate placement exam. Advanced study of a specific topic in the pedagogy of music. May be repeated for up to 6 credits total as topics change.

790 Graduate Recital (1:0:0) Prerequisite: at least three credits graduate PMI in the appropriate instrument or voice. Corequisite: MUSI 72x (3-credit level). Public performance. Repertoire and performance standards as approved by faculty. May be repeated for up to 4 credits total.

796 Directed Reading/Research (1–3:0:0) Prerequisite: baccalaureate degree in music, graduate placement exam. Individualized study on a topic approved by faculty. May be repeated for up to 6 hours total credit.

799 Thesis (1–6:0:0) Prerequisite: at least 12 graduate credits including MUSI 511, and approval of thesis topic. Students in the music education concentration must also have taken MUSI 562, and have successfully passed comprehensive exit exam. Supervised research on approved thesis topic. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study music. Program of studies designed by the student’s discipline director and approved by student’s doctoral committee that brings student to participate in research, performance, or creative activity of discipline director and results in a paper reporting original contributions. Enrollment may be repeated.

810 Doctoral Seminar in Analysis (3:3:0) Prerequisite: graduate placement examination. Seminar study of a specific genre or repertoire from various analytical perspectives. May be repeated for up to 9 credits as topics change.

821 Doctoral Private Music Instruction (2–3:0:1) Prerequisite: audition portfolio. Private instruction in performance, conducting, or composition. May be repeated for up to 18 credits.

822 Doctoral Private Music Instruction Piano (2–3:0:1) Prerequisite: audition. Private instruction in piano performance. May be repeated for up to 18 credits.

823 Doctoral Private Music Instruction Voice (2–3:0:1) Prerequisite: audition. Private instruction in vocal performance. May be repeated for up to 18 credits.

824 Doctoral Private Music Instruction Woodwind (2–3:0:1) Prerequisite: audition. Private lessons in woodwind performance. May be repeated for up to 18 credits.

825 Doctoral Private Music Instruction Brass (2–3:0:1) Prerequisite: audition. Private lessons in brass performance. May be repeated for up to 18 credits.

826 Doctoral Private Music Instruction String (2–3:0:1) Prerequisite: audition. Private lessons in string performance. May be repeated for up to 18 credits.

827 Doctoral Private Music Instruction Percussion (2–3:0:1) Prerequisite: audition. Private lessons in percussion performance. May be repeated for up to 18 credits.

828 Doctoral Private Music Instruction Composition (2–3:0:1) Prerequisite: portfolio of recent compositions. Private lessons in composition. May be repeated for up to 18 credits.

829 Doctoral Private Music Instruction Conducting (2–3:0:1) Prerequisite: audition. Private lessons in conducting. May be repeated for up to 18 credits.

830 Doctoral Seminar in Music History (3:3:0) Prerequisite: graduate placement exam. Seminar study of a specific genre, composer, or repertoire from a historically analytical perspective. May be repeated for up to 9 credits as topics change.

860 Doctoral Seminar in Music Education (3:3:0) Prerequisite: graduate placement exam. Seminar study of a specific issue in music education. May be repeated for up to 12 credits as topics change.

880 Doctoral Major Ensemble (1:0:3) Prerequisite: audition. Selective ensemble experience for doctoral students in music. Public concerts are given. May be repeated for up to 6 credits.

890 Doctoral Recital (1–2:0:0) Prerequisite: at least 3 credits in MUSI 821 in the appropriate instrument or voice. Corequisite: MUSI 821 (3-credit level). Public performance. Repertoire and performance standards as approved by faculty. May be repeated for up to 4 credits.

998 Dissertation Proposal (1–3:0:0) Prerequisite: admission to doctoral program in music, permission of faculty. Preparation of a proposal for a dissertation study in music under the supervision of music faculty members. May be repeated for up to 6 credits.

999 Dissertation (1–6:0:0) Prerequisite: candidacy in a doctoral program in music. Preparation of a dissertation in music under the supervision of music faculty members. May be repeated for credit.

Nanotechnology (NANO)

Computational and Data Sciences

500 Introduction to Nanomaterials and Interactions (3:3:0) Prerequisite: BS in any physical science, mathematics, or engineering; or permission of certificate director. Introduction to nanotechnology. Discussion of the Feynman challenge and its relation to modern science. Applications to nanostructures of charges, currents, diamagnetics, paramagnetics, and ferromagnetics.

510 Strategies for Nanocharacterization (3:3:0) Prerequisite: NANO 500 or permission of certificate director. Introduces various nanocharacterization techniques, with a discussion of which techniques are most useful in various applications. Includes gates and bridges, chemical thermodynamics, kinetics, and solid-state reactions.

520 Survey of Nanostructures (3:3:0) Prerequisite: NANO 500 or permission of certificate director. Discusses nanomechanical oscillators and nanoresonators, nanofibers, and conducting polymer nanowires. Nanomechanical beams for reacting ion etching. Electron-beam lithography and photolithography.
335 Molecular, Developmental, and Systems Neuroscience (3:2:3) Prerequisite: NSCI 210 or permission of instructor. In-depth survey of genetic and embryological development of the brain and introduction to systems neuroscience, including sections on patterning gene expression, generation and migration of neurons, axonal and dendritic outgrowth, and basic neuroanatomy.

461 Special Topics in Neuroscience (1-3:0; 1-3) Prerequisite: PSYC 372, 375, or equivalent or permission of instructor. Selected topics reflecting interest in specialized areas of neuroscience.

Neurosciences (NEUR)
College of Science

College of Humanities and Social Sciences
Krasnow Institute for Advanced Study

600/PSYC 556 Chemistry and the Brain (3:3:0) Prerequisite: admission to neuroscience PhD program or permission of instructor. Fundamentals of general chemistry, atoms, molecules, and reactions, with emphasis on water solutions. Organic compounds and functional groups, biosynthesis and properties, and examples from nervous system. Also includes biopolymers and their roles in cellular and neuronal organization, ionic channels, neurotransmitter receptors, and psychoactive substances.

601/PSYC 527 Developmental Neuroscience (2:2:0) Prerequisite: PSYC 372, or BIOL 213 and 303. Introduction to neurobiology with overview of embryological development of the nervous system in evolutionary context. Regional and systems neuroanatomy introduced by study of the mammalian visual system with a comparative perspective.

602/BIOS 721 Cellular Neuroscience (3:3:0) Prerequisite: admission to PhD program in biosciences or neuroscience, or permission of instructor. Detailed overview of the functioning and interactions of the cellular elements of the central nervous system. Topics include structure and function relationships, the chemical, physical, and electrical basis of neural signaling, local versus long-distance signaling, functional consequences of variations in the typical action potential, and essentials of synaptic conduction.

603/PSYC 531 System Neuroscience (3:2:3) Prerequisite: PSYC 527. Functional anatomy of the brains of mammals, with emphasis on regional and systems neuroanatomy of humans. Anatomy is correlated with material from clinical neurology where possible. Laboratory component includes brain dissections and clinical correlations.

604/CSI 639 Ethics in Scientific Research (1–3:1–3:0). Prerequisite: graduate standing. Reflects on purpose of scientific research, and reviews foundational principles for evaluating ethical issues. Offers skills for survival in scientific research through training in moral reasoning and teaching of responsible conduct. Discusses ethical issues in research, and teaches how to apply critical thinking skills to design, execution, and analysis of experiments. Issues include using animals and humans in research, ethical standards in computer community, and research fraud. Currently accepted guidelines for behavior in data ownership, manuscript preparation, and conduct of persons in authority may be presented and discussed in terms of relevant ethical issues.
634 Neural Modeling (3:3:0) Prerequisite: NEUR 602 or permission of instructor. Introduces the objectives, philosophy, and methodology of neuronal modeling. Instructs students in the use of some of the more popular neural modeling software packages. Students learn the syntax of several software packages, how to create neurons from subcellular components, and how to create networks by connecting neuron models.

689 Topics in Neuroscience (3:3:0). Prerequisite: permission of instructor. Selected topics in neuroscience reflecting specialized areas or new subfields not covered in fixed-content neuroscience courses. Course may be repeated for credit as needed.

701 Neurophysiology Laboratory (2:0:6) Prerequisite: NEUR 602 and admission to neuroscience PhD program or permission of instructor. Hands-on training in current techniques of modern neurophysiology. Acquaints students with the theoretical basis of each technique and trains the student in the laboratory skills necessary to perform each technique. Includes intracellular and extracellular recording techniques. Preparations include vertebrates and invertebrates. Meets once weekly for six hours.

702 Research Methods (3:3:0) Prerequisite: graduate standing. Trains students in research methodologies, techniques, and data analysis in neuroscience. The course is divided into three modules that introduce separate but equally significant components of any research project. The first module will focus on parameters required for outlining and synthesizing a problem. The second module will cover various techniques of measurement and analysis used by neuroscientists. The last module will cover various approaches used for data analysis and interpretations.

709 Neuroscience@GMU Seminars (1:1:0) Prerequisite: admission to neuroscience PhD program. Special seminar series for first year neuroscience PhD students. Detailed overview of neuroscience research at Mason. Each week, a different neuroscience laboratory and principal investigator gives two lectures to students. First is introductory lecture on the neuroscience basics necessary to appreciate laboratory research theme and mission. Second is a more practical description of the active research program, possibly including a visit to the laboratory.

710 Special Topics in Neuroscience (1:1:0) Prerequisite: admission to neuroscience PhD program. Examines topics in neurosciences, including neurogenetics, neural imaging, and the competing computational and biological approaches to understanding the mind.

734 Computational Neurobiology (3:3:0). Prerequisites: NEUR 602 and MATH 214, or permission of instructor. Intense review of neurobiology for graduate students interested in studying how nerve cells integrate and transmit signals, and how behavior emerges from integrated actions of populations or circuits of nerve cells. Covers electrical and biochemical properties of single neurons, and electrical and chemical communication between neurons. Emphasizes mathematical descriptions and computational techniques to study and understand neurons and networks of neurons.

735 Computational Neuroscience Systems (3:3:0). Prerequisite: NEUR 734, or permission of instructor. Intensive introduction to systems neuroscience from quantitative perspective. Covers computational techniques used to study function of networks of neurons. Uses spike train statistics, neural encoding, and information theory to investigate behaviors that emerge from integrated actions of networks of neurons.

741 Introduction to Neuroimaging (3:3:0) Prerequisite: NEUR 602 or 603, or permission of instructor. Introduction to physics and techniques of magnetic resonance imaging (MRI) and their applications to clinical and basic neuroscience. Students learn about the protocols used in the acquisition of images in both structural and functional contexts, and experimental paradigms applied to the exploration of cognition, learning, and development. Students gain experience with creating an experimental design for a study and understanding practical logistics involved in imaging, such as MRI safety and subject screening.

742 Cognitive Neuroscience (3:3:0). Prerequisite: NEUR 602 or 603, or permission of instructor. Introduces cognitive neuroscience topics, including aspects of cognitive science covering an array of perceptual, sensory, cognitive, and affective processes. Incorporates studies of brain lesions, brain imaging, and animal and computational models.

751 Applied Dynamics in Neuroscience (3:3:0) Prerequisites: NEUR 603 or CSI 734, or permission of instructor. Covers recent developments in the application of applied dynamics to neuroscience. Emphasizes dynamical system approach to the understanding of neural processes. Topics include neural synchrony and control; formation of waves; oscillations; patterns within neural ensembles; network topology and dynamics of neurons; and decoding and encoding of neural signals.

752 Modern Instrumentation in Neuroscience (3:3:0) Prerequisite: NEUR 602 or 734, or permission of instructor. Builds on knowledge of how and what things are measured and controlled in modern bioinstrumentation. Topics include fundamental instrumentation; principles of sensing; basic electronics; computer interfaces and data acquisition; signals in biological systems; biopotential and ionic concentration measurements; and optical techniques.

851 Advanced Computation and Brain Dynamics (3:3:0) Prerequisite: NEUR 603 or CSI 734, or permission of instructor. In-depth study of open issues and the state-of-the-art in advanced brain dynamics. Using mathematical and physical models, the course covers the neurodynamical aspects of neural nets, receptive fields, ion-channels, intercortical interactions, phase-locking, synchronicity, and the possible nontrivial role of quantum effects. It will emphasize the latest experimental approaches developed by Llinas and Crick.

996 Doctoral Reading and Research (1–6:0:0). Prerequisites: admission to NEUR PhD, and permission of instructor. Reading and research on specific topic in neuroscience under direction of faculty member. May be repeated as needed.

998 Dissertation Proposal (1–12:0:0) Prerequisite: permission of advisor. Covers development of a research proposal under guidance of dissertation director and doctoral committee. Proposal forms the basis for the doctoral dissertation. Course may be repeated as needed; however, no more than a total of 24 credits in NEUR 998 and 999 may be applied toward satisfying doctoral degree requirements. Out of the 24, no more than 12 credits of NEUR 998 may be applied.
Courses

999 Doctoral Dissertation (1–12:0:0) Prerequisite: admission to candidacy in neuroscience doctoral program. Doctoral research performed under the direction of the dissertation director. May be repeated as needed; however, no more than a total of 24 credits in NEUR 998 and 999 may be applied toward satisfying doctoral degree requirements.

New Century College (NCLC) New Century College

First-Year Experience

110 Community of Learners (8:8:0) Develops essential college skills, particularly communication (reading, writing, speaking) for critical thinking and problem solving, information literacy, statistics, and probability. Issues such as transition to college life, cultural diversity, and personal freedom and responsibility are explored. Credit distribution: composition (3), communication (2), math/analytical reasoning (1), and information technology (2).

111 Composition, Communication and Community (7:7:0) Students study key skills for our information economy. They research original ideas and analyze critically the ideas of others. They also learn to communicate their conclusions through writing, speech, and the creative use of electronic media. Topics covered include writing to learn, information literacy, individual and small-group communication, and collaborative problem solving. Credit distribution: written communication, 3; oral communication, 2; quantitative reasoning, 1; and information technology, 2.

120 The Natural World (8:6:2) Designed for students pursuing a BA or BS in integrative studies in New Century College. Introduces worlds of science and mathematics. Students explore contemporary issues of public health and the environment, with a historical perspective and understanding of how scientists communicate ideas. Students will engage in debate, poster presentation, and group problem solving. Credit distribution: math/analytical reasoning (2), natural science (4), and communication (2).

121 Science, Mathematics, and Technology in Society (7:7:0) Building on skills developed in NCLC 110/111, designed for students pursuing a BA or BS in integrative studies within New Century College. Introduces natural sciences and their relation to mathematics. After building a knowledge base, students explore the natural world through contemporary issues. Discusses man and nature from biological, historical and contemporary viewpoints, while developing an understanding of how science develops and communicates ideas. Students learn to work in groups to solve problems and work through issues, then publicly present ideas through debates, posters and various written formats. Credit distribution: math/analytical reasoning (3), natural science (4).

130 The Social World (8:8:0) Designed for students pursuing a BA or BS in integrative studies in New Century College. Focuses on the social world and its cultural origins. Students investigate how that world is both model and mirror of social behavior. Students are encouraged to model objective and subjective thinking, analysis and synthesis, explanation, and understanding. Credit distribution: arts (2), humanities (2), and social sciences (4).

140 Self as Citizen (8:8:0) Designed for students pursuing a BA or BS in integrative studies within New Century College. Explores definitions of self and society in historical non-Western and Western contexts. Issues relating to the concepts of moral identity and cultural differences are covered using text, film, plays, social science research methods, and writing. Credit distribution: art (1), literature (3), and social sciences (4).

Learning Communities

Learning Communities: Special Topics (3–15:3–15:0) Division II is composed of a variety of learning communities; each combining subjects usually taught in separate courses into a single course of study. Offering the equivalent of between 3 and 15 credits of undergraduate work, replaces the often fragmented classroom experience and integrates material from several perspectives. Credit is assigned for each learning community at the time it is offered.

200 Visual Thinking and the Creativity (4:3:1) Investigates modes of visual and textual creativity through art, literature, and variety of visual and textual forms. Through interdisciplinary approach to picturing text, provides opportunity to experiment with creative composition that includes visual elements; and with arts forms that include textual elements. Explores blocks to creativity, and provides understanding of how to evaluate and write about visual texts as well as how to produce documents that integrate words, images.

201 The World Since 1945 (3–15:3–15:0) Examines the history of the past 50 years to illuminate the contemporary world as well as build connections between the global and local. Using historical works, fiction, autobiographies, films, and daily newspapers, students explore such major events as the Cold War, the struggle against apartheid in South Africa, the Vietnam War, the Chinese Cultural Revolution, and the continuing conflict in the Middle East. As a learning community, requires active student participation in group projects and discussions.

202 Public Speaking and Critical Thinking Skills (4:3:1) Combines process of learning to speak in front of audiences with analysis of arguments and persuasive appeals. Students learn how to create and present effective speeches, adapt messages to specific audiences, and evaluate and critique messages produced for others. One credit of experiential learning enables students to examine public speeches, news stories, political campaigns, and advertising, among others, to make meaningful connections between public speaking theory, practice.

204 Leadership Theory and Practice (3:3:1) Examines historical and contemporary leadership theories, analyzes various methods and styles of leadership while providing students with opportunity to better understand their leadership strengths, challenges.

211 Introduction to Conservation Studies (6:4:2) Provides foundation for the integrative study of environmental conservation. Formal and informal writing assignments and oral presentations designed to strengthen critical thinking and communication skills important to students who pursue conservation-related professions. Instructors encourage students to use course assignments and off-campus work to identify suitable educational and career paths within the conservation world.

220 Energy and Environment (3–15:3–15:0) Investigates current sources of energy, various modes of their utilization, and environmental effects. Offers an overview of the
mechanical, physical, and chemical methodologies of energy use and delves into the biological, environmental, and ecological aspects of pollution-generating mechanisms.

225 Dean’s Honor Book Review (1:1:0) Open to New Century College students admitted with a GPA of 3.30 or better. Considers the ways in which specific works such as books, dramas, works of art, or ideas have influenced the intellectual climate of their times and beyond.

226 Dean’s Honors Seminar (1:1:0) Prerequisite: students must have entered New Century College with GPA of 3.50 or greater, or with 6 or more AP credits. Considers dynamic relationship of author or artist with cultural and intellectual climate of times and beyond. Broader question is how one helps create culture and is influenced by it.

230 Math and Culture (3–15:3–15:0) Focuses on mathematical problems and their emergence in different cultures and historical moments. Emphasizes interdisciplinary nature of the motivations for the development of mathematics and on the process of mathematical discovery. High degree of faculty/student interaction, which enables students to demonstrate, through the use of presentations and projects, their understanding and mastery of fundamental mathematical ideas and techniques and the role of mathematics in the development of human culture.

231 Introduction to Community Studies (4:3:1) Examines relationship between sustainable communities and democratic citizenship in a diverse society. The objectives are to improve one’s understanding of and thinking critically about communities and democratic principles, theories and practice. Students will identify and work through problems that communities address by working in a community service-learning setting.

244 Beats, Rhyme, and Culture (4:3:1) Examines the history of hip-hop and the effect it has had on our society. The primary focus is to consider hip-hop as a medium of communication that impacts, represents, and misrepresents the life experiences of youth in the United States. Students are exposed to historical, socio-economic, and musical/aesthetic contexts of this genre through in-class activities, and by attending related cultural events.

245 Visual Culture and Society (4:3:1) Explores the role of visual culture in contemporary society including an examination of photography, the visual and performing arts, film and video, and electronic media. Readings focus on the historical foundations of visuality as well as theories of visual culture and aesthetics. Students investigate the ways that forms of visual culture function in society and how these are linked to race, class, and gender as well as politics and economics. Students will gain hands-on experience working with contemporary visual media tools such as computer graphics and digital video editing.

249 The Internet: Literacy, HTML Tools, and Virtual Community (3–15:3–15:0) Introduction to cyberspace, the Internet, and web. Students learn basic HTML to create individual and collaborative web pages. In addition to using e-mail, students explore use of listserv, online discussion forums, and virtual communities. Assignments include collaborative and individual web pages, analytical and creative papers, and online research. One experiential credit is required in this class.

270 Page and Stage: Theory and Practice (3–15:3–15:0) In reading, writing, and performing plays and other literary texts, we discover our own ability to inhabit others’ minds, live in others’ bodies and see through others’ eyes. Students investigate the metamorphosis of reader into actor and text into three-dimensional theater. How do writers use images, voices and structure to shape their material and reach out to an audience? How does the actor as detective follow a writer’s clues to achieve a unique performance? Throughout the semester, students practice communicating those answers on stage and page.

275 Special Topics (3–15:3–15:0) Studies topics of special interest to undergraduates. May be repeated for credit if subtitle is different.

300 Utopia (3–15:3–15:0) Examines utopian and dystopian literature, theory, and practice including Plato, Piercy, LeGuin, Robinson, and others. Examines how utopian dreams (and dystopian nightmares) have changed over time and how texts are designed to jostle readers’ ideas about society and themselves. Students study several utopian experiments and visit a few local utopian communities.

301 Science in the News (3:3:0) Examination and discussion of the current trends in science as reported in the popular media. Students learn how to evaluate the science that is reported so they may become informed consumers; discuss how scientific advancement might shape society by looking at how science and society have changed together over time; and use examples from the past to discuss future trends.

304 Social Movements and Community Activism (4:3:1) Examines how citizens, individually and collectively, accomplish social change in society through case study analysis. Considers advantages, limits of social change strategies from communication and social movement theory perspectives. Surveys topics including how leaders maintain momentum in face of opposition; how movements, organizations use slogans, symbols, music to inspire followers; and how participants construct persuasive media campaigns and political arguments to facilitate policy change. One credit of experiential learning enables students to explore their role as social advocates and effective citizens in context of community.

305 Conflict Resolution and Transformation (6:6:0) Examines the nature and dynamics of conflict and ways to resolve and transform conflict. Experiential learning is used as the vehicle through which students explore their assumptions about communication and develop their skills for resolving interpersonal conflicts.

306 Our Common Futures (3–15:3–15:0) Students and faculty work together to model patterns of life that fit within the planet’s ecological means. Involves the study of “enviro-nomics,” introductions to urban systems and planning, and studio work to actually create models of alternative growth.

307 Narratives of Nature (6:3:3) Course begins with the individual’s connection to the infinite, the cosmos, and ends in a microscopic examination of the behavior of the human animal. Looks at the fundamental questions relating to scientific thinking and writing.

308 American Landscapes in Fiction, Film, and History (6:4:2) Satisfies requirements for ENGL 302. Waterways and roadways have always had practical, spiritual significance
for Americans. Course looks at American literary works and films in historical context to better understand the roles roads, rivers play in shaping physical, cultural landscape of United States. Students explore course themes outside classroom on weekend field trips, and conduct self-directed road trip as a main learning events.

310 Violence and Gender (3–15:3–15:0) Using nonfiction, research documentaries, oral histories, case studies, literature, feature films, music, dance, and visual arts, examines the dynamics of violence through different cultural lenses. Students work in university and community settings to integrate their academic experiences with practice.

311 The Mysteries of Migration: Consequences for Conservation (3–15:3–15:0) Investigates the biology of migration and its implications for science policy. Students consider the phenomenon of migration in the context of natural history, conservation, and cultural issues. The course includes several weekend trips for field study.

312 Images and Experiences of Childhood: Social Construct, Literature and Film (3–15:3–15:0) Immerses students in the images of childhood through the media of literature, video, and poetry, with a strong emphasis on historical perspectives of childhood. The class is interactive, requires some work in groups, and requires classroom participation.

313 Strangers in a Strange Land: Immigration in 20th Century America (3–15:3–15:0) Examines immigration experience as historical reality, culture. Through explorations of historical and contemporary discourse of immigration in United States, illuminates connections between current-day events, and ideas and policies that inform them.

315 Spirituality and Conflict Transformation (6:6:0) Examines dimensions of spirituality, including peace-making efforts in large-scale conflicts, conflicts within faith communities, and interpersonal disputes. Experiential learning explores spiritually informed resolution.

317 Issues in Family Relationships (4:3:1) Prerequisite: 35 credits. Dynamics of family systems and issues that shape relationships among family members. How families evolve as members grow, leave, and create related family systems; family roles and forms; and communication patterns, decision-making, conflict, stress, and power. Content draws from family communication, family relations, psychology, and counseling. Lecture, discussion, observation, analysis, research, and role-playing. One credit counts for experiential learning; students complete 45 credits of course-related work outside classroom.

318 Exploring Virginia’s Watersheds (4:4:0) Prerequisites: HIST 120, 121, 122, or equivalent; and EVPP 110 or GEOG 102 or GEOL 109 or NCLC 120. Comprehensive overview of history, geography, economics, and management of water resources in Virginia; and how rapidly growing population has measurably degraded resource. Includes one weekend field trip.

319 An Endangered Earth (3–6:3–6:0) Introduces issues and problems raised by science in the public policy process, especially the inherent tension between the tenets of a democratic society and scientific community. Using environmental policy problems, course is structured to prepare students to ask intelligent and useful questions about the science and politics of particular public policy issues, understand where they might go to find information for developing options, and develop criteria by which they can evaluate these ideas.

320 Construction of Differences; Race, Class, and Gender (3–15:3–15:0) Investigates race, sex, sexual orientation, and social class in contemporary American society. Examines commonalities in the construction of these categories and experiences of those who occupy them.

321 Vision Quest: Modeling the Natural World Using Art, Computer Programs, and Science (3–15:3–15:0) Imparts concepts of science in a visual, auditory, and kinetic fashion. Uses simulation programs, modeling the natural world to help students understand the principles and mysteries of science.

325 Dean’s Honor Book Review (1:1:0) Open to New Century College students who have had a previous semester GPA of 3.30 or better and at least 30 college credits. Focuses on classical philosophers and artists and the impact of their works for contemporary times. May be repeated for credit if the topic is different.

326 Dean’s Honors Seminar (1:1:0) Prerequisite: overall GPA of 3.50 or greater while in New Century College. Focuses on a variety of topics of interest ranging from book and film reviews to development of special events and symposiums. May be repeated for credit if the topic is different.

330 Enterprise Development (3–15:3–15:0) Prepares students for enterprise development in diverse environments by examining the spectrum of sociocultural, organizational, behavioral, strategic, and management factors that impact enterprise creation. Instructional method is interactive, using case studies, scenarios, role playing, guest speakers, and student-driven semester projects to link theory to practice.

331 The Nonprofit Sector (4:3:1) Readings, classroom discussions and activities, and practical experience reveal historical, legal, and socioeconomic forces that define and influence the American nonprofit sector. Explores structures, issues that affect nonprofit management, governing, and financial systems. Includes 1 experiential learning credit.

333 The Nature of Mathematics (3:3:0) Prerequisites: performance on Math Placement Exam equivalent to requirements for entrance to math, successful completion of algebra program in mathematics learning center, or any mathematics course that fulfills university’s general education requirement in quantitative reasoning; and permission of instructor. May be taken even after credit for MATH 106 or equivalent has been received. Sections include theoretical framework, historical context, connections with some other disciplines, and current issues. The sections are illustrated with selected mathematics topics (more advanced algebra and geometry plus introductions to set theory, probability, calculus, and number theory) Student presentations (in pairs) on what they have read and learned in mathematics, and result of optional experiential learning component of the course. Enrollment in NCLC 395 Experiential Learning is optional for at least 1 credit.

335 Ethics, Communication, and Freedom (3–15:3–15:0) Prerequisites: sophomore standing and 3 credits each of communication and philosophy; or permission of instructor. Students examine ethical principles, discuss some underlying bases for these principles, and work to understand how such principles are experienced and can be applied in a free
society. Focus is on examining potential conflicts between ethics and the freedoms believed essential to a healthy democratic society. Cases drawn from sports, medicine, media, politics, and business.

336 Wealth, Power, and Values (3–15:3–15:0) Investigates political, economic, social, industrial, and diplomatic sources of wealth, values, and power at the end of the 18th, 19th, and 20th centuries. Includes lecture, discussion, debate, and experiential learning, with emphasis on individual research projects.

337 Politics, the Arts, and History (9:9:0) Students taking this learning community receive opportunities to see how major musicians, composers, studio artists, dramatists, writers, architects, and dancers confront political issues and historical events. Students are required to attend several museum exhibitions or performances.

340 Progress: Can America Figure Out What It Means? (3–15:3–15:0) Explores our land, the built and the left natural, as valued and sacred. Challenges students as developers and environmentalists, as citizens and business persons, to strive for a win-win scenario.

341 Progress: Washington—the New Edge City? (3–15:3–15:0) NCLC 340 investigates how the city, both the good parts and the bad parts, came to be. This course investigates what we might do about the situation. Requires active engagement of the students in research and discussion. Collective field work and class field trips both semesters. Students may take either Part I or Part II of this course but are encouraged to take both.

343/ENGL 343 Interactive Digital Texts (3:3:0) Prerequisite: English 101 or equivalent. Writing-intensive course devoted to critical reading of new media texts, and to creation of technology-enhanced texts in a variety of rhetorical genres targeted to specific audiences. Includes analysis of text embedded within technology-enhanced writing and that which surrounds this emerging medium. Critical reading and interpretive skills, historical and theoretical contexts for development of contemporary textual media. Allows students to explore critically such genres and gain command of a new rhetorical field for academic, educational, informational, technical, and business communication.

345 Introduction to Multimedia (3–15:3–15:0) Technological, aesthetic, and educational issues of using interactive multimedia. Topics include theoretical underpinnings of some technological issues involved in multimedia computing as well as techniques for authoring interactive multimedia projects using a variety of digital media tools.

346 Art as Social Action (4:3:1) This learning community explores historical record to understand different ways art has been produced, distributed, and consumed. Examines ways artists have affected change in their worlds. Through interdisciplinary studies, teaches major social movements, and artists and theories used in socially engaged art. Students engage in experiential learning outside classroom as course requirement.

347 Gender Representation in Popular Culture (3-6:3-6:0) Explores the way in which masculinity and femininity have been represented across the decades in television, movies, music videos, pop art, and print media. Provides a review of the scholarship on the historical and contemporary roles of women and men in society; examines the contradictions and expectations associated with gender roles. Incorporates active group learning through creative, insightful opportunities; critical thinking and discussions; and group presentations and media research activities.

348 Information in the Digital Age (6:3:3) Prerequisite: NCLC 249. Examines how purpose and function relate to form, and how digital material can attract or hinder audience responsiveness. Unique concerns of copyright, security, and privacy in a digital environment are considered. By looking at significant social, cultural, ethical, business, and economic consequences of the digital age, students gain hands-on experience in working with and assessing digital information.

349 Writing for Multimedia (4:3:1) Looks at how literary traditions of 20th century meet the cybercultures of 21st century. Workshop course exploring writing tasks facing multimedia professional, whether as a concept and storywriter, a producer, or as a hands-on creator of multimedia presentations and narratives. Students practice creative and project-focused writing. Scripting interactivity is a key component of both kinds of multimedia writing; class time is spent working on the skills and concepts needed to creatively communicate interactively.

350 Cyberculture (6:6:0) Prerequisite: NCLC 249, or permission of instructor. Research and write reports about ethical, social, educational, and cultural dynamics of online communities. Students examine who forms and has access to these communities, various types of communities, how people represent themselves online, electronic mediums they use, how technology shapes human interactions, and vice versa. Extensive online discussion component, and students post their work on the web. Student groups create a cyberculture web site as the final project. Students expected to know basic web publishing.

360 The Built Environment (3–15:3–15:0) Examines, records, and interprets objects, structures, and landscapes that compose our built environment. Draws on the fields of historical archaeology, architectural history, and urban geography, and employs photography, cartography, and evocative writing to represent the material world we inhabit. Builds on study of one neighborhood in Arlington, Virginia, and expands to entire metropolitan area.


375 Special Topics (3–15:3–15:0) Studies topics of special interest to undergraduates. May be repeated for credit if subtitle is different.

378 Medicine, Justice, and Public Policy (3:3:0) Explores formation of public policy relating to several key issues in medicine. Students examine basic theories of justice and public policy formation and apply these to contemporary issues in the field of medicine. The goal is to examine how current policy on these issues was established and to example major stakeholders in the debate. This course involves some traditional lecture and discussion classes, but also features participative learning through group work and web-based discussions.
379 Cancer and Its Social Impact (4:3:1) Prerequisite: 60 credits, or permission of instructor. Introduces epidemiology and biological basis for treatment and prevention of cancer. Students consider the social impact of cancer by looking at how patients and families cope with the disease. A portion of the learning community focuses on working with and learning from people living with cancer. Designed for biology and premedical students as well as nonscience majors interested in connecting the physiology of health and disease to the human spirit.

381 When Cultural Worlds Collide (3–15:3–15:0) Explores what happens when “civilization” encounters “the jungle” by reading, writing, discussing, and viewing written and filmed works dealing with contacts between cultures with colliding world views. Literature (from Conrad’s The Heart of Darkness to Shakespeare’s The Tempest to Burrough’s Tarzan), news articles, radio broadcasts, web home pages, art exhibits, and many film and video presentations provide the basis for in- and out-of-class activities.

391 Introduction to Integrative Studies (3:3:0) Students may not enroll in this course after completing 12 or more learning community credits, or simultaneously with or after completing NCLC 491. Describes key components of the Integrative Studies Program in New Century College. Students prepare for active participation as a community of learners; to develop skills in reflective learning and self-assessment; and to identify areas of intellectual and professional interests, values and skills so that students may take greater advantage of opportunities in NCC. As a learning community, this course fosters group collaboration, intensive writing, and reflective learning.

401 Conservation Biology (3–15:3–15:0) Prerequisite: junior standing, or permission of instructor. Provides students with a working knowledge of conservation biology. Integrates the study of social, economic, and political factors with biodiversity, population modeling, habitat degradation, and management issues. Students confront the leading edge of this exciting field by developing real species conservation plans. The experiential learning component of the course will include trips to the Smithsonian Institution’s Conservation and Research Center in Front Royal, Virginia, to study with nationally known experts.

410 Contemporary Health Issues (3–15:3–15:0) Looks at a variety of health and health care issues. Examines several of the major health concerns of women and, to a lesser degree, men. Also explores the biology and medical implications of these diseases and how our society deals with potential life-altering information. Examines who is making the decisions on the allocation of research funds and prevention of diseases.

420 Work Effectiveness Skills (3–15:3–15:0) Develops a variety of work-readiness skills needed to become successful in both local and global marketplaces. Topics and skills covered include communication, problem solving in the business setting, workplace ethics, listening skills, how to influence others, building team project rapport, and meeting effectiveness skills.

422 An Experiential Approach to American Foreign Policy (3–15:3–15:0) Takes an experiential approach to the study of American foreign policy. Through case studies, discussions, group projects, and directed research, students learn how foreign policy is made and executed and how they as citizens, activists, or officials can influence national decisions.

423 Management in the Global Marketplace (6:6:0) Experiential approach to the study of global management and organizational behavior. Through exercises, case studies, discussions, group projects, and individual research and essays, students learn the principles of effective management as they apply to modern global organizations, whether public, private, or nonprofit.

424 Force and Justice in the International System (3–15:3–15:0) Examines ethical dimensions of war and peace, human rights, and international justice. During the first seven weeks of the semester, students explore these issues in a classroom setting, followed by a seven-week, off-campus internship, and an integrating project, monitored by instructor. The class meets again as a group in the last week of the semester to share and consolidate the learning experience.

426 Dean’s Honors Research/Thesis (3:3:0) Research related to an aspect of your specialization or BIS Project. Course will require analysis, quantitative interpretation, and a minimum 15-page thesis to be presented in written and oral form.

431 Principles of Fundraising (4:3:1) Prerequisite: NCLC 331. Examines history of philanthropy and public policy, economic and legal frameworks that shape it. Combining theory and practice, students study human behavior, communications, and management systems that are hallmarks of successful fundraising, and begin to develop skills to generate donations, foundation grants, and other unearned revenue for a nonprofit organization. Includes 1 experiential learning credit.

435 Leadership in a Changing Environment (4:3:1) Prerequisite: 60 credits. Explores the basic framework for change management. It examines leadership styles focusing on historical, philosophical, and industrial examples, as well as personal change stories. Students learn about the diverse nature of leadership, explore historical perspectives on leadership, and interview business and community leaders to understand strategies for change.

440 Death, Dying, and Decision Making (3:3:0) Prerequisites: 60 credits, or permission of instructor. Inter-disciplinary examination of clinical care of dying persons along with psychosocial issues related to processes of death and dying. Special emphasis on application of ethical principles in resolving complex problems for individuals with life-threatening illnesses and their families as care givers or decision makers. Students consider the changing norms and mores surrounding end-of-life decisions and explore the care available to terminally ill patients.

441 AIDS: Impact on Society (variable 3–15:3–15:0) In-depth understanding of the medical, legal, and psychosocial factors surrounding HIV disease. Provides conceptual framework of current issues to become better prepared to deal with the emerging challenges posed by AIDS. Students may take this course for 5 credits and work with the Center for Service-Learning to develop internship or experiential learning project involving impact of AIDS in our society.

445 Multimedia Design (5:4:1) Prerequisite: NCLC 345, or permission of instructor. Technological, aesthetic, and educational issues of using interactive multimedia. Topics include theory and practice, integration of digital media,
449 Multimedia Research and Project Development (4:3:1) Prerequisite: NCLC 345, or permission of instructor. Provides a solid background in multimedia research and concept development from a scientific yet practical point of view. Students gain a full understanding of the computer-based principles behind multimedia and appreciate the symbiotic relationship between the two. Students also learn about the life cycle of development for a multimedia application including what constitutes a good idea, usability testing, and copyright issues.

475 Special Topics (3–15:3–15:0) Studies topics of special interest to undergraduates. May be repeated for credit if subtitle is different.

491 The Senior Capstone Experience (3:3:0) Should be taken semester before graduation; 85 credits required. Graduation requirement for integrative studies students. Students complete final NCC portfolio and senior exposition. Provides information on issues of professional development (interviewing skills, resume development, career strategies, alumni opportunities).

510 Institutional Records Keeping (3:3:1) Explores theory and mechanics of animal records keeping at zoological and aquarium institutions and how AZA, ISIS, SSPs®, TAGs, PMPs, WCMC, studbooks, and animal records collected in the ISIS database combine forces to manage captive populations.

511 Career Development (3:3:1) Prerequisite: PUAD 505 or permission of instructor. Focuses on traditional and industry-specific nonprofit management topics ranging from marketing to education. It is one of a series of three management courses for MAIS ZAL students.

512 Organizational Development (3:3:1) Prerequisite: NCLC 511. Covers traditional zoo and aquarium organization topics, strategic planning, human resources, leadership styles, crisis management, and personal ethics. It is one of a series of three management courses for MAIS ZAL students.

513 Population Management I: Data Acquisition and Processing (3:3:1) Prerequisite: Admission to MAIS ZAL program or permission of instructor. Teaches students to use SPARKS software and collect, process, and enter data into the studbook computer software program to manage captive populations in zoos and aquariums. Introduces principles of captive population management and genetics.

514 Population Management II: Data Analysis and Breeding Recommendations (3:3:1) Prerequisite: NCLC 513. Educates students to be competent population managers with the ability to manage the genetic health of captive populations in zoos and aquariums.

520 Conservation Education (3:3:1) Prerequisite: Admission to MAIS ZAL program or permission of instructor. Provides students with a comprehensive view of best practice and an understanding of pedagogical reform necessary to provide excellence in modern zoo and aquarium education. Focuses on public education and K–12 program development.

522 Developing an Institutional In Situ Conservation Strategy (3:3:1) Prerequisite: Admission to MAIS ZAL program or permission of instructor. Educates students about the process and disciplines necessary to facilitate the professional development of an institutional in situ conservation strategy. Teaches the students key components of a successful institutional conservation strategy. Presents model for strategy development that can be used as a guide to develop institutionally specific strategies.

523 Managing Animal Enrichment and Training Programs (3:3:1) Prerequisite: Admission to MAIS ZAL program or permission of instructor. Focuses on the study of animal behavior, exhibit enrichment, training, and animal welfare in modern zoos and aquariums. Topics include history, philosophy, and theory of animal welfare and husbandry planning.

531 Principles of Elephant Management (3:3:1) Prerequisite: Admission to the MAIS ZAL program or permission of instructor. This course is designed to train students to be competent elephant managers through understanding and application of behavioral science, reproductive physiology, population genetics, and conflict resolution.

625 Online Library Research for the Zoo and Aquarium Professional (3:3:0) Examines technologies such as full-text databases, open access publishing, and websites. Develops an understanding of expectations of the scientific method and ethical conduct among zoo and aquarium professionals. Covers case studies of appropriate conduct including peer review, allocation of credit, animal welfare, and conservation education. Students review cases, conduct independent research, and draw on their own professional experiences to demonstrate an understanding of appropriate process and moral behavior.

Independent and Experiential Learning

165, 265, 365, 465 Independent Study (1–12:1–12:1–12) Prerequisite: permission of instructor and dean. Individualized section form required. Study of a topic not otherwise available to the student. May involve any combination of reading assignments, tutorials, lectures, papers, presentations, or field/labatory study (determined in consultation with instructor) Students are encouraged to work as a team on a particular topic. Maximum 12 credits can be used to fulfill graduation requirements.

190, 290, 390, 490 Internship (1–6:0:1–6) Prerequisite: sophomore standing and permission of instructor. Internship credit may be applied to 12 credits required in experiential learning. Students may take no more than 6 credits in any one semester, unless approved by director of experiential learning or associate dean. Structured and supervised professional experience, within an approved agency, for which the student earns academic credit. The primary purpose of an internship is to connect the student’s academic course work to experiences and challenges outside the university classroom. The faculty also expects that students will enhance their competencies and skills and explore career options.

194, 294, 394, 494 Service-Learning Experience (1–15:1–15:0) Service-learning courses offer students,
faculty, and community partners an opportunity to work together to integrate and apply knowledge to address community needs. Learning goals, action strategies, and assignments developed collaboratively. Students demonstrate progress through critical reflection that illustrates growth in acquiring and comprehending values, skills, and knowledge content. Critical reflection may take the form of papers, presentations, portfolios, journals, and exams.

195, 295, 395, 495 Field-Based Work (1–15:1–15:0) Directed field studies in topic not otherwise available to students. Topics vary, but entire course or significant component is located off campus. In addition to fieldwork, course may also include reading assignments, tutorials, lectures, papers, presentations, portfolios, journals, and exams. Students bear costs of required field trips and should consult Center for Field Studies for more information.

196, 296, 396, 496 Teaching Assistant Experience (1–6:1–6:0) Teaching assistantship and peer-mentoring duties carried out through existing university programs, such as Technology Assistants, Writing Tutors, and Residence Advisors. Also includes teaching assistantship arrangements for specific courses detailed in individualized course contract signed by instructor and student. In addition to peer mentoring/advising, course work may include logistical support, reading assignments, papers, presentations, and portfolios.

197, 297, 397, 497 Add-On Experiential Learning (1–3:1–3:0) Prerequisites: must be enrolled in a learning community or experiential learning class to add this additional credit. For students who wish to add one or more experiential learning credit to existing experiential learning course or learning community. May also be used by students who wish to add an experiential learning component to course that provides no experiential learning credit (with permission of instructor). Unless experiential learning add-on requirements are spelled out in course syllabus, requirements for add-on experiential learning credit must be detailed in individualized course contract signed by instructor and student.

198, 298, 398, 498 Field-Based Work (1–15:1–15:0) Experiential-based individualized studies, mentored by instructor. Topics decided by student and instructor, and approved by associate dean. Requirements must be detailed in individualized course contract signed by student, instructor, and associate dean. May include reading assignments, papers, journals, and portfolios.

Nursing (NURS)

College of Health and Human Services

305 Application of Basic Nursing Techniques (1:0:2) Prerequisite: acceptance into accelerated second degree program. To be taken fall semester of accelerated second degree program. Introduces basic nursing technologies, and provides opportunities to apply these skills in simulated technology lab.

309 Introduction to Basic Nursing Care (3:3:0) Corequisite: N310. Enrollment restricted to second-degree students only. Introduces basic fundamentals of nursing care across the life span. Emphasis on nursing process, critical thinking, and foundational technologies and skills required to practice in the health care setting.

310 Application of Basic Nursing Care (3:0:9) Prerequisite: acceptance into accelerated second degree program. Application of basic nursing care in acute care settings utilizing the nursing process.

317 Introduction to Nursing Research (2:2:0) Prerequisites: statistics, junior standing. Introduces current knowledge, theory, and research. Emphasizes acquiring skills to access and utilize nursing and other health care research.

319 Pathophysiological Basis for Nursing Care of Individuals and Small Groups (4:4:0) Prerequisite: acceptance into second degree program. Focuses on pathophysiological, psychological, sociocultural, and risk-reduction factors related to nursing care for clients with psychiatric conditions, as well as for child-bearing women, infants, children, and adolescents with acute health care needs.

325 Application of Nursing Care for Individuals and Small Groups II (5:0:15) Enrollment restricted to second-degree international students only. Prerequisites: NURS 309, 310, 318, 328, 329, and 428; corequisites: 426, 440, 430, and 455. Seven weeks of clinical with focus on obstetric and family nursing, and seven weeks of pediatric nursing. Students may also follow selected clients in clinics or home situations. Clinical consists of two full days at acute care clinical agencies.

330 Nursing Fundamentals and Health Assessment (3:3:0) Prerequisite: junior standing; corequisite: NURS 331. Introduces nursing process and communication skills as the foundation for beginning health assessment and fundamental nursing care for culturally diverse individuals throughout the life span.

331 Nursing as a Process for Health Practicum (2:0:6) Prerequisite: junior standing; corequisite: NURS 330. Opportunity to practice health assessment and fundamental nursing technologies while using communication skills with culturally diverse and vulnerable populations in a variety of settings. Includes agency and campus labs.

332 Concepts of Health Promotion and Disease Prevention throughout the Lifespan (3:3:0) Prerequisite: junior standing. Introduces epidemiology, health promotion, and disease prevention; and the impact on health status of culturally diverse individuals, families, small groups, and communities. Focuses on health problems and potential interventions throughout life span, and incorporates principles of teaching, learning as they apply to nursing.

334 Nursing as a Health Profession and Discipline (3:3:0) Prerequisite: open only to RNs, LPNs, and second-degree students; corequisite: NURS 309 and 310 for second-degree students only. Introduces nursing as a dynamic and caring health profession, the impact of epidemiology, health promotion, and disease prevention on health status of culturally diverse and vulnerable individuals, families, small groups, and communities throughout life span. Incorporates nursing and critical thinking processes as they apply to the art and science of nursing. Historical perspectives on ethical, legal, political, and social issues are included.

337 Applied Nursing Fundamentals and Health Assessment (1:0:2) Prerequisite: junior standing; corequisites: NURS 330 and 331. Opportunity to practice health assessment and fundamental nursing technologies while using communication skills with culturally diverse and vulnerable populations in a variety of settings.

339 The Nursing Process through Case Studies (1:1:0) Prerequisite: admission to traditional or LPN to BSN path-
way. Corequisites: NURS 330, 331, and 347; and 348 or 349. Meets every other week for two hours. Provides opportunities to use nursing process while examining health conditions of clients in geriatric, maternal and infant, pediatric, or medical and surgical settings. Particular attention to assessing health needs of clients and their families through using case studies.

342 Case Studies in Health Promotion and Disease Prevention (1:1:0) Prerequisites: successful completion of NURS 330, 331, 332, and 333; corequisite: NURS 341. Meets every other week for two hours. Opportunity to integrate nursing care with health care needs of culturally diverse and vulnerable populations throughout the life span.

343 Pharmacology (3:3:0) Covers principles of pharmacokinetics, pharmacodynamics of selected drug classifications, and nursing responsibilities related to drug administration to individuals throughout life span.

344 Intermediate Nursing Technologies (1:0:2) Prerequisites: successful completion of fall and spring junior nursing courses; corequisite: NURS 346. Laboratory course to assist students in acquiring therapeutic nursing interventions. Technologies presented are asepsis and wound care, administration of medications including dosage calculations, and management of intravenous therapy.

345 Nursing of Clients in an Acute Care Setting (5:0:15) Prerequisite: successful completion of fall and spring junior nursing courses; corequisite: NURS 346. Concentrated clinical course in an acute care setting. Opportunity to provide collaborative nursing care to culturally diverse adults experiencing acute or chronic health problems. Uses case presentations dealing with adult family members with health problems.

346 Case Studies in Medical Surgical Nursing (1:1:0) Corequisite: NURS 345. Meets every week for two hours. Explores in-depth nursing care related to culturally diverse adults experiencing acute and chronic health problems. Uses case presentations dealing with adult family members with health problems.

347 Adult Pathophysiology and Nursing Care (2:2:0) Introduces changing health needs of culturally diverse and vulnerable populations. Focuses on normal physiological, pathophysiological, psychological, sociocultural, risk reduction, and nursing care of these clients.

348 Maternal-Newborn Physiology, Pathophysiology, and Nursing Care (2:2:0) Introduces normal and abnormal processes with maternal-infant clients including cultural diversity and vulnerable populations. Focuses on normal physiological, pathophysiological, psychological, sociocultural, risk reduction, and nursing care of these clients.

349 Pediatric Pathophysiology and Nursing Care (2:2:0) Focuses on changing health needs of culturally diverse and vulnerable populations. Includes nursing care, pathophysiological, psychological, sociocultural, and risk-reduction implications of frequently experienced health problems in pediatric population.

350 Application of Nursing Care for Individuals and Small Groups (5:0:15) Prerequisite: all fall semester courses in second degree program, or permission of instructor. Introduces intermediate nursing technologies, and provides opportunities to apply these skills in simulated technology lab.

351 Application of Intermediate Nursing Technologies (1:0:2) Prerequisite: all fall semester courses in second degree program, or permission of instructor. Introduces intermediate nursing technologies, and provides opportunities to apply these skills in simulated technology lab.

352 Case Studies in Health Promotion and Disease Prevention (1:1:0) Prerequisites: successful completion of NURS 330, 331, 332, and 333; corequisite: NURS 341. Meets every other week for two hours. Opportunity to integrate nursing care with health care needs of culturally diverse and vulnerable populations throughout the life span.

353 Pharmacology (3:3:0) Covers principles of pharmacokinetics, pharmacodynamics of selected drug classifications, and nursing responsibilities related to drug administration to individuals throughout life span.

354 Intermediate Nursing Technologies (1:0:2) Prerequisites: successful completion of fall and spring junior nursing courses; corequisite: NURS 346. Laboratory course to assist students in acquiring therapeutic nursing interventions. Technologies presented are asepsis and wound care, administration of medications including dosage calculations, and management of intravenous therapy.

355 Nursing of Clients in an Acute Care Setting (5:0:15) Prerequisite: successful completion of fall and spring junior nursing courses; corequisite: NURS 346. Concentrated clinical course in an acute care setting. Opportunity to provide collaborative nursing care to culturally diverse adults experiencing acute or chronic health problems. Uses case presentations dealing with adult family members with health problems.

356 Case Studies in Medical Surgical Nursing (1:1:0) Corequisite: NURS 345. Meets every week for two hours. Explores in-depth nursing care related to culturally diverse adults experiencing acute and chronic health problems. Uses case presentations dealing with adult family members with health problems.

357 Adult Pathophysiology and Nursing Care (2:2:0) Introduces changing health needs of culturally diverse and vulnerable populations. Focuses on normal physiological, pathophysiological, psychological, sociocultural, risk reduction, and nursing care of these clients.

358 Maternal-Newborn Physiology, Pathophysiology, and Nursing Care (2:2:0) Introduces normal and abnormal processes with maternal-infant clients including cultural diversity and vulnerable populations. Focuses on normal physiological, pathophysiological, psychological, sociocultural, risk reduction, and nursing care of these clients.

359 Pediatric Pathophysiology and Nursing Care (2:2:0) Focuses on changing health needs of culturally diverse and vulnerable populations. Includes nursing care, pathophysiological, psychological, sociocultural, and risk-reduction implications of frequently experienced health problems in pediatric population.

360 Application of Nursing Care for Individuals and Small Groups (5:0:15) Prerequisite: all fall semester courses in second degree program, or permission of instructor; corequisite: NURS 333, 419, and 353. Includes five weeks of clinical experience in each specialty area, with focus on obstetric and family nursing, pediatric, and psychiatric mental health nursing. Students may also follow selected clients in clinics or home situations. Clinical consists of two full days per week in acute-care agencies.

361 Application of Intermediate Nursing Technologies (1:0:2) Prerequisite: all fall semester courses in second degree program, or permission of instructor. Introduces intermediate nursing technologies, and provides opportunities to apply these skills in simulated technology lab.

362 Case Studies in Health Promotion and Disease Prevention (1:1:0) Prerequisites: successful completion of NURS 330, 331, 332, and 333; corequisite: NURS 341. Meets every other week for two hours. Opportunity to integrate nursing care with health care needs of culturally diverse and vulnerable populations throughout the life span.
427 Advanced Technologies for the Accelerated pathway (1:1:2)
Prerequisites: NURS 310, 320, and 343. Advanced technology course developing knowledge base related to acquisition of advanced skills in nursing practice. Refinement of assessment skills associated with selected advanced technologies integrated into this laboratory course.

428 Community Health Clinical for the Accelerated Pathway (2:0:6)
Prerequisites: NURS 436 and 440. Clinical experience with a focus on collaborative nursing care with individuals, families, and large groups in the community. Emphasis on health promotion and disease prevention for well populations, and community-based care for individuals and families with acute and chronic illness.

429 Preceptorship for the Accelerated Pathway (3:0:9)
Prerequisites: NURS 309, 310, 320, 343, 419, and 436. Opportunity to deliver collaborative nursing care to culturally diverse and vulnerable populations. Concentrated clinical experiences available in selected institutional settings.

430 Leadership and Management of Health Care (3:3:0)
Introductory course in the leadership and management of health-related organizations. Reviews administrative issues in health-related services with particular emphasis on developing organizational strategies for effective interfacing of medical, nursing, allied health, and administrative staff. f,s

440 Community Health and Epidemiology (3:3:0)
Prerequisite: completion of junior year. Addresses population-focused health care. Emphasis is on primary, secondary, and tertiary prevention of health problems. Concepts of community, public health, and health policy affecting culturally diverse and vulnerable populations are examined. f,s

441 Nursing of Clients in Communities and Large Groups (5:0:15)
Prerequisites or corequisites: NURS 410, 436, and 440; corequisite: NURS 442. Provides clinical experience with a focus on collaborative nursing care with individuals, families, and large groups in the community. Emphasis on health promotion and disease prevention for well populations, and community-based care for individuals and families with acute and chronic illnesses. f,s

442 Case Studies in Community Health Nursing (1:1:0)
Corequisite: NURS 441. Examines the application of nursing care related to vulnerable and culturally diverse populations. Emphasis is on case studies, which include health promotion, disease prevention, cultural, political, ethical, and legal issues. Primary, secondary, and tertiary preventive concepts are applied. Seminar meets every other week for two hours.

451 Advanced Clinical Preceptorship (5:0:15)
Prerequisites or corequisites: NURS 410 and 436; corequisite: NURS 452, 455. Opportunity to provide complex, collaborative nursing care to culturally diverse and vulnerable populations. Concentrated clinicals available in selected institutional settings. f,s

452 Research in Nursing (3:3:0)
Prerequisite: statistics. Introductory research course designed to present basic concepts and methods of research. The research process is examined as a foundation for scholarship. Emphasis on critique and use of current nursing and research in clinical practice.

455 Advanced Technologies in Nursing (2:0:4)
Corequisite: NURS 451. Opportunity to acquire advanced skills in nursing practice. Refinement of assessment skills associated with selected advanced technologies integrated into this laboratory course.

466 Community Health Nursing (2:2:0)
Prerequisite: completion of junior year. This course addresses population-focused health care. Concepts of public health, epidemiology, environmental health, extended roles in nursing and health policy affecting culturally diverse and vulnerable populations are examined.

467 Clinical in Community Health Nursing (2:0:6)
Prerequisite: completion of junior year. Opportunity to provide complex collaborative nursing care with individuals, families, and large groups in the community. Emphasis is on health promotion and disease prevention for well populations and community-based care for individuals and families with acute chronic diseases.

468 Psychiatric and Mental Health Nursing (2:2:0)
Focuses on the nursing care, pathophysiological and psychological, social-cultural, and risk reduction implications of health problems in the area of mental health and psychiatric nursing.

469 Clinical in Psychiatric and Mental Health Nursing (2:0:6)
Prerequisite: NURS 468. Clinical experience with a focus on collaborative nursing care with individuals, families, and large groups in the community. Emphasis is on health promotion and disease prevention for well populations and community-based care for individuals and families with acute chronic diseases.

475 Grand Rounds Complex Case Presentations (3:3:0)
Enrollment restricted to second degree students only. Prerequisites: NURS 254, 262, 318, 319, 320, 419, 426, 430, 450, and 455. Examines nursing implications of selected major health problems that significantly affect individuals throughout the life span. Focus is on complex health problems. Class meets once a week in the format of group presentations in the clinical setting. sum

487 Principles, Concepts and Techniques of Operating Room Nursing (3:3:0)
Prerequisites: RN licensure, one year clinical experience, and letter of acceptance to six-month operating room clinical preceptorship. Prepares the registered nurse in basic principles and skills of operating room nursing. Learning environment is provided for registered nurse with no previous operating room experience to apply fundamental skills and knowledge of operating room nursing in clinical practice. Based on the Association of Operating Room Nurses Standards and Recommended Practices and Guidelines.

488 Inquiry-Based Clinical Seminar (2:2:0)
Students focus on a selected client they have provided care for during their NURS 451 clinical preceptorship. Students examine the data in the case, draw inferences, make deductions, identify assumptions, and generate interpretations regarding the client’s problems. The class will participate as a group in the inquiry process to identify strengths and weaknesses of the arguments presented.

491 Critical Thinking and Analysis of Test Taking Strategies (2:2:0)
Prerequisite: permission of instructor. Increases test-taking abilities and improves critical-thinking skills related to nursing situations. Also guides the student to
analyze and organize content to assist in decision making about nursing interventions. With faculty supervision, students work independently based on their learning needs.

492 Death, Dying, and Decision Making (3:3:0) Interdisciplinary examination and analysis of clinical care of dying and psychosocial issues related to death and dying. Special emphasis on applying ethical principles in resolution of complex problems for individuals with life-threatening illnesses and their families as caregivers or decision makers. Decision-maker models provide basis for clinical case discussions. Questions of futility examined with associated care issues. Current professional and lay literature discussed in context of socially changing norms and mores. Explores hospice and alternative palliative care models, and reviews policies, laws, and regulations that affect caregivers and health service providers. Includes advance directives, do-not-resuscitate orders, and assisted suicide. Presents bereavement as part of death, dying, and grieving process. Lecture-discussion.

494 Special Topics in Nursing (3:3:0) Selected topics analyzing specialized areas in nursing. Content varies. Lecture, seminar, laboratory, and workshops.

495 Directed Reading in Nursing (1–2:0:0) Prerequisite: permission of college. Examines literature on specialized topic in nursing practice, education, or scholarship. Readings conducted in consultation with faculty. May be repeated for a maximum of 4 credits.

496/GCH 496 Violence in Today’s Society (3:3:0) Examines magnitude of problem of violence globally and more specifically within the United States. Discussion and reflective activities engage students in the learning process.

499 Independent Study in Nursing (1–3:0:0) Prerequisite: permission of college. Provides individual study of a particular problem area in nursing research, theory development, or education under the direction of faculty. Clinical practice may be arranged. May be repeated for maximum 6 credits.

505 Case Management (3:3:0) Prerequisite: bachelor’s degree, or permission of instructor. Open to seniors. Survey course on state of case management programs and practice for health care and human service professionals. Special emphasis on comparing the nature, process, and outcomes for baccalaureate and graduate students guided by the objectives.

508 Psychopharmacology (3:3:0) Surveys therapeutic effects and side effect profiles of psychopharmacological drugs including psychotropic and recreational drugs. Emphasizes understanding mechanisms of actions, drug interactions, and subject variables influencing drug effects.

509 Introduction to Emergency Nursing (3:3:0) Introduces emergency care nursing, focusing on relevant pathophysiological disease processes, diagnostics, medical therapeutics and relevant technology as applied to emergency nursing. Focuses on care of multicultural clients across the life span, as well as the patient-family unit of care. Addresses collaboration and triage, as well as legal, ethical, and psychosocial issues. Course based on core curriculum of the Emergency Nursing Association (ENA)

513 Advanced Pharmacology in Nursing (3:3:0) Does not meet requirements for nurse practitioner majors, but may be taken as an elective. Provides knowledge of physiologic responses and pharmacokinetic principles of pharmacologic agents that will undergird the student’s learning of advanced pharmacologic concepts. Topics include advanced pharmacokinetic principles, pharmacotherapeutics of single and multiple drug regimens, client education needs, special population needs, and legal requirements for prescriptive authority.

514 Application of Advanced Health Assessment Methods (1:2:0) Prerequisite: undergraduate-level health assessment course for degree credit or approved CEU course. Expands on undergraduate skills in systematic health assessment across the life span. Teaches application of advanced health assessment skills in specialty advanced nursing practice setting. Integration of skills and techniques in collecting health assessment data towards appropriate decision making, clinical assessments, and therapeutic interventions in select population emphasized.

530 Nurses as Writers (3:3:0) Focuses on theories and practices related to writing in nursing. Researching, composing, revising, and editing practiced in a variety of writing styles.

546/GCH 546 Leadership Strategies in Health Policy (3:3:0) Examines the leadership process from a policy and organizational perspective to expand students’ ability to impact the health policymaking process.

550 Pathophysiology Bases for Major Health Deviations of Individuals (3:3:0) Examines health deviations occurring in people in the United States that require long-term or terminal health care interventions. Deviations are presented within a developmental framework as they influence physiologic integrity at the cellular level. Focus is on man as a whole, open system. Complex health programs from the perspective of maintaining homeodynamics are examined.

556 Principles of Assessment and Evaluation in Nursing Education (3:3:0) Presents techniques of assessment, measurement, and evaluation of nursing knowledge and skills in classroom and clinical settings. Provides opportunities for the informal assessment of learning; formal construction, analysis, and evaluation of tests; and evaluation of standardized tests. Examines the current research and the legal and ethical principles related to assessment and evaluation in nursing education.

557 Introduction to Clinical Genetics in Health Care (3:3:0) Focuses on human clinical genetics including basic Mendel genetics; cytogenetics; molecular genetics; genetic disease, diagnosis, testing, and screening. Discusses central principles and impact of Human Genome Project on health care practice in terms of ethical and legal issues, including genetic testing and counseling.

570 Cultural Dimension of Aging (3:3:0) Examines the impact of cultural definitions of aging, research methodologies, and findings of crosscultural studies. Implications for health care and nursing are explored.

571/GCH 571 HIV/AIDS: Concepts, Principles, and Interventions (3:3:0) Provides overview of all aspects of HIV disease to include retrospective and current concepts and analyses of the epidemic, global, and societal impact, and cutting-edge research. Examines development of therapeutic tools and skills to educate, reduce risks, control infection, and affect care and healing of client, family, and community; and issues of increasing dilemma for health care professionals.
580 Operating Room—RN First Assistant (3:3:0) Prepares the experienced operating room nurse to become a registered nurse first assistant. Modeled after the official AORN RNFA core curriculum. Student receives hands-on practice in knot tying and suturing, as well as experience with microscope and endoscopy labs.

581 Operating Room—RN First Assistant Clinical Practicum (3:1:2) Prerequisite: NURS 580, and operating room nursing experience. Practicum course that prepares the RNFA to practice in an expanded clinical nursing role in the operating room. Based on the core curriculum of AORN. Individually designed practicum is taken after completion of NURS 580 to give the experienced operating room nurse 120 hours of practicum experience as a surgical first assistant working under the supervision of a surgeon preceptor.

582 Nursing Care of Infants and Children (3:3:0) Prerequisite: junior nursing courses. Corequisites: NURS 451 and 455. Senior elective nursing course for students with specific interests in the field of pediatric nursing. Focuses on impact of illness and hospitalization on infants, children, and adolescents with emphasis on the family unit. Content builds on previous knowledge of pathophysiological, sociocultural, and risk reduction factors related to nursing care of infants, children, and adolescents.

585 Entrepreneurship in Health Care (3:3:0) Overview of models of entrepreneurship in health care. Provides opportunities for collaborative problem solving to support business development, entrepreneurial behavior, and leadership. Explores innovative approaches to and alternatives for nursing practice and health care delivery.

586 Parish Nursing I (3:3:0) Students must be registered nurses. Introduces parish nursing as a developing specialty practice for professional nurses. Identifies basic skills for ministry in a faith community. Emphasizes scope of practice, various theological concepts for health ministry, and application of assessment skills to the faith community. Examines processes of case consultation and spiritual formation.

587 Parish Nursing II (3:3:0) Students must be registered nurses. Focuses on skill development in spiritual assessment, ethical decision making, and effective use of prayer. Emphasizes health promotion, working with volunteers, and utilizing community resources. Self-care and professional identity for the parish nurse are addressed. Students continue the processes of case consultation and spiritual formation.

594/GCH 594/HAP 594 Special Topics in Nursing (3:3:0) Presents selected topics analyzing specialized areas in nursing. Content varies. Lecture, seminar, laboratory, workshop.

595 RN to MSN Transition: Evidence Based Community Health Nursing (3:2:1) Initial course in RN to MSN Pathway. Introduces concepts of community health nursing with evidence-based focus. Students apply concepts to selected communities; demonstrate an understanding of health promotion and disease prevention; explore role of master’s prepared nurses; and complete 45 hours of clinical practicum to achieve course objectives.

605 Clinical Nurse Educator Academy (3:3:0) Integrates knowledge and skills from clinical practice with new knowledge and skills needed as a clinical nurse educator. Narratives are used to teach essential skills for clinical nurse educators, such as assessment of learning needs, writing of objectives, teaching strategies, clinical simulation, and performance evaluation.

611 Anthropology of Health (3:3:0) Explores cross-cultural issues of health and illness from medical anthropology theory. Discusses cultural dimensions of developmental cycle and health care systems.

620 Advanced Psychiatric/Mental Health Nursing (3:3:0) Build on basic psychiatric and mental health nursing knowledge and skills in assessment, diagnosis, therapeutic intervention, and management. Focuses on enhancing fundamental roles of psychiatric or mental health advanced practice nurse, including practice, teaching, consultation, supervision, and research in relation to clients and their families.

623 Clinical Concepts in Community-Oriented Primary Care (3:2:3) Theoretical and clinical application of community oriented primary care concepts with focus on health promotion and disease prevention. Examines scope of practice of advanced practice nurse practitioner. Students work with interdisciplinary groups to improve health indicators for populations.

630 Acute Care Nursing for Advanced Practice (3:3:0) Focuses on acute-care nursing for advanced practice with individuals and their families diagnosed with potentially life-threatening alterations in health. Emphasizes risk factors, physical symptoms, evidence-based interventions, functional capacity, and patient and family dynamics; and psychosocial, economic, and cultural factors and their impact on care.

645 Gerontological Nursing 1 (3:3:0) Prerequisites: NURS 680 and 688. Provides content related to nursing care of older adults with emphasis on advanced practice and issues relevant to improved health care of the elderly. Focuses on biological, psychological, and sociocultural elements that influence the aging process, and onset of age-related illnesses.

646 Gerontological Nursing 2 (3:3:0) Prerequisite: NURS 645. Builds on content in NURS 645, and focuses on health care deviations and nursing interventions in advanced gerontological nursing practice. Age-related illnesses and common disorders are discussed in the context of health behaviors, healthy adaptation, cultural sensitivity, developing appropriate coping strategies, and family, community, and nursing supports.

654 Nursing Administration Financial Management (3:3:0) Investigates managerial technologies related to financial planning and control functions of midlevel nurse administrators. Content develops knowledge and skills necessary for effective participation in financial management as related to business plan development, program budget planning, and control.

660/PHIL 510 Seminar in the Ethics of Health Care (3:3:0) Examines moral dilemmas in the health care profession, with special emphasis on patients’ rights, professionals’ obligations to other professionals, and issues of social justice in health care. Methods of moral deliberation based on ethical knowledge and justification are applied to ethical dilemmas in health care.

680 Theoretical Foundations Related to Nursing (2:2:0) Examination and evaluation of assumptions, concepts, and propositions inherent in selected nursing and related discipline theories.

685 Advanced Nursing Research Methods (3:3:0) Prerequisite: admission to graduate nursing program; corequisite: NURS 755 and a graduate-level bivariate statistics course. Examines principles and methods of research in problem identification, theoretical framework, design, data collection, and analysis. Students develop a nursing research proposal.

686 Projects in Nursing Research (2:2:0) Prerequisite: NURS 685. Applies knowledge gained in NURS 790 to implement research proposal designed in NURS 790.

688 Organization of Nursing and Health Care Delivery Systems (3:3:0) Prerequisite: admission to graduate nursing program. Provides foundational overview of U.S. nursing and health care delivery systems. Surveys key concepts, frameworks, processes, and structures related to health care delivery organizations. Lecture, discussion.

690 Independent Study in Nursing (1–3:0:0) Prerequisites: admission to graduate nursing program, and permission of associate dean for academic programs. Studies in-depth a selected area of nursing theory, research, or practice under direction of faculty. May be repeated; maximum 6 total credits.

704 Nursing Administrative Leadership Academy (3:3:0) Uses a leadership competency framework to integrate knowledge, skills, values, and best practices of innovative nursing leadership. Lectures, interactive collaborative discussion, written projects, and leadership self-assessment identify and teach the proficiencies specific to the administrative executive role.

719 Advanced Health Assessment (2:0:4) Course is offered through George Washington University and is charged at GWU tuition rates. Prerequisite: admission to an NP concentration or permission of instructor. Application of advanced health assessment skills and clinical decision making with adults of all ages in primary care settings. Students formulate differential diagnosis related to body systems and presenting signs and symptoms. Students explore communication techniques related to motivating and changing health behaviors. The performance of skills and techniques needed to collect data for comprehensive health assessment is emphasized in this supervised practicum by nurse practitioner preceptors.

720 Practicum in Family Primary Care Nursing I (4:2:6) Prerequisites: NURS 710, 723, 745, 747, 756. Performance of beginning-level nurse practitioner clinical decision-making skills in assessment and management of families and individuals across the life span, with emphasis on health maintenance and health promotion. Seminar, lab, and clinical practicum.

721 Practicum in Assessment and Management of the Developing Family (8:3:15) Prerequisite: NURS 720. Theoretical and clinical application of health assessment, health maintenance and promotion, anticipatory guidance, diagnosis, and management of common primary health care concerns through clinical decision-making skills focused on childrearing and childbearing families. Seminar, lab, clinical practicum.

722 Practicum in Family Primary Care Nursing II (8:3:5) Prerequisite: NURS 721. Students perform advanced clinical decision making in the role of family nurse practitioner. Family primary care problems throughout the life span are assessed and managed, particularly families with elderly and medically underserved members. Seminar, lab, and clinical practicum.

723 Clinical Decision Making (2:2:0) Course is offered through George Washington University and is charged at GWU tuition rates. Corequisite: NURS 756, admission to an NP concentration, or permission of instructor. Analyzes clinical cases using student participation in decision-making formulation. Correlates pathophysiology with symptom manifestations. Evaluates family, medical, and social history; physical findings; laboratory data; and radiographic studies as they contribute to the decision-making process. The theoretical basis for selecting pharmacological and nonpharmacological therapies is explored. Therapies are justified by examining the evidence to support them.

725 Hermeneutic Research Methodologies in Health Care (3:3:0) Uses seminar/discussion for in-depth exploration of interpretive phenomenology, philosophical background for hermeneutics, and hermeneutics as method in context of conducting research in health care. Uses readings from philosophers such as Heidegger, Merleau-Ponty, and Gadamer to situate hermeneutical methodologies in philosophy of science.

726 Perspectives in Nursing Education (3:3:0) Uses seminar approach to provide an overview of nursing education. Provides the foundation for teaching and learning in nursing with emphasis on relevant research.

727 Application of Nursing Education Principles to Curriculum and Program Development (3:3:0) Prerequisite: NURS 726. Uses seminar and discussion forums to analyze and apply theoretical principles and teaching and learning strategies in planning, developing, and evaluating nursing programs. Examines the overall creative, planned, and collaborative process of program development and evaluation.

728 Practicum and Seminar in Nursing Education I (3:1:6) Prerequisites: admission to graduate nursing program or post-master’s status; NURS 726 and 727; NURS 536 or EDRS 531. Uses seminar/discussion approach and practicum experience to analyze the role and functions of the nurse educator in the academic classroom. Emphasis is on the application of teaching/learning strategies, legal and ethical issues in nursing education, and role development as a nurse educator.

729 Practicum and Seminar in Nursing Education II (3:1:6) Prerequisites: admission to graduate nursing program or post-master’s status; NURS 727 and 728; NURS 536 or EDRS 531. Uses seminar/discussion approach and practicum experience to analyze the role and functions of the nurse educator in the clinical setting. Application of research-based teaching and evaluation strategies in the clinical setting are emphasized.

730 Leadership Strategies for the Clinical Nurse Leader (2:2:0) Prerequisites or corequisites: NURS 597 and 685. Explores aspects of horizontal and vertical leadership central to clinical nurse leader (CNL) role. Emphasizes quality management and improvement, communication processes, evidenced-bases practice initiatives in microsystem, and
strategies for efficient use of resources while maintaining safe and effective patient care.

731 Clinical Nurse Leader Role Integration (2:0:6) Explores roles, functions of clinical nurse leader in microsystem in health care arena. Uses seminar and clinical approaches to develop competence in clinical decision-making, critical thinking, problem identification, and outcome measurement for select client population at point of care.

732 Clinical Nurse Leader Practicum (7:0:21) Guided implementation of clinical nurse leader role in selected health care microsystem. Uses clinical and seminar approaches to acquire in-depth skills related to design, implementation, and evaluation of patient care. Focuses on accountability for coordination, delegation, and supervision of care provided by unit-based health care team.

733 Introduction to Forensic Science (3:3:0) Prerequisite: admission to a graduate program or extended studies, or permission of the instructor. Examines the introductory concepts of forensic science including the various professional roles of forensic scientists and practitioners. This course provides a broad overview of the forensic science profession. Different types of violence, as well as prevention and reduction strategies, are discussed. The forensic professional’s role in policy and legal processes are explored. Forensic research is introduced. Professional certification options are explored.

734 Role of the Sexual Assault Nurse Examiner and Interpersonal Violence (3:3:0) Prerequisites: Must be a registered nurse with a valid nursing license; NURS 733 or permission of instructor. Focuses on the incidence and consequences of interpersonal violence across the lifespan. Identifies the role of sexual assault nurse examiner (SANE) as a member of the Sexual Assault Response Team (SART). Examines forensic techniques used to collect evidence. The role of the SANE in the judicial process is explored.

735 Crime Lab and Crime Scene Investigation (3:3:0) Prerequisite: NURS 733 or permission of instructor. Examines the components of the crime lab and the crime scene analysis process. Explores the role of the forensic scientist in crime scene investigation. This course covers the initial crime scene response and initial assessment measures needed to properly collect and handle evidence. Documentation and preservation efforts are reviewed for various types of evidence collected.

736 Psychological and Legal Aspects of Forensic Science (3:3:0) Prerequisite: NURS 733 or permission of instructor. Evaluates the psychological and legal aspects of forensic science. Reviews victimology and the role of the forensic professional when dealing with victimized individuals. This course reviews various types of violence and identifies the assessment criteria needed to pursue prosecution. Examines the legal process and the role of the forensic professional in providing testimony in a court of law.

737 Investigation of Injury and Death (3:3:0) Prerequisite: NURS 733 or permission of instructor. Explores the role of the forensic scientist in death investigation. Examines death, manners of death, and causes of death, along with the death certification process. The role of the medical office professional and autopsy procedures will be reviewed. DNA evidence and the CODIS system will be analyzed.

740 Clinical Nurse Specialist Internship (3:0:9) Prerequisite or corequisite: NURS 775. A continuation of clinical application of theory from NURS 775 to a selected clinical specialty with attention to the health illness continuum of individuals, families, and community. This course may be taken twice.

745 Pharmacology (3:3:0) Course is offered through George Washington University and charged at GWU tuition rates. Describes the pharmacologic principles and pharmacodynamic actions of major classes of drugs. Distinguishes between the major drug classes by the pharmacologic properties of the drugs on the cellular, organ, and whole organism level. Study of indications and contraindications of appropriate therapeutic entities for health deviations is based on a thorough knowledge of drugs including their mechanism of action, possible toxic effects, and their fate in the human body. Evaluation and recognition of drug interactions for the possible impact on each drug’s therapeutic behavior, as well as on the body as a whole is emphasized. Chooses and interprets appropriate monitoring mechanisms for drug efficacy and toxicity.

746 Practicum in Adult Primary Care Nursing (6:2:12) Prerequisite: NURS 719, 723, 743, 747, 756. Prerequisite or corequisite: NURS 623. Demonstration of the ability to function at a beginning level in the role of the nurse practitioner. Performance of advanced skills in assessment and the development of plans for health maintenance and promotion for adults.

747 Pharmacology in Disease and Pathophysiology (1:1:0) Course is offered through George Washington University and charged at GWU tuition rates. Corequisite: NURS 719. Prerequisite: permission of instructor. Analyze drugs and their interaction with physiologic processes on the cellular level. Discuss the therapeutic actions of drugs in relationship to pathophysiologic states. Recognize those physiologic and pathophysiologic states that have direct consequences on the actions of drugs.

748 Practicum in Adult Primary Care Nursing II (8:2:16) Prerequisite: NURS 746. Enables nurse practitioner student to assume increased responsibility in the delivery of primary care to adults. Special emphasis on primary care needs of elderly and medically underserved groups.

751 Primary Care of the Developing Family (5:5:0) Prerequisites: national certification as adult nurse practitioner; and graduate-level advanced health assessment, pathophysiology, and pharmacology. Taught through George Washington University Distance Learning. Post-master nurse practitioner course to introduce primary care nurse practitioner to knowledge and skills necessary to practice as a family nurse practitioner. Combines clinical experiences with instructional and informative family content, which focuses on primary care needs of the developing family. Provides theoretical and practical foundation for primary care nurse practitioners to expand their scope of practice to encompass family-based nursing. Participants collaborate with other students in group projects and web-based group discussions. Students broaden their knowledge through clinical experiences and clinical logs.

752 Advanced Family Primary Care (8:8:0) Taught through George Washington University Distance Learning. Seminar and clinical practicum that focuses on the integration of the family nurse practitioner role through the applica-
tion of family theory and concepts in primary care settings. Application of advanced critical thinking and decision making of family care needs and family systems is emphasized. For advanced students in the Post Master Advanced Practice Nurse Practitioner Program.

753 Diagnosis and Management of the Developing Family (4:2:6) Prerequisites: NURS 731. Taught through George Washington University Distance Learning. Didactic and laboratory course focused on primary care needs of families. Integration of advanced health assessment, health maintenance and promotion, anticipatory guidance, and diagnosis and management of common primary care health concerns to advance the knowledge and skills of primary care nurse practitioner needs of family care as provided by family nurse practitioners. For students in the Post Master Advanced Practice Nurse Practitioner Program.

754 Advanced Adult Primary Care (4:1:9) Prerequisites: NURS 719, 723, 745, 747, 756. Enables the post-master's nurse practitioner student to develop and assume increased responsibility in delivery of primary care to adults. Clinical preceptorship and instructional and informative didactic material in primary care enable students to demonstrate advanced skills in the assessment, clinical diagnostic, and clinical management of common acute and chronic primary care problems. Special emphasis to the development of community-based health promotion and disease prevention strategies with adults and medically underserved populations.

756 Advanced Pathology and Pathophysiology (4:4:0) Course is offered through George Washington University and charged at GWU tuition rates. Prerequisite: students must be enrolled in an NP concentration. Corequisite: NURS 723. Analyze health deviations in the physiologic and pathophysiologic aspects of systems functioning across the life span. Students assimilate the process of systematic assessment and management of health deviations foundational for making clinical decisions. Collaborate in interprofessional student groups to develop strategies for health promotion and disease prevention in vulnerable populations.

762 Managed Care Concepts for Primary Care Practice (1–4:1–4,3–12) Prerequisites: acceptance into nurse practitioner track, and permission of instructor. Presents managed care concepts specific to primary care practice through self-paced learning modules, seminars, and selected nondirect care internship experiences in managed care settings.

763 Administrative Theory in Nursing (3:3:0) Prerequisite: admission to graduate nursing program. Prerequisites or corequisites: NURS 680 and Management/Organizational Theory. Uses administrative theory and management principles and processes as related to roles and functions of the nurse in management in health-related agencies. f

765 Practicum in Nursing Administration I (3:1:8) Prerequisites: admission to graduate nursing program, and NURS 680. Prerequisite or corequisite: NURS 763. Applies administrative theory and management principles and processes in a selected health-related agency. Roles and functions of the nurse in management are explored. Lab arranged. f

766 Administrative Strategies in Nursing (3:3:0) Prerequisite: NURS 763. Explores roles and functions of the nurse in management as the nurse manager develops patterns of nursing care, articulating nursing education, and nursing service. s

768 Practicum in Nursing Administration II (3:1:8) Prerequisites: NURS 763 and 765. Prerequisite or corequisite: NURS 766. Implements and integrates roles and functions of the nurse in management. Emphasizes using appropriate management principles and processes in a selected health-related agency. Lab arranged. s

773 Advanced Clinical Nursing I (3:3:0) Prerequisite or corequisite: NURS 550 and 680. Foundational theory relevant to the emerging roles in advanced clinical nursing, focusing on therapeutic nursing interventions in a variety of clinical specialties, with attention to health-illness continuum of individuals, families, and communities.

775 Advanced Specialty Practice I (3:2:7) Prerequisites: admission to graduate program and NURS 680. Corequisite: NURS 772. Focuses on clinical application of theory from NURS 773 to a selected clinical specialty with attention to the health illness continuum of individuals, families, and communities.

776 Advanced Clinical Nursing II (3:3:0) Prerequisite: NURS 773. Expansion of selected content included in NURS 773 for the delivery of advanced nursing care in a variety of settings. Emphasizes development and evaluation of the advanced practice nursing role in complex health care systems.

778 Advanced Specialty Practice II (3:2:7) Prerequisites: NURS 773 and 775. Corequisite: NURS 776. Applies concepts of the advanced practice nursing role from NURS 776 to a selected clinical specialty.

780 Practicum in Gerontological Nursing I (3:0:3) Prerequisites: NURS 719, 723, 745, 747, 756. Corequisite: NURS 746. Demonstrates the ability to function at a beginning level in the role of the gerontological nurse practitioner. Performance of advanced skill in geriatric assessment with a special emphasis on the delivery of health promotion and disease prevention services (practicum of at least 100 clinical hours and case analysis conferences).

781 Practicum in Gerontological Nursing II (3:0:3) Prerequisite: NURS 780; corequisite: NURS 748. Demonstrates the ability to function at an advanced level in the role of the gerontological nurse practitioner in varied settings, including primary care, long-term care, and sub-acute care (practicum of at least 100 clinical hours and case analysis conferences).

804/GCH 804 Advanced Quantitative Data Analysis for Health Care Research I (3:3:0) Prerequisite: a graduate-level statistics course. Examines factorial ANOVA, factorial ANCOVA, repeated measures ANOVA, ANOVA and ANCOVA via regression approach, and multiway frequency analysis. Students apply mathematical calculations and interpret SPSS outputs using health care research data.

805/GCH 805 Advanced Quantitative Data Analysis for Health Care Research II (3:3:0) Prerequisite: GCH/NURS 804 or an equivalent statistics course. Examines multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), multiple regression (ordinary least squares), and logistic regression. Students apply mathematical calculations and use linear combinations of multivariate tests in health care research data.

806/GCH 806 Advanced Multivariate Statistics and Data Analysis for Health Care Research (3:3:0) Prerequisite: GCH/NURS 805 or an equivalent multivariate statistics
807/GCH 807 Measurement Theories and Applications in Health Care Research (3:3:0) Prerequisite: doctoral-level course in research design and statistics; completion of GCH/NURS 805 or GCH/NURS 806 is highly recommended. Theories, principles, and techniques presented as foundation for the development and evaluation of instruments for use in health care research. Includes review of statistical techniques required for understanding measurement theory, reliability, validity, item analysis, and instrument construction. Students required to design, construct, administer, analyze, and evaluate an original instrument or evaluate an existing instrument in health care research.

810 Evaluation Research in Nursing Education (3:3:0) Prerequisites or corequisites: NURS 920 and 930. Uses seminar/discussion to analyze and apply theoretical models for implementing evaluation research in nursing education. Examines quantitative approaches for evaluating process and outcomes of domestic or international nursing education programs, including role of accreditation guidelines.

811 Nurse as Educator and Scholar (2:2:0) Prerequisites: NURS 920 and 930. Uses seminar/discussion to explore role of nurse educator in meeting research and scholarship expectations of college, university, or service setting. Addresses approaches to scholarship in relation to types of evidence appropriate for various scholarly expectations in academic setting.

820 Human Genetics Concepts for Health Care (4:4:0) The study of human genetics, principles of heredity and disease risks.

855/IHS 855 Ethics in Health Administration (3:3:0) Prerequisite: admission to PhD program; for non-PhD students, permission of instructor. Philosophical foundations of health care ethics. Students analyze specific ethical dilemmas faced by administrators in health care settings.

870 Nursing and Health Care Administration I (3:3:0) Prerequisites: organization behavior course such as MGMT 600, PUAD 620, LRNG 700, or equivalent; and NURS 955. Examines the theoretical basis of scholarship and practice in leadership and management of health systems and nursing organizations. Includes discovery of concepts and forces influencing the organization and performance of health care systems.

871 Nursing and Health Care Administration II (2:2:0) Prerequisite: NURS 870. Analyzes and applies selected concepts related to nursing and health system leaders and managers as well as factors influencing the performance of health systems and organizations.

874 Internship in Health Care Administration/Policy/Education (4:1:9) Prerequisite: completion of all other course work except NURS 998; written advanced application and permission of instructor by due dates (April/November 1) in advance of semester. Internship experience of at least 126 hours with leader in field of nursing, health care administration, policy, or education. Participatory activities require integration and application of principles, frameworks, and science related to executive preceptor role.

875 Research Internship (1:0:1) Provides guided research experience of 45 hours, during which students participate as a member of a research team engaged in scientific inquiry. Designed to enhance professional socialization in research scholarship at the doctoral level.

880 Informatics Inquiry for the Doctor of Nursing Practice (3:3:0) Prerequisite: admission to the DNP program or by permission of instructor. Introduces theoretical and practice components of nursing and health care informatics for the doctor of nursing practice (DNP). Health care data standards, classification schemes, and the electronic health record will be introduced. Students will evaluate informatics as it applies to quality improvement, outcomes measurement, complex decision making, consumer use, and legal and ethical issues. Students will analyze atomic and aggregate data to support practice, patient care, health education, and organizational management.

881 Issues and Methodologies in Translational Research (4:4:0) Prerequisite: admission to the DNP program or by permission of instructor. Build on knowledge of research methodologies to analyze the selection and evaluation of research underlying evidence-based practice. Apply research methodologies and strategies to examine and interpret population-based data sets. Explore models and the supporting research relating to the dissemination of knowledge and the translation of research practice. Determine the analytic approaches of relevance to translational research including interdisciplinary models. Address issues of measurement of quality health outcomes at the individual, family, system, and population level.

882 Theoretical Foundations Related to Human Health Behaviors (2:2:0) Prerequisite: admission to the DNP program or by permission of instructor. Explores and evaluates elements of selective behavioral and social science theories and models related to health risk behaviors and chronic disease management. Examines the impact of selected theories on advanced nursing practice. Applies behavioral change theory to the development of interventions for improvement in individual, organizational, and community health outcomes.

920 Qualitative Research in Nursing and Health Care (3:3:0) Corequisites or prerequisites: NURS 955. Philosophical foundations and approaches to qualitative research in nursing and health care administration, health care policy, and health care ethics analyzed within scholarship of discovery, integration, application, and teaching. Computer analysis required. Lecture, discussion.

925 Methodological Issues in Nursing and Health Care Qualitative Research (3:3:0) Prerequisites: NURS 920/HSCI 920 or equivalent course, and permission of instructor. Explores, analyzes, and synthesizes conceptual, methodological, and ethical issues in qualitative research within the scholarship of discovery, integration, application, and teaching. Seminar.

930 Quantitative Methods in Nursing and Health Care (3:3:0) Prerequisites: NURS 955 and a multivariate statistics course such as NURS 799 or equivalent. Examines advanced principles and special problems in quantitative research methodology. Emphasizes measurement as it relates to nursing and health care administration, health care ethics, and health policy research. Computer analysis required.

940 Independent Study for the Doctoral Student (1-6:0:0) Prerequisite: admission to a doctoral nursing program. Stud-
ies in depth a selected area of nursing theory, research, or practice under direction of faculty. May be repeated; maximum 6 credits.

950 Special Topics in Nursing (3:3:0) Presents selected topics analyzing specialized areas in nursing. Content varies. Lecture, seminar, laboratory, workshop.

955 Philosophical Bases of Inquiry (3:3:0) Prerequisite: admission to nursing doctoral program, or permission of instructor. Philosophical bases of discipline and practice of health-related disciplines are examined within scholarship of discovery, integration, application, and teaching. Compares nursing and health science philosophy with relevant related discipline philosophies.

980 Practice Inquiry I (4:3:0:1) Prerequisite: completion of DNP core courses. A seminar for doctor of nursing practice (DNP) students to identify an area of practice inquiry. Synthesize the literature related to the problem. Analyze the environmental factors impacting the problem. Identify the standard of care related to the clinical problem. Assess the quality of evidence that supports the standard of care. Develop a proposal that will impact the delivery of care in the identified area of practice inquiry. Develop the appropriate outcome measures to address the specific practice inquiry area.

981 Practice Inquiry II (4:2:0:2) Prerequisite: NURS 980. Implement the proposal developed in Practice Inquiry I. Maintain an ongoing process analysis of the project. Collect data. Analyze the findings from the practice inquiry. Disseminate the findings from the practice inquiry in a scholarly manner.

998 Doctoral Dissertation Proposal (3:0:0) Prerequisite: Completion of all other course work except NURS 999; and completion of doctoral comprehensive examination. A seminar for doctoral students to accompany the development of a doctoral dissertation proposal. Development of the research problem with analysis and critique of methodology discussed. May be repeated up to 12 credits.

999 Doctoral Dissertation (1–9:0:0) Prerequisite: NURS 998. Provides continued faculty assistance on an individual basis toward completion of approved dissertation.

Operations Management (OM)

School of Management

If a student takes noncore, upper-level business courses before acceptance to the School of Management (SOM), those courses will not count on an undergraduate degree application for any major in SOM, except as general elective credit. A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.

210 Statistical Analysis for Management (4:4:0) Prerequisites: C or higher in MATH 108 or MATH 113, corequisite MIS 102. Introduces application of statistical methods to support quantitative decision analysis for resolving business problems. Lecture, recitation format; requires attendance in weekly lecture and weekly recitation.

301 Operations Management (3:3:0) Prerequisite: C or higher in OM 210, sophomore standing. Examines the principal aspects of an organization’s operations in various settings. Emphasizes planning and decision-making activities associated with managing operations, with focus on service operations. Uses analytical models to describe key planning and control activities.

320 Supply Chain Management and E-Business (3:3:0) Prerequisites: C or higher in OM 301, degree status. Design, development, and management of supply chain systems, including production and inventory management, distribution channels, and information systems that support them. Emphasizes impact of e-business on companies and industries, including Internet’s impact on the way goods and services flow through value chain from providers to customers.

352 Methods and Models of Management Science (3:3:0) Prerequisites: C or higher in OM 301, degree status. Introduces operation research and management sciences (OR/MS) techniques for supporting business management decisions. Specific mathematical programming and probabilistic topics include linear programming, integer programming, goal programming, network flow models, decision analysis, game theory, queuing models, and Monte Carlo simulation.

435 Business Process Analysis and Simulation (3:3:0) Prerequisites: C or higher in OM 301, degree status. Introduces concepts and tools used in designing, modeling, analyzing, and improving business processes. Various business process analysis and simulation methods, such as process mapping/flowcharting, process flow and capacity analysis, service process design, theory of constraints, process modeling and simulation, and business process reengineering are discussed. Introduces methods and analytical tools such as queue theory and computer simulation used to design, model, analyze, and improve business processes. Discusses methods such as process mapping/diagramming, service process design, process modeling, and business process reengineering.

452 Business Forecasting (3:3:0) Prerequisites: C or higher in OM 301, degree status. Introduces techniques for producing predictions of future business operations as aids to making planning decisions. Specific topics include judgmental forecasting, forecast accuracy, correlation analysis, smoothing methods, regression models, decomposition, and autoregressive and ARIMA models. Methods demonstrated and used through computer software.

456 Quality Management (3:3:0) Prerequisites: C or higher in OM 301, degree status. Provides an understanding of the multifaceted nature of quality management by emphasizing topics such as quality philosophies, total quality management, design quality, process quality, and managing quality in information systems development. Discusses ISO 9000 and Capability Maturity Model. Uses software, case studies.

493 Management of Technology Projects (3:3:0) Prerequisites: C or higher in OM 301, degree status. Focuses on managerial problems associated with meeting technical, cost, and time constraints of technology projects. Discusses project management areas including organization, teams, scheduling, cost control, earned value analysis, risk management, and quality. Discusses software cost estimation models. Software and case studies.

499 Independent Study in Operations Management (1–3: 0:0) Prerequisites: C or higher in OM 301, degree status. By special arrangement with instructor, and approval from associate dean for undergraduate programs. Investigates business problem according to student interest, using state-of-the-art decision science methodology.
Operations Research (OR)

Systems Engineering and Operations Research

335/SYST 335 Discrete Systems Simulation Modeling (3:3:0) Corequisite: CS 112, STAT 344, SYST 202, or CS 310; or permission of instructor. Introduction to basic concepts of modeling complex discrete systems by computer simulation. Topics include Monte-Carlo methods, discrete-event modeling, specialized simulation software, statistics of input and output analysis. f,s

441/MATH 441 Deterministic Operations Research (3:3:0) Prerequisite: MATH 203, or permission of instructor. Survey of deterministic methods for solving “real-world” decision problems. Covers linear programming model and simplex method of solution, duality, and sensitivity analysis; transportation and assignment problems; shortest path and maximal flow problems; and introduction to integer and nonlinear programming. Emphasizes modeling and problem solving. f,s

442/MATH 442 Stochastic Operations Research (3:3:0) Prerequisite: STAT 344, MATH 351, or equivalent. Survey of probabilistic methods for solving decision problems under uncertainty, probability review, decision theory, queuing theory, inventory models, reliability, Markov chain models, and simulation are covered. Emphasis on modeling and problem solving. s

481/MATH 446 Numerical Methods in Engineering (3:3:0) Prerequisites: MATH 213 or 215, and MATH 203 or 322; or equivalent. Modern numerical methods and software. Emphasis on problem solving through software and assessing the quality of solutions obtained. Topics include computer arithmetic, linear equations and least squares data fitting, interpolation, nonlinear optimization, and differential equations. Involves extensive computer use. f,s

498 Independent Study in Operations Research (1–3:0:0) Prerequisite: 60 credits; must be arranged with instructor and approved by department chair before registering. Directed self-study of special topics of current interest in operations research. May be repeated for maximum 6 credits if topics substantially different. f,s,sum

499 Special Topics in Operations Research (3:3:0) Prerequisites: 60 credits and permission of instructor; specific prerequisites vary with nature of topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics substantially different. f,s,sum

540/SYST 540 Management Science (3:3:0) Prerequisites: MATH 108, and STAT 250 or OM 200; or equivalent. Operations research techniques and their application to managerial decision making. Mathematical programming, Markov processes, queuing theory, inventory models, PERT, CPM, and computer simulation are covered, as well as use of contemporary computer software for problem solving. Case-study approach to problem solving is used. OR/MS and SE/MS majors do not receive credit. f,s

541 Operations Research: Deterministic Models (3:3:0) Prerequisite: MATH 203 or equivalent. Survey of deterministic methods of solving “real world” decision problems. Covers linear programming model and simplex method of solution, duality, and sensitivity analysis, transportation and assignment problems; shortest path, minimal spanning tree, and maximal flow problems; and an introduction to integer and nonlinear programming. Emphasis on modeling and problem solving. Students who have taken OR 441/MATH 441 will not receive credit.

542 Operations Research: Stochastic Models (3:3:0) Prerequisite: STAT 344 or MATH 351, or equivalent. A survey of probabilistic methods for solving decision problems under uncertainty, probability theory review, reliability, queuing theory, inventory systems, Markov chain models, and simulation. Emphasis on modeling and problem solving. Students who have taken OR 442/MATH 442 do not receive credit.

635 Discrete System Simulation (3:3:0) Prerequisite: OR 542, or STAT 354 or 344, or equivalent; and knowledge of scientific programming language. Computer simulation as a scientific methodology in operations analysis, with emphasis on model development, implementation, and analysis of results. Discrete-event models, specialized software, input modeling, and output statistics are covered. Extensive computational work is required.

640 Global Optimization and Computational Intelligence (3:3:0) Prerequisites: MATH 203 or equivalent, and knowledge of a scientific programming language. Introduction to global optimization of nonconvex mathematical programs and numerical methods for the solution of such problems. Topics covered include high-level survey of traditional mathematical programming algorithms; critical comparison of metaheuristics and artificial intelligence (AI) algorithms to traditional mathematical programming algorithms; probabilistic search, multistart methods, statistical tests of performance and confidence, simulated annealing, genetic algorithms, neural networks, Tabu search, homotopies and tunneling; the traveling salesman problem, the Steiner problem, Stackelberg-Cournot-Nash mathematical games and other classical nonconvex optimization problems.

641 Linear Programming (3:3:0) Prerequisite: OR 541, or permission of instructor. In-depth look at the theory and methodology of linear programming: Computational enhancements of the revised simplex method; sparse—matrix techniques, bounded variables and the dual simplex method. Alternative interior point methods described and computational complexity of various algorithms analyzed. f

642 Integer Programming (3:3:0) Prerequisite: OR 541, or permission of instructor. Cutting plane and enumeration algorithms for solution of integer linear programs; bounding strategies and reformulation techniques; heuristic approaches to the solution of complex problems; knapsack problems, matching problems, setting covering and partitioning problems; applications to problems in OR/MS, such as capital budgeting, facility location, political redistricting, engineering design, and scheduling. s

643 Network Modeling (3:3:0) Prerequisite: OR 541, or permission of instructor. Introduction to network problems in operations research, computer science, electrical engineering, and systems engineering. Solution techniques for various classes of such problems are developed. Topics include minimal-cost network flow, maximal flow, shortest path, and generalized networks; plus stochastic networks, network reliability, and combinatorially based network problems. Complexity of each problem class analyzed. f

644 Nonlinear Programming (3:3:0) Prerequisites: MATH 213 or equivalent, and OR 541; or permission of instructor. Nonlinear optimization theory and techniques applicable to problems in engineering, economics, operations research,
and management science. Covers convex sets and functions, optimality criteria and duality; algorithms for unconstrained minimization, including descent methods, conjugate directions, Newton-type and quasi-Newton methods; and algorithms for constrained optimization, including active set methods and penalty and barrier methods.

645/STAT 645 Stochastic Processes (3:3:0) Prerequisite: OR 542, STAT 544, or permission of instructor. Selected applied probability models including Poisson processes, discrete- and continuous-time Markov chains, renewal and regenerative processes, semi-Markov processes, queuing and inventory systems, reliability theory, and stochastic networks. Emphasis on applications in practice as well as analytical models.

647 Queuing Theory (3:3:0) Prerequisite: OR 542, STAT 544, or permission of instructor. Unified approach to queuing, organized by type of model. Single- and multiple-channel exponential queues; Erlangian models, bulk and priority queues, networks of queues; general arrival and/or service times; and statistical inference and simulation of queues are covered. Extensive use of computational software.

648 Production and Inventory Systems (3:3:0) Prerequisites: OR 541 and 542, or permission of instructor. An analysis of production and inventory systems. Use of mathematical modeling for solutions of production planning and inventory control problems is introduced. Also included are stochastic inventory systems of lot-sized reorder type; periodic review and single-period models; application of dynamic programming theory to deterministic and stochastic cases; and static and dynamic production-planning models.

649 Topics in Operations Research (3:3:0) Prerequisite: permission of instructor. Advanced topic chosen according to interests of students and instructor from dynamic programming, inventory theory, queuing theory, Markov and semi-Markov decision processes, reliability theory, decision theory, network flows, large-scale linear programming, nonlinear programming, and combinatorics. May be repeated for maximum 6 credits if topics are substantially different.

651 Military Operations Research I: Cost Analysis (3:3:0) Corequisite: OR 541 or 542. While drawing on other disciplines (managerial accounting, econometrics, systems analysis), cost analysis uses operations research to assist decision makers in choosing preferred future courses of action by evaluating selected alternatives on the basis of their costs, benefits, and risks. Cost analysis is distinctly different from cost estimating in that projecting future courses of action almost always requires mathematical modeling. Topics include analysis overview, economic analysis, estimating relationships (factors, simple and complex models), acquiring and verifying cost data, cost progress curves, life cycle costing, scheduling estimating, effectiveness and risk estimation, relationship of effectiveness models and measures to cost analysis.

652 Military Operations Research Modeling II: Effectiveness Analysis (3:3:0) Corequisite: OR 541 or 542. Examines issues and modeling underlying military decisions at the Military Service, Joint Staff, and Department of Defense level. Analytical methods with applications to theater campaign analysis, equipment and weapon system modernization, force structure development, strategic mobility and deployment, small scale contingency operations, logistics, and requirements determination are considered. Optimization, simulation, and statistical techniques are stressed. Realistic problems presented and solved as case studies. Display of results and presentation techniques for military decision makers emphasized.

660/SYST 660 Air Transportation Systems Modeling (3:3:0) Prerequisite: SYST 460/560, or permission of instructor. Introduces range of current issues in air transportation, including public policy toward the industry, industry economics, system capacity, current system modeling capability, human factors considerations, safety analysis and surveillance systems, and new technological developments. Students expected to develop broad understanding of contemporary and future issues. Knowledge evaluated through class discussions, a take-home midterm exam and a term project to be completed by the end of the semester.

671/SYST 671 Judgment and Choice Processing and Decision Making (3:3:0) Prerequisite: STAT 510 or equivalent, or permission of instructor. How do people make judgments and decisions? Course presents an initial review of scientific literature directed toward answering this question, and emphasizes its importance when performing decision analysis and designing systems to support judgment and decision processes.

674/SYST 674 Dynamic Programming (3:3:0) Prerequisites: OR 442 or OR 542 or permission of instructor. This is a course on the theory and practice of dynamic programming, i.e. optimal sequential decision making over time in the presence of uncertainties. The course will stress intuition, the mathematical foundations being for the most part elementary. It will introduce the theory, applications (finance, engineering, and biology), and computational aspects of dynamic programming for deterministic and stochastic problems.

675/STAT 678/SYST 675 Reliability Analysis (3:3:0) Prerequisite: STAT 544 or 554, or permission of instructor. Introductions to component and system reliability, their relationship, and problems of inference. Topics include component lifetime distributions and hazard functions, parameter estimation and hypothesis testing, life testing, accelerated life testing, system structural functions, and system maintainability.

677/STAT 677/SYST 677 Statistical Process Control (3:3:0) Prerequisite: STAT 544 or 554, or permission of instructor. Introduces concepts of quality control and reliability. Acceptance sampling, control charts, and economic design of quality control systems are discussed, as are system reliability, fault-free analysis, life testing, repairable systems, and the role of reliability, quality control and maintainability in life-cycle costing. Role of MIL and ANSI standards in reliability and quality programs also considered.

680 Project Course in Operations Research (3:3:0) Prerequisites: 21 graduate credits in OR or SYST. Capstone course for both the master’s program in operations research and certificate in computational modeling. Can also be used in lieu of the project in master’s program in systems engineering. Focus is on model development and implementation involved in the practice of operational modeling. Key activity is completion of a major applied group project. Work includes project proposal planning, completion, documentation, and presentation. To be taken in last spring semester of studies.
681/SYST 573 Decision and Risk Analysis (3:3:0) Prerequisites: OR 542 or MBA 638. Application of analytic reasoning and skills to practical problems in decision-making. Topics include problem structure, analysis and solution implementation, emphasizing contemporary approaches to decision analytic techniques.

682/CSI 700 Computational Methods in Engineering and Statistics (3:3:0) Prerequisites: MATH 203 and 213 or equivalent, and modern numerical methods and software. Numerical methods have been developed to solve mathematical problems that lack explicit closed-form solutions or have solutions that are not amenable to computer calculations. Examples include solving differential equations or computation probabilities. Discusses numerical methods for such problems as regression, analysis of variance, nonlinear equations, differential and difference equations and nonlinear optimization. Applications in statistics and engineering are emphasized. Involves extensive computer use.

683/SYST 680/ECE 670 Principles of Command, Control, Communications, Computing, and Intelligence (C4I) (3:3:0) Prerequisite: ECE 528, OR 542, or SYST 611; or equivalent. Fundamental principles of C4I are developed from descriptive, theoretical, and quantitative perspectives. Principles and techniques applicable to wide range of civilian and military situations. Topics include C2 process; modeling and simulation for combat operations; detection, sensing, and tracking; data fusion and situation assessment; optimal decision making; methodologies and tools of C4I architectures; tools for modeling and evaluations of C4 systems such as queuing theory.

690 Optimization of Supply Chains (3:3:0) Prerequisites: graduate standing, mathematics through linear algebra, and STAT 344. Focuses on both supply chain optimization from an enterprise-wide perspective, and supply chain optimization from a business-to-business e-commerce concern. Concerned with optimizing the value of goods and services and assuring a reasonable return on such sales. Describes both heuristic and exact algorithms for scheduling, production, inventory management, logistics, and distribution. New software that enables such optimization is presented, as are manufacturing and service examples from the public and private sectors. New techniques to handle risk, quality of data, and robustness of solutions are presented. Students perform case studies using state-of-the-art software.

719/STAT 719/CSI 775 Computational Models of Probabilistic Reasoning (3:3:0) Prerequisite: STAT 652 or 664, or permission of instructor. Introduction to theory and methods for building computationally efficient software agents that reason, act, and learn environments characterized by noisy and uncertain information. Covers methods based on graphical probability and decision models. Studies approaches to representing knowledge about uncertain phenomena, and planning and acting under uncertainty. Topics include knowledge engineering, exact and approximate inference in graphical models, learning in graphical models, temporal reasoning, planning, and decision-making. Practical model-building experience provided. Students apply what they learn to a semester-long project of their own choosing.

735/IT 735/OR 735 Advanced Stochastic Simulation (3:3:0) Prerequisite: OR 635 or permission of instructor. Special topics and recent developments in Monte Carlo simulation methodology for discrete-event stochastic systems. Contents vary; possible topics include statistical analysis of simulation output data, random number and random variate generation, variance reduction techniques, sensitivity analysis and optimization of simulation models, distributed and parallel simulation, object-oriented simulation, and specialized applications. May be repeated for credit when topics are distinctly different.

741 Advanced Linear Programming (3:3:0) Prerequisites: OR 541 and 641. Recent developments in linear programming. Highlights advances in interior point methods and also addresses developments in the simplex method. Projective methods, affine methods, and path-following methods are examined, including Karmarkar’s original work. Discusses relationships between these methods, and relationships to methods in nonlinear programming. Also discussed are advances in data structures and other implementation issues. Students test software and solve large-scale linear programs.

750 Advanced Topics in Operations Research (3:3:0) Prerequisites: OR 541 or 542, and 600-level course that varies with content of course. Special topics, applications, or recent developments in operations research. Contents vary and may include topics in optimization, stochastic methods, or decision support that are not covered in the standard OR curriculum. May be repeated for credit when topics are distinctly different.

751 Advanced Topics in Operations Research for Planning, Scheduling, and Network Design (3:3:0) Prerequisite: OR 642, 643, or 690. Introduces network and combinatorial optimization problems in logistics, computer science, electrical engineering, and systems engineering. Solution techniques for various classes of such problems are developed. Topics include scheduling algorithms, capital budgeting, minimal cost network flow, optimal routings, and generalized networks. Scheduling algorithms, network reliability, stochastic networks and combinatorially-based network problems are discussed.

763/IT 763/SYST 763 Empirical Methods in Information Technology (3:3:0) Prerequisite: STAT 354. Examines alternative paradigms of scientific research and their applicability to research in information technology. Topics include the fundamental elements of scientific investigation, basic principles of experimental design and statistical induction, philosophy of science and its relation to the information technology sciences, and case studies of information technology research.

780/IT 780 Queuing Modeling of Computer-Communication Networks (3:3:0) Prerequisite: OR 645 or 647, or ECE 542; or equivalent. Studies analytical modeling of computer and communication networks and performance evaluations. Topics include Markovian systems, open networks, closed networks, approximations, decomposition, simulation, sensitivity analysis, and optimal operation of systems. Presents local area networks, manufacturing systems, and other applications.

782/IT 782 Advanced Topics in Combinatorial Optimizations (3:3:0) Prerequisites: OR 641 and 642. Studies problems using most recent developments. Topics include cutting plane procedures based on polyhedral combinatorics; column-generation procedures for large, complex problems; heuristic approaches such as genetic algorithms, simulated annealing, and tabu search; study of special structures;
reformulation techniques; and bounding approaches. Topics stress most recent developments in field. May be repeated for credit when topics are distinctly different.

783/IT 983 Advanced Networks (3:3:0) Prerequisites: OR 643. Recent developments in solving optimization problems on networks. Prepares doctoral students to perform advanced research on network-related problems. Topics include linear, discrete, nonlinear, and stochastic problems. Several aspects of problems also studied, including computational complexity, exact algorithms, heuristics, solvable special cases, and computer implementation issues.

784/IT 784 Advanced Topics in Nonlinear Programming (3:3:0) Prerequisite: OR 644. Studies theory and algorithms for solving nonlinear optimization problems. Contents vary; possible topics include large-scale and parallel-unconstrained optimization, theoretical issues in constrained optimization, duality theory, Lagrangian and sequential quadratic programming methods. May be repeated for credit when topics are distinctly different.

842/IT 842 Models of Probabilistic Reasoning (3:3:0) Prerequisites: STAT 544 and OR 681. Survey of alternative views about how incomplete, inconclusive, and possibly unreliable evidence might be evaluated and combined. Discusses Bayesian, Baconian, Shafer-Dempster, and Fuzzy systems for probabilistic reasoning.

888/ECE 753/IT 888 Distributed Estimation and Multi-sensor Tracking and Fusion (3:3:0) Prerequisite: ECE 734 or SYST 611. Centralized and distributed estimation theory, hierarchical estimation, tracking and data association, multisensor multitarget tracking and fusion, distributed tracking in distributed sensor networks, track-to-track association and fusion, and Bayesian networks for fusion.

944/IT 944 The Process of Discovery and Its Enhancement in Engineering Applications (3:3:0) Prerequisite: IT 842 or permission of instructor. Studies ingredients of imaginative reasoning as it concerns efficient discovery of new ideas and valid evidential test of them. Topics include different interpretations of Peirce’s theory of abductive reasoning and other forms of reasoning, Hintikka’s analysis of process of inquiry, and current attempts to design systems that provide assistance in discovery-related or investigative activities.

981 Optimization in Medicine (3:3:0) Prerequisites: OR 641, OR 642, OR 643, or OR 644. This course will focus on applications of optimization to medicine. Focus is on modeling used in the applications, as well as solution approaches to the optimization problems generated. We will pay particular attention to algorithms and methodology that are not discussed in other optimization courses. Optimization topics covered will include nonlinear integer programs, large scale nonlinear and integer programs, problems governed by differential equations and more.

Organizational Learning—See LRNG

Parks, Recreation, and Leisure Studies (PRLS) School of Recreation, Health, and Tourism

110 Exploring Outdoor Adventure (2:1:1) Provides students with an introduction to outdoor adventure activities and the leadership theory involved to properly plan the activities. This class aims to bridge the gap between theory and practice as it pertains to outdoor adventure activities.

This class focuses on developing introductory skills in a variety of outdoor recreation activities, including rock climbing, canoeing, orienteering, and caving. Traditional classroom and in-the-field instruction will be used during the various activities.

115 Introduction to Fly Fishing (1:1:0) A practical course designed for students with little or no knowledge of fly fishing. The course will involve activities to teach students the basics of fly fishing to include terms and equipment, casting, knot tying, aquatic entomology, fly selection, reading water, wading techniques and safety, and fly fishing tactics. In addition to the one-hour classes required during the week, a full day on a stream will be included.

116 Introduction to Indoor Rock Climbing (1:1:0) Fee required. Introduces equipment, techniques, safety, and planning related to basic rock climbing.

117 Rock Climbing (2:2:0) Fee required. This course is for individuals who have never done any formal rock climbing. The course will involve activities to teach students basic climbing terms, techniques, equipment, and safety practices for top rope and lead climbing and rappelling. We will build on communication skills and trust.

118 Intermediate Rock Climbing (2:2:0) Prerequisite: PRLS 117. Fee required. This intermediate course is for individuals who have some prior skills in rock climbing looking to further increase their skill level. The course will involve teaching students climbing terms, advanced knots, equipment, safety practices for redirect belay and top rope belay, as well as setting up techniques using rope and webbing. Special emphasis on anchor building will also be included. Ability to climb and rappel at least at the beginner’s level will be required. This is not a certification course.

119 Trap and Skeet Shooting (2:2:0) This course is designed to educate the student on gun and range safety. Includes hands-on learning of the games trap and skeet, where competitors fire at clay targets (approximately 4¼ inches in diameter and 1½ inches in height) launched from a trap at varying angles.

120 Introduction to Backpacking (2:2:0) Fee required. This practical and experiential course is designed for students with little or no knowledge of backpacking. Involves discussions, demonstrations, and activities to teach students the basics of backpacking. Topics covered include equipment selection and use, map and compass skills, backcountry cooking, staying healthy in the outdoors, safety and emergency procedures, backcountry ethics (Leave No Trace), and natural history. Application of these skills will be realized over a four-day backpacking trip. Not only will students have the opportunity to practice these skills, but they will also develop their leadership abilities by working in a collaborative team environment.

121 Intermediate Trap and Skeet Shooting (2:2:0) Prerequisite: PRLS 119 or permission of instructor. This course is designed to increase the skill competencies in trap shooting. Includes hands-on learning of the different trap games (16-yard, handicap, doubles, and Olympic trap shoot on a wobble trap) where competitors fire at clay targets (approximately 4¼ inches in diameter and 1½ inches in height) launched from a trap at varying angles. Gun and range safety will also be emphasized.
122 Introduction to Horsemanship (1:1:0) Introduces the basics of horseback riding and horsemanship. Emphasis will be on learning how to care for a horse, tack a horse, and basic riding skills. Students will learn how to walk, trot, and jump small obstacles.

170 Introduction to Whitewater Kayaking (1:1:0) Fee required. This course is designed to provide students with an overview and entry-level skills and knowledge necessary to navigate rapids up to Class II difficulty and plan and execute trips on moving water. Include instruction in, but not limited to, paddle strokes and maneuvers, boat handling, basic terminology, equipment, proper clothing, kayak design, trip planning, river safety, self and group rescue techniques, water reading, river etiquette, and environmental ethics. A high priority is placed on emphasizing safety aspects.

173 Basic Coastal Kayaking (2:2:0) Fee required. This course is designed to provide students with the core skills and knowledge necessary to safely paddle sea/coastal kayaks and execute trips on rivers and coastal environments. Includes instruction in, but not limited to, boat handling, terminology, kayak design, trip planning, marine hazards and safety, rules of the nautical road, weather and tides, and environmental ethics. There will be several trips within 50 miles of Mason.

174 Open Water Coastal Kayaking (2:2:0) Prerequisite: PRLS 173 or permission of instructor. Fee required. This course is designed to provide experienced coastal kayaking students with an introduction to advanced strokes and maneuvers, open water rescues, on-water navigation, and safety concerns related to open water.

175 Introduction to Rowing (1:1:0) This course is designed to provide students with the skills and knowledge necessary to row successfully in an eight-oared rowing shell. Includes instruction in, but not limited to, proper handling of rowing equipment, basic terminology, the proper execution of the rowing stroke, water safety, and team building.

180 Whitewater Canoeing (2:2:0) Prerequisite: Ability to swim fully clothed for five minutes and put on a PFD in water. A practical course designed for students with little or no knowledge or skills in moving water and white water canoeing. Involve activities to teach basic terms, rules, techniques for river safety, paddle strokes, boat control and maneuvering, reading river currents and conditions, self-rescue techniques, ethics and river etiquette, and running rivers up to Class II+ in difficulty. There will be one classroom and four all-day paddling sessions on regional rivers.

181 Whitewater Canoeing II (2:2:0) Prerequisite: PRLS 180 or permission of instructor. A practical methods course to advance and refine the student’s whitewater canoeing skills with regard to paddle strokes, turns, maneuvers, boat control, and safety rescue skills.

190 Downhill and Cross-Country Skiing (1:1:0) Basic skills and techniques of downhill skiing are taught and refined. Includes becoming familiar with use of ski equipment, terminology, and safety rules. Includes lecture and field experience to improve downhill skiing skills.

191 Snowboarding (1:1:0) Basic skills and techniques of snowboarding are taught and refined. Includes becoming familiar with use of equipment, terminology, and safety rules. Includes lecture and field experience to improve snowboarding skills. This course also consists of demonstrations, discussions, and videos.

195 Introduction to Hot Air Ballooning (2:2:0) The course will include history, FAA regulations, equipment, weather, instruments, flight planning, balloon operations, and medical factors. Laboratory includes skill development as a crewmember and pilot, using an AX-8 hot air balloon. FAA student pilot certificates will be offered to all students. Although this is an introductory course, those completing it with a B or better grade will be eligible to sit for the FAA written examination for lighter-than-air, free balloon, a requirement for the private pilot certificate.

210 Introduction to Recreation and Leisure (3:3:0) Open to nonmajors. Traces the development of current concepts of recreation and leisure and their implications and consequences. Covers influences of philosophy, religion, science, economics, sociology, and politics on discretionary time and its uses.

214 Field Study in Natural History (3:3:0) This course provides an introduction to natural history and its application in natural area interpretation through field study investigation of the environment. Fundamentals of bird, plant, animal, and rock identification, as well as sky and landscape interpretation, will be covered.

220 Experiential Education Theory and Application (3:3:0) Provides a broad theoretical, as well as practical, background in teaching and learning experientially. Concepts presented, experienced, and discussed in this course include the basic premises of experiential learning according to a wide variety of educators and philosophers. The content and experience of this course applies to recreation, education, development, and therapeutic settings.

221 Challenge Course Facilitator Field Work (2:2:0) Prerequisite: PRLS 220; CPR and first aid certifications. Fundamental principles and techniques of challenge course facilitation. Consolidate classroom learning in an experiential setting through leading youth groups in the field. Introduction to specific safety, skills, and facilitation techniques for the Hemlock Overlook challenge course, including all low elements, mechanics of operating the zip wire complex, and belay and safety for the Total Team Challenge™.

241 Practicum (3:0:3) Open to majors and minors only. Prerequisites: PRLS 210 and 310 for majors; PRLS 210, 310, 316, 327, and corequisite PRLS 410 for minors. Paid or voluntary work experience in a park and recreation agency. Minimum period of 10 to 12 weeks of part-time employment or experience. Capstone course for minors, allowing for integration and application of course work, theories, and research to a work setting. Work sites chosen among four approved sites. Includes meetings and assignments prior to and during the practicum. Pass/fail.

250 Wilderness Travel and Sustainability (2:2:0) Prerequisite: PRLS 120. This experiential course is designed for students with prior backpacking experience. Involves discussions, demonstrations, and activities that teach students wilderness skills, safety and judgment, leadership and teamwork, and environmental ethics. Topics covered include basic wilderness first-aid, hazard evaluation, emergency procedures, expedition behavior, self awareness, judgment and decision making, campsite selection, shelter and stove use, fire building, sanitation and hygiene, cooking, nutrition and rationing, equipment care and selection, staying warm and dry, route finding and navigation, Leave No Trace backpacking, weather, natural history, and wilderness ethics.
Application of these skills will occur during the 14-day off-trail backpacking trip in a remote wilderness area. Not only will students practice these wilderness skills, but they will also develop leadership abilities by working in a collaborative team environment.

**253 Florida Everglades Canoe Expedition (3:2:1)** This course focuses on developing the knowledge and skills necessary to plan, manage, and participate in extended wilderness excursions by canoe in remote locations, while exploring a region’s natural history. Students will be engaged in classroom preparation; training in canoeing and wilderness travel/living skills; group leadership; and environmental education in the Everglades National Park ecosystem. The class will travel and camp for 6 days/nights in the Everglades back country by canoe as a self-contained group. Students will perform a service project in the park. For students planning careers in outdoor recreation; interpretation; and natural resources management and planning; and students with a general interest in the course topics.

**300 People with Nature (3:3:0)** Traces philosophical evolution of perceptions of and attitudes toward nature. Examines role of philosophers, scientists, nature-writers, and artists in the shaping of environmental thought. Includes extensive reading of Emerson, Thoreau, Muir, Leopold, Carson, Wilson, and others.

**302 Park Management and Operations (3:3:0) Prerequisite: PRLS 300.** Focuses on management and operations of park resources, including the management of visitors and recreation development. Emphasizes understanding of contemporary threats to park integrity and preservation of resources. Also covers maintenance management systems.

**310 Program Planning and Design (3:3:0) Prerequisite: PHED 200, PRLS 210, SPMT 201, or TOUR 200.** Fundamental principles and techniques of the planning process for health, fitness, and recreation programs. Covers specifying an area of need; goals, objectives, and mission statement; generating solutions; and selecting a program design for implementation.

**316 Outdoor Education and Leadership (3:3:0)** Focuses on promotion of lifelong health and fitness via non-competitive and informal outdoor activities. Introduces safety, skills, and leadership techniques. Covers sustainable use, conservation, and stewardship of natural resources.

**317 Social Psychology of Play and Recreation (3:3:0)** Applies social psychological theories and research to the study of leisure, play, and recreation behavior, including correlates, antecedents, and consequences of and constraints to these concepts.

**327 Foundations of Therapeutic Recreation (3:3:0)** Covers nature and perceptions of disability and their consequences; problems of stigma, stereotype, and labeling; and principles of normalization and inclusion. Introduces therapeutic recreation model and activity assessment.

**360 Bill of Rights Issues in Parks, Schools and Public Places (3:3:0)** Examines issues, particularly those involving First Amendment free speech and freedom of religion issues such as political protests, religious displays, and use permits.

**402 Human Behavior in Natural Environments (3:3:0) Prerequisites: PRLS 210 and 300, or permission of instructor, and 60 credits.** Applies social and behavioral theories to management for recreational users of land and water resources. Examines deterioration and pollution of land and water, noise, crowding, and conflicts among users. Discusses strategies for mitigation of deleterious impacts and detriative behaviors, and attitudes toward resource conservation, preservation, and use.

**405 Planning, Design, and Maintenance of Leisure Facilities (3:3:0) Prerequisites: PRLS 310 or permission of instructor, and 60 credits.** Covers quantity, location, and design standards for facilities. Includes safety, functionality, durability, and maintenance demand criteria in planning and design; programmatic and operational objectives to be met, including user comfort and convenience, crowd management, and traffic flow, and space relationships. Includes field study of local facilities.

**410 Administration of RHT Organizations I (3:3:0) Prerequisite: 60 credits.** Focuses on operation and management of health, fitness, and recreation services organizations. Covers management and leadership theories and techniques, problem-solving and decision making, organizational communications, design of organizational structures, and budgeting.

**411 Administration of RHT Organizations II (3:3:0) Prerequisites: PRLS 310 and 410, and 60 credits.** Focuses on planning techniques for health, fitness, and recreation organizations. Covers program and organizational marketing principles and strategies; service quality assessment and organizational evaluation techniques; and organizational financing.

**416 Issues and Trends in Therapeutic Recreation (3:3:0) Prerequisite: PRLS 327.** Explores the role of leisure in human development with a specific focus on needs, demands, and services for people with disabilities and illness. Presents concepts associated with leisure, aging, physical challenge, targeting leisure services, research, and public policy. Field experience required.

**418 Assessment in Therapeutic Recreation (3:3:0) Prerequisite: PRLS 327 and 416.** Presents methods of assessment, development of treatment program plans, and evaluation of all components. Extends program design by developing competencies in the planning approaches, individual and group assessment techniques, program evaluation, and documentation strategies for people with disabilities and illness. Field experience required.

**450 Research Methods (3:3:0) Prerequisites: HEAL 323 and STAT 250, and 60 credits.** Covers the development of empirical research designs for both practical and theoretical problems in health, fitness, and recreation resources management. Includes literature review of hypothesized relationships, and formulation of research proposals.

**460 Sport and Recreation Law (3:3:0) Prerequisite: 60 credits.** Emphasizes safety, liability, and risk. Covers current law and liability issues for administrators of RHT facilities and programs.

**480 Special Topics in Parks, Recreation, and Leisure Studies (3:3:0) Prerequisite: 60 credits.** Selected topics reflecting interest in specialized areas of parks and outdoor recreation or therapeutic recreation.

**490 Internship (12:0:12) Prerequisites: 90 credits; HEAL 205 and 323; PHED 200; and PRLS 210, 310, 316, and 410.** Paid or voluntary work experience in a park and recreation
agency for a minimum period of 10–12 weeks of full-time employment, and 480 hours for therapeutic recreation students. Applies course work, theories, and research to work settings. Work sites are chosen by students after approval of faculty supervisors. Includes meetings and assignments before and during internship. Pass/fail.

499 Independent Study (1–3:0:0) Prerequisite: 90 credits. Individual study of topic area in leisure research, theory, or practice under direction of faculty.

501 Introduction to Natural Resources Law (3:3:0) Prerequisite: PRLS 460 and 90 credits, graduate status, or permission of instructor. Selected legal issues involving conflicting use and preservation demands on our nation’s limited natural resource base, particularly those involving public lands, open space, and recreation resources. Uses case studies of recent court decisions.

503 Disability Rights Law in Sport and Recreation (3:3:0) Prerequisite: PRLS 460 and 90 credits, or graduate status; or permission of instructor. Overview of several major law and policy issues related to the provision of community recreation services to special populations. Primary focus is the Americans with Disabilities Act and related federal legislation.

526 Environmental Education and Resource Interpretation (3:3:0) Prerequisites: PRLS 402 or permission of instructor, and 90 credits. Provides methods for communicating and disseminating information pertaining to the use of natural recreation resources. Covers design and implementation of educational materials and programs to enhance understanding and appreciation of cultural, historical, and natural resources.

531 Natural Resources Recreation Planning (3:3:0) Origins and evolution of recreation use philosophy, policies, and service of public estate management. Examines planning for a spectrum of opportunities, from wilderness to developed settings. Work sites are chosen by students after approval of faculty member. May be repeated. No more than 3 credits may be earned.

Philosophy (PHIL)

Philosophy

100 Introduction to Philosophy (3:3:0) Introduction to the nature of philosophical reasoning and some of the main problems of philosophy.

111 Individual and Society (3:3:0) Examines philosophical issues revolving around the relationship between the individual and society, drawing from Plato, Hobbes, Locke, Rousseau, and Marx. Issues include the concept of individual rights, the legitimacy of political authority, and the competing demands of individual liberty, equality, and the common good.

112 Ethics and the Cybersociety (1:1:0) Examines ethical issues associated with new developments in information technology, including privacy rights, intellectual property rights, and the effect of information technology on society.

151 Introduction to Ethics (3:3:0) Considers some perennial issues in ethical theory.

156 What Is Art? (3:3:0) Introduction to philosophical reflection on the arts by looking at the critical issues in the history of aesthetics. Applies considerations to specific works and exploring these works in terms of their historical contexts and influences. Concentrates on one form of art or one period and always emphasizes questions of critical evaluation and art historical analysis.

173 Logic and Critical Thinking (3:3:0) Basic concepts and techniques of deduction, emphasizing the modern treatment of such topics as quantification and rules of inference, with study of the classical treatment. Basic principles of induction, informal fallacies, and uses of logic in everyday life.

180 Logic and Law (3:3:0) What are the standards of reasoning that guide decision-making in the law? This question draws attention to the criteria for a sound argument, a topic that is central to logic. In this course, students examine how lawyers rely on such criteria to persuade jurors of the merits of their case. Standards of reasoning associated with work of jurors also examined.

253 Philosophy and Literature (3:3:0) Examines differences and relations between literary and philosophical texts. Examines texts from a given period in the history of literature and philosophy. Topics include the presence of common issues in literary and philosophical writings, the influence of philosophical ideas on the production of literary texts and literary theory, and the development in literary texts of issues that are possible objects of philosophical inquiry.

254 Contemporary Ethical Problems (3:3:0) Topics include homosexuality, abortion, drugs, civil disobedience, capital punishment, and rights of individual versus the rights of society.

301 History of Western Philosophy: Ancient (3:3:0) Classical Greek philosophy, including pre-Socratic, Socrates, Plato, and Aristotle.

302 History of Western Philosophy: Medieval (3:3:0) Figures and problems of medieval philosophy. Study of leading thinkers from the 5th to the 15th centuries.
303 History of Western Philosophy: Modern (3:3:0)
Figures and problems of modern philosophy. Study of philosophers such as Descartes, Locke, Berkeley, Hume, Kant, and Hegel.

305 Business Ethics (3:3:0)
Examines some moral problems that arise with regard to the responsibilities of various segments of the business community, including employers, management, stockholders, to one another, to the consumer, and to society at large.

306 Business Ethics Internship (1:0:0)
Working independently or in teams, students participate in evaluation of organizations nominated for National Capitol Business Ethics Award. With no scheduled class meetings but working with the professor, students learn ethical standards and practices for business and how ethics can be incorporated into organizational culture. They gain understanding of ethics codes, leadership skills that develop ethical behavior, and management techniques that support an ethical environment in business.

309 Bioethics (3:3:0)
Prerequisite: completion or concurrent enrollment in all other general education courses. Examines some major moral issues involved in practice and research in medicine and health care. Topics to be chosen from medical experimentation, definition of death, physician assisted dying, genetics and human reproduction, distribution of scarce resources, fertility and organ transplants.

311 Philosophy of Law (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Investigation of theories of natural law, legal positivism, and legal realism as they pertain to some of the central philosophical questions about law.

312 Philosophy of Technology (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Philosophical examination of modern technology in its broadest human context. Several alternative philosophies of technology are examined. Examines the relationships between technology and religion, economics, and politics. Ethical issues raised by the use of technology are also examined. Typically, the course focuses on the ethical issues raised by the use of one kind of technology.

313 Philosophy of Religion (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Study of classical appeals to philosophy in support of belief in god’s existence (Philo, Augustine, Anselm, Aquinas, Descartes); the fideism of Hume and the metaphysical agnosticism of Kant; the concept of religious experience in the philosophies of Hegel, Schleiermacher, and Kierkegaard; and the problem of religious language in contemporary empirical philosophy.

323 Classical Western Political Theory (3:3:0)
Prerequisite: GOVT 101, or 3 credits of philosophy. Exploration through lecture and discussion of developments in the Western tradition of political thought from the time of the Greek city-state to late medieval Christendom, focusing on such topics as the nature and purpose of politics, the relationship between the individual and the state, the political significance of religion and tradition, and the concept of natural law.

324 Modern Western Political Theory (3:3:0)
Prerequisite: GOVT 101, or 3 credits of philosophy. Exploration through lecture and discussion of developments in the Western tradition of political thought from the Renaissance to the middle of the 19th century, focusing on such topics as the rise of individualism in political theory, early developments in social contact theory, theories of radical popular sovereignty, and early criticisms of liberal theory.

325 Karl Marx’s Social and Political Thought (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Study and evaluation of Marx’s social and political ideas based on writings selected from several phases of his career. Examination of relation of Marx’s thought to post-Marxist socialist theory and practice.

327 Contemporary Western Political Theory (3:3:0)
Prerequisite: GOVT 101, or 3 credits of philosophy. Exploration through lecture and discussion of recent developments in the Western tradition of political thought from the middle of the 19th century to today. Different sections of this course will focus on one or another of the various political theories that have been influential during this period, such as liberal, libertarian, conservative, communitarian, Marxist, feminist, and postmodern thought. This course can be retaken for credit when the subject matter is different.

332 Twentieth-Century Analytic Philosophy (3:3:0)
Prerequisites: 3 credits of logic and PHIL 303, or permission of instructor. Examination of the attempts of 20th-century philosophers to solve philosophical problems by an analysis of language. Figures and movements covered include Russell, Moore, Wittgenstein, logical positivism, and ordinary language philosophy.

333 Nineteenth-Century Philosophy (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Development of German Romanticism and Idealism during a brilliant period in the history of the West rivaled only by ancient Greece. Kant, Fichte, Hegel, Kierkegaard, Schopenhauer, and Nietzsche mount a revolt against the rationalism and scientism of the modern world.

336 Twentieth-Century Continental Thought: Existentialism (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Examination of existential philosophy from its 19th-century origins to its 20th-century expressions. Philosophers studied include Kierkegaard, Nietzsche, Sartre, De Beauvoir, and Buber.

337 Twentieth-Century Continental Thought: Phenomenology (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Examines phenomenological way of doing philosophy, its findings in regard to the “life-world,” questions of “first philosophy,” and the subject matter of the social sciences, as well as critical difficulties in its development. Texts by Husserl, Heidegger, Merleau-Ponty, Sartre, Schutz, and Derrida.

338 Woman: The Philosophical Questions (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Exploration of the meaning and politics of the question of woman that puts the idea of woman into question. Recognizing the historical context of this issue, the ways in which the structures of patriarchy situate woman as the other and determine the meanings of sexuality, subjectivity, the body, and language are examined. One overriding theme is relationship between the “woman” question and other central issues of contemporary philosophy.

340 Hermeneutic Philosophy (3:3:0)
Prerequisite: 3 credits of philosophy, or permission of instructor. Study of the development of hermeneutic philosophy in works by
Heidegger, Gadamer, and Ricoeur, as an effort toward coming to terms with the historicity of human experience. Implications for interpretive understanding of artworks, institutions, events, texts, and the human condition.

343 Issues in Environmental Ethics (3:3:0) Prerequisite: Completion or concurrent enrollment in all other required general education courses. Philosophical examination of issues in environmental ethics, such as moral status of animals, moral significance of nature, duties to protect wilderness areas, economics and environment protection, and environmental justice.

349 Christian Ethics (3:3:0) Examines the foundations of Christian and Jewish ethics from the Hebrew Bible and studies the meaning of Christian teachings. Examines Catholic, Orthodox, and Protestant texts as the framework to explore various Christian positions on major ethical issues such as war, embryonic stem cell research, abortion, and euthanasia in order to understand the meaning of the Christian life as it is faithfully practiced by members of the major Christian groups.

351 Philosophy Business Ethics Internship (3:3:3) This internship will develop self-directed learning skills in which the student will gain a better understanding and appreciation of both ethics and its application in the business world. Students will learn appropriate ethical standards for business; develop an appreciation of the need for an ethical culture; and experience the day-to-day activities of a business organization where they learn how ethics is incorporated into the culture. Students will gain understanding of ethics codes, leadership skills that rely on ethics, and management techniques that encourage and support an ethical environment in business.

355 Theories of Ethics (3:3:0) Prerequisite: Three credits in philosophy or permission of instructor. A critical examination of a variety of different types of classical, modern, and contemporary ethical theories, including consequentialist theories, deontological theories, and virtue theories.

356 Philosophy of Art (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. Basic problems that arise from an inquiry into meaning and value of art and our response to art.

357/SOCI 599 Philosophy of the Social Sciences (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. Philosophical issues relating to competing methodologies for the social sciences. Analysis and critique of mainstream positivism and behaviorism; paradigm theory and scientific revolutions; interpretive understanding and hermeneutical science; phenomenology and the social construction of reality; ethnomethodology and situational meaning; analytic philosophy and action theory; the “idea” of a social science; sociology of knowledge and theory of ideology; and Western Marxism and critical theory.

371 Philosophy of Natural Sciences (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. One semester of logic recommended. Study of aims and methodology of science. Among the questions of concern are, What constitutes a good scientific explanation? What grounds are used for comparing rival theories? Is there a special method of scientific discovery?

372 Philosophical Methods (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. Study of the relationship between a philosopher’s method, doctrine, and concept of truth. Philosophers studied may include representatives from among the empirical, analytical, phenomenological, hermeneutical, and structuralist movements.

373 Theory of Knowledge (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. Discussion of basic problems concerning the nature of knowledge, with study of the relation of knowledge to perception, belief, and language.

374 Philosophy of Mind (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. Investigation of such theories as dualism, behaviorism, and materialism as they pertain to some of the central philosophical questions about mind.

375 Metaphysics (3:3:0) Prerequisite: 3 credits of philosophy, or permission of instructor. Study of basic problems concerning being in general and foundations of individual being; traditional treatments of such problems and criticism of possibility of such knowledge. Selected readings from Plato, Aristotle, Aquinas, Spinoza, Leibniz, Kant, Bradley, Heidegger, and others.

376 Symbolic Logic (3:3:0) Prerequisite: PHIL 173 or MATH 110, or permission of instructor. Study of predicate calculi by means of a step-by-step construction of artificial languages. Topics include procedures for constructing a calculus, proof techniques, significant properties of predicate calculi, and procedures for recognizing phrases.

377 Darwin: Biology and Beyond (3:3:0) Prerequisite: completion or concurrent enrollment in all other required general education courses. Introduction to and philosophical examination of the theory of evolution in its historical perspective. Examines Darwin’s theory of evolution as a scientific theory, connect it to its context in the history of science, and survey its wider cultural impact. In particular, examine implications of the theory of evolution for religion and morality.

378 Reason, Science and Faith in the Modern Age (3:3:0) Prerequisite: completion or concurrent enrollment in all other required general education courses, or permission of instructor. Historical examination of the rise of sciences in the modern age (1500–present) and the impact this has had on religion, drawing from such thinkers as Luther, Bacon, Galileo, Newton, Pascal, Hume, Darwin, Kierkegaard, and James.

391, 392 Special Topics in Philosophy (3:3:0), (3:3:0) Examines topics of current interest, such as death and dying, rights of children, or philosophical controversies in modern physics.

421 Seminar (3:3:0) Prerequisite: 9 credits in philosophy. Students with fewer credits in philosophy may be admitted, at the discretion of the professor, if the topic is sufficiently close to their field of study. May be repeated for credit.

422 Honors Seminar (3:3:0) Prerequisite: 9 credits in philosophy and acceptance to the honors program in philosophy. Seminar for students enrolled in the honors program in philosophy.

425 Independent Study (3:0:0) Prerequisites: 60 credits, including 15 credits in philosophy and permission of department. May be repeated for credit.
427 Feminist Political Thought (3:3:0) Prerequisite: GOVT 101 or WMST 200, or 3 credits of philosophy; or permission of instructor. Explores feminist political thought in historical context. Topics include feminist political movements, feminist critiques of political philosophy, and feminist contributions to political theory.

428 GOVT 428 Advanced Democratic Theory (3:3:0) Prerequisites: GOVT 101 or one course in philosophy. Explores various theoretical approaches to nature and justification of democracy. Topics may include liberal, communitarian, pluralist, and deliberative theories and their critics; constitutionalism; role of markets; and transnational democracy.

429 International Ethics (3:3:0) Prerequisite: course in philosophy, or GOVT 101. Examines key value issues in international affairs, including global justice and poverty, human rights and the extension of democracy, and preservation of environment in view of economic globalization, persistence of nationalism, and new forms of war and terrorism.

470 Seminar: Philosophical Examination of Social Issues and the Law (3:3:0) Prerequisite: 3 credits in philosophy, or permission of instructor. Philosophical study of social issues that are subject to legislation and judicial review. Analysis of the purpose and function of law in society lays the groundwork for reflection on specific issues such as abortion, euthanasia, capital punishment, divorce, child care, and health care.

471 Honors Seminar (3:3:0) Prerequisite: 9 credits in philosophy and acceptance to the honors program in philosophy. Honors version of PHIL 470.

510 Seminar in Ethics of Health Care (3:3:0) Prerequisite: 90 credits, graduate standing, or permission of instructor. Examines moral dilemmas within the health care profession on ethical theories and principles. Special emphasis on patients’ rights, social justice of health care, and evolving health care technologies.

602 Plato: Selected Dialogues (3:3:0) Prerequisite: graduate standing. A study of the central issues in the philosophy of Plato through a close reading of selected dialogues. Issues investigated will include the questions of the possibility of knowledge, the nature of being, and of the good. May be repeated for credit.

603 Aristotle: Selected Works (3:3:0) Prerequisite: graduate standing. Close study of Aristotle’s work and its place and future in history of philosophy. Topics vary by semester, and include Aristotle’s metaphysics, natural sciences, ethics, political thought, logic, epistemology, and psychology. May be repeated once with permission of department when topics and readings differ significantly.

604 Augustine and Aquinas (3:3:0) Prerequisite: graduate standing. Critical examination of philosophies of Augustine and Aquinas with special attention to the mode of argument of each.

605 Mind-Body Problem in Early Modern Philosophy (3:3:0) Prerequisite: graduate standing. Examines views of major early modern philosophers on issues such as mind and body interaction, personal identity, and freedom of the will, as well as of interpretations of these philosophers by historians of philosophy.

608 Hegel’s Phenomenology of the Spirit (3:3:0) Prerequisite: graduate standing. A study of the philosophy of Hegel through a reading of the text that presents an introduction to his system. Special attention is paid to Hegel’s background in the work of Kant and the German Idealists.

611 Philosophy of Law (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines major jurisprudential theories that underpin law in Western society. After examining the theories, students apply them to contemporary social and political problems.

615 Postmodern Thought (3:3:0) Prerequisite: graduate standing, or permission of instructor. In recent decades, the term “postmodern,” first used by art critics in the late 19th century, has been taken up by prominent contributors to the arts, social thinkers, and philosophers, to describe developments as well as the current period. This course examines three thematic concerns found in work that is identified with postmodern issues: what modernity defines itself in contrast to or against, the status of “man,” and status of “subjectivity.”

616 Phenomenology (3:3:0) Prerequisite: graduate standing. This major approach in philosophy is studied in regard to its basic features, the tasks to which it has been set by major contributors, certain findings of phenomenology in practice, as well as crucial problems that develop as phenomenology proceeds and how they are addressed by phenomenologists.

617 Movements and Issues in the History of Political Philosophy (3:3:0) Prerequisite: graduate standing. Explores themes, movements, and periods in the history of political theory.

618 Contemporary French Feminism (3:3:0) Prerequisite: graduate standing. Examines philosophical contexts of existential-phenomenological and psychoanalytic French Feminist. It explores the ways in which French feminist thought has influenced continental philosophical thinking and international feminist theory.

621 Philosophy of Science (3:3:0) Prerequisite: graduate standing. Explores whether and how scientific advances can be achieved. Special attention is paid to relativism and rationalism debates and to the role of technology in science.

631 Freud and Philosophy (3:3:0) Prerequisite: 6 credits of philosophy, course in personality theory, or permission of instructor. Explores philosophical aspects of Freud’s thought, focusing on Freud’s philosophy of human nature and culture, and influence on contemporary thought.

632 Twentieth Century Logical Positivism (3:3:0) Prerequisite: graduate standing. Examines 20th century logical positivism and its place in the history of philosophy. Topics include Russell’s logical atomism and theory of descriptions, program of the Vienna Circle, attempts to formulate empiricist criteria of meaning, and legacy left by the movement.

640 History of Ethical Theory (3:3:0) Prerequisite: graduate standing. Examines history of Western ethical theory from ancient Greece to the present day, including virtue theory, consequentialism, deontological theory and contemporary feminism.

641 Ethics and the Professions (3:3:0) Prerequisite: graduate standing, or permission of instructor. A philosophical analysis of the concept of profession as a category
of the world of work. Professional codes of ethics are examined to determine their effectiveness as guides for professional conduct.

642 Biomedical Ethics (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores the application of ethical theories and principles to issues in contemporary health care. Cases central to the development of the field will be examined.

643 Environmental Ethics (3:3:0) Prerequisite: graduate standing. An examination of human interactions with the natural environment from an ethical perspective. Emphasis will be placed on the strengths and weaknesses of various ethical theories and the different conceptions of the proper relationship between humans and their environment.

644 Business and Organizational Ethics (3:3:0) Prerequisite: graduate standing. Examines organizational culture as necessary for ethical development and of the application of ethics in business and organizational settings.

646 International Ethics (3:3:0) Prerequisite: graduate standing, or permission of instructor. Considers normative issues in international affairs, including global distributive justice, just war, foundations of human rights, harms to women, cultural and national identities, possibilities for transnational democracy, responsibilities of global corporations, and environmental ethics.

658 Feminist Theory (3:3:0) Prerequisite: graduate standing, or permission of instructor. Analysis of the critique of patriarchy offered by contemporary continental feminist philosophers. Examines contemporary moral, political, and epistemological issues in feminist theory.

673 Current Issues in Theory of Knowledge (3:3:0) Prerequisite: graduate standing. Advanced exploration of conditions and limits of knowledge, from the perspective of contemporary philosophy. Is there any infallible, or fallible but at least reasonable, foundation for achieving an understanding of the world and of our minds? This question is examined from the perspective of sense datum theory, coherentism, and various naturalized epistemologies. The nature of a priori knowledge (from mathematics and logic) is also examined.

681 Philosophical Figures (3:3:0) Prerequisite: graduate standing. Examines major philosophical author of crucial philosophical texts and their influence on philosophical thought. May be repeated for maximum 6 credits.

691 Special Topics in Philosophy (1–6:1–6:0) Prerequisite: graduate standing, or permission of instructor. Topics vary. May be repeated for credit.

693 Directed Readings in Philosophy (3:0:0) Directed readings and research on specific topic in philosophy chosen by student and instructor. May be repeated for maximum 6 credits.

719 Phenomenology of World (3:3:0) Prerequisite: previous course in phenomenology, or permission of instructor. Studies one of the most fully deployed and enduring themes in phenomenological philosophy, namely, sense of “world.” Philosophers covered include Husserl, Heidegger, and Merleau-Ponty.

720 Nietzsche and his Readers (3:3:0) Prerequisite: graduate standing. Reading of major texts of Nietzsche and some of his most influential interpreters and critics.

721 Advanced Seminar in Philosophy (3:3:0) Prerequisite: graduate standing. Close study of selected topics in current philosophical discourse. May be repeated for credit.

733 Current Issues in Cognitive Science (3:3:0) Prerequisite: admission to master’s program in philosophy or permission of instructor. Examines current areas of investigation in cognitive science and philosophy of mind, such as nature of consciousness, and representational and connectionist theories of mind. May be repeated for credit.

799 Thesis (1–6:0:0) Prerequisite: completion of 24 credits, approval of the thesis proposal, and permission of instructor (thesis director). Develop research and write an original thesis under the direction of their thesis director.

Physical Education (PHED)

School of Recreation, Health, and Tourism

103 Fencing I (1:1:0) Gives the beginning student basic knowledge of the sport of fencing and teaches the fundamental movements required in the sport. Students should expect to learn some officiating and etiquette of the sport and acquire the ability to fence at the novice level. The instructor will use any combination of the following: instructional videos, written handouts, guest fencers for demonstrations, drills, and group and individual instruction.

105 Aerobics and Basic Conditioning (1:1:0) Introduce students to fitness and healthy lifestyles. The course is designed to provide students with four lectures and multiple cardiovascular workouts. The lectures include cardiovascular endurance, cardiovascular diseases, body composition, nutrition, and weight management. The class also teaches students how to use cardiovascular equipment and how to design an aerobic fitness program. The course is geared for beginners, yet all students will be helped on an individual basis (therefore advanced individuals can also participate).

107 Social Dance (1:1:0) Provides a knowledge base of dance fundamentals and skill development in various ballroom dances and includes basic rhythms, dance positions, floor alignments, techniques of leading and following, and maintenance of dance frame in partner dancing.

108 Weight Training and Body Conditioning (1:1:0) Introduces students to fitness and healthy lifestyles. The course is designed to provide students with an overview of the various types of weight training but primarily emphasizes circuit weight training method. There will usually be a brief lecture each week with a longer one two or three times during the semester. The lectures include the five health-related components of physical fitness, nutrition, and weight management. The class also teaches students how to use resistance and cardiovascular equipment, and how to design fitness programs. The course is designed for beginners, yet all students will be helped on an individual basis (therefore advanced individuals can also participate).

110 Beginning Swimming (1:1:0) Develops a knowledge base and basic swimming skills for the weak swimmer and nonswimmer, and make them water safe. These skills include, but are not limited to, locomotion and propulsive movements in a prone and supine position, breath control, rhythmic breathing, and beginning diving techniques; personal safety, and rescue skills to maintain a water-safe environment.
113 Latin Dance (1:1:0) Provides students with a knowledge base of dance fundamentals and skill development in various Latin dances and includes basic rhythms, dance positions, floor alignments, techniques of leading and following, and maintenance of dance frame in partner dancing.

114 Social Dance II (1:1:0) Provides a review of dance fundamentals and dance patterns of the five dances learned in PHED 107 Social Dance. Builds on social dance by offering two additional dance patterns in each of the five dances and adding a sixth dance, the tango, to improve and expand students’ dancing skills.

118 Advanced Life Guarding (1:1:0) Prerequisite: PHED 150 or permission of instructor. Introduces and develops skills and knowledge necessary to become an American Red Cross-certified lifeguard. Focus is on training participants in aquatic facility and patron safety, in-water rescue skills, and physical conditioning. It teaches the lifeguard candidates to prevent, recognize, and respond to aquatic-related emergencies.

127 Social Dance II (1:1:0) Prerequisite: PHED 107 or permission of instructor. Provides an introduction to the tango and additional patterns for the fox trot, waltz, cha-cha, rumba, and Eastern swing.

128 Fencing II (2:2:0) Prerequisite: PHED 103 or permission of instructor. Reviews the advanced footwork and handwork techniques learned in Fencing I and expands on the third component of the sport, strategic tactics. Students are introduced to the rules and protocol of competitive fencing and use electric scoring equipment and electric fencing gear.

129 Introduction to Yoga (1:1:0) Introduces students to the practice of Hatha yoga. Class emphasis will be on learning yoga asanas (postures) and pranayama (breathing exercises) to enhance physical fitness and mental concentration.

130 Intermediate Yoga (1:1:0) Prerequisite: PHED 129 or permission of instructor. Expands on the yoga practices taught in PHED 129. Class emphasis will be on mastering yoga asanas (postures) and pranayama (breathing techniques) to enhance physical fitness and mental concentration. Students will learn 10 new yoga poses and practice the complete Sun Salutation.

134 Self-Defense for Men and Women (1:1:0) Fee required. A practical self-defense course designed for students with little or no background in martial arts or self-defense. Defensive and offensive techniques are taught to prepare students for any potentially dangerous event they may encounter. The course will also improve student’s physical and mental fitness.

135 Self-Defense for Men and Women II (1:1:0) Prerequisite: PHED 134. Fee required. A continuing practical self-defense course designed for students with a basic self-defense skill level or minimal martial arts experience. More advanced defensive and offensive techniques will be taught building on the student’s previous training. Continued improvement in the student’s physical and mental fitness will also be emphasized.

136 Tae Kwon Do (1:1:0) Fee required. A beginner-level course designed to develop basic skills of Tae Kwon Do, a Korean martial art that predominantly emphasizes kicking.

137 Intermediate Tae Kwon Do (1:1:0) Prerequisite: PHED 136 or permission of instructor. Fee required. An intermediate-level course that continues to develop basic skills of Tae Kwon Do. Course instruction continues to focus on the student’s mental development, as well as physical training.

138 Brazilian Jiu-Jitsu (1:1:0) Fee required. A practical self-defense course instructing students in Brazilian Jiu-Jitsu techniques designed for students who have no prior experience in martial arts or Brazilian Jiu-Jitsu. Brazilian Jiu-Jitsu’s primary goal is to give advantage to those who use correct form, posture, and technique over strength.

139 Brazilian Jiu-Jitsu II for Men and Women (2:2:0) Prerequisite: PHED 138 or permission of instructor. Fee required. A beginner-to-intermediate-level course teaching techniques in Brazilian Jiu-Jitsu. Students will learn specific defensive techniques to be used against an attacker along with escapes and submissions from a variety of different attacks. Students will participate in basic sparring with particular attention to safety. Students will also undergo an intensive training and conditioning routine.

140 Golf (1:1:0) Fee required. A practical course designed for students with little or no golf knowledge. The course involves activities to teach students basic golf terms, rules, and techniques for the full swing, putting, chipping, and pitching, as well as playing on a golf course.

144 Intermediate Golf (2:2:0) Prerequisite: PHED 140 or permission of instructor. Fee required. A practical course designed for students with basic golf knowledge and skills. The course will include course strategies, course management, the proper use of the rules, club selection, speed of play; skill building, and different golf formats.

145 Beginning Judo for Men and Women (1:1:0) Fee required. This is an introduction to Judo in which students will learn basic body mechanics of throwing, sweeping, grappling, and submission. Students will learn the fundamentals in these areas both for self-defense and sport. The history of judo, rules of the sport, and proper safety and falling techniques will be presented.

146 Introduction to Badminton (1:1:0) A practical course designed as an introduction to badminton. Students learn badminton terms, scoring rules, and techniques for forehand and backhand strokes, and the serve. Students are also introduced to basic strategy for singles and doubles play.

147 Advanced Tae Kwon Do (2:2:0) Prerequisite: PHED 137 or permission of instructor. Advanced-level course that continues to enhance and refine skills of Tae Kwon Do. Students develop more extensive jump and spin kicks, as well as combinations of the same. This course provides brown to black belt levels of promotion and continues to focus on each student’s mental development and physical training.

149 Tai Chi (1:1:0) A beginner-level course designed to increase awareness of the mind and body. Students will be introduced to basic principles of Chi (energy) and Yin Yang (polarity) and how these apply to their bodies through practicing the T’ai Chi Chih® movements.

150 Intermediate Swimming (1:1:0) A course designed to build on basic-level swimming skills by providing practice for confidence, refinement of coordination, and improvement of other aquatic skills. Presents more advanced swimming
strokes and focuses on physical conditioning and aquatic safety.

151 Introduction to Tennis (1:1:0) A practical course designed as an introduction to tennis. Involves activities to teach students tennis terms, rules, scoring, techniques for the forehand and backhand ground strokes, volley, overhead, and serve, as well as basic strategy for singles and doubles.

153 Intermediate Tennis (1:1:0) Prerequisite: PHED 151 or demonstrated ability. A practical course designed for the novice tennis player. Involves such activities as control of pace, direction, and depth on forehand and backhand ground strokes; the use of topspin and under spin; tactical use of the volley; styles of play; and strategy for singles and doubles.

155 Introduction to Springboard Diving (2:2:0) Prerequisite: PHED 150 or permission of instructor. A beginner-level course designed to increase awareness of the sport of diving, safety issues pertaining to competitive and recreational diving, competition formats, and history and evolution of the sport and scoring systems. Students will be introduced to fundamental skill progressions leading to basic dives.

156 Intermediate Springboard Diving (2:2:0) Prerequisite: PHED 155 or permission of instructor. Students build on the fundamental skill progressions and perform more advanced skills and dives than in the introductory course (PRLS 155). This course is also designed to increase awareness of the sport of diving, safety issues pertaining to competitive and recreational diving, competition formats, history and evolution of the sport, and scoring systems.

157 Aikido for Men and Women (1:1:0) Designed for students who have no prior experience in martial arts, this course can benefit those with a solid martial arts background. Mind-body techniques useful to all athletes and students are taught in a classical martial art self-defense context. Each class involves mind-body coordination exercises, and solo and partner practice. This active close contact class gives all students a chance to execute throws, locks, and pins, both as the thrower and the one who takes falls.

158 Underwater Hockey (1:1:0) Prerequisite: PHED 150 or permission of instructor. Fee required. Designed to provide basic instruction in the fundamentals of underwater hockey. Students learn free diving and snorkeling activities in preparation for underwater hockey. They will learn about and experience physiological reactions to aquatic submersion. Significant attention throughout this course will be given to safety issues related to underwater training, emphasizing current and lifelong skills.

159 Advanced Swimming (1:1:0) Prerequisite: PHED 150 or permission of instructor. Fee required. A course designed to build on intermediate-level swimming skills by providing practice to refine and perfect swimming strokes, so that students swim with more ease, efficiency, power, and smoothness over greater distances. Focuses on developing a higher level of fitness and maintaining better physical conditioning. Introduces other aquatic activities to enrich the class and broaden the horizons of the participant.

160 Intermediate Tai Chi (1:1:0) Prerequisite: PHED 149 or permission of instructor. A second-level course for students to learn Tai Chi Weapon (Tai Chi Straight Sword), as well as practice the basic principles of Tai Chi. Students will increase awareness of the mind and body.

162 Introduction to Bowling (1:1:0) Fee required. Students will learn the sport of 10-pin bowling. Topics covered are bowling etiquette, history of bowling, playing rules for league members, scoring, different approaches to the game, and the appropriate equipment for these approaches. Inexperienced and experienced bowlers are welcome to participate.

163 Karate (1:1:0) American Kenpo Karate is the combination of art and science. Emphasizes techniques, forms (kata), and sets (drills). All the techniques are related by motion and principles. Each technique builds on the previous one, creating a web of knowledge.

164 Intermediate Karate (1:1:0) Prerequisite PHED 163 or permission of instructor. Second-level course in American Kenpo Karate. Students review information and refine skills developed in the introductory class, as well as learn new forms and techniques to increase skill performance at the next level.

165 Introduction to Racquetball (1:1:0) A practical course designed as an introduction to racquetball. Involves activities to teach students basic racquetball terms, rules, scoring, safety, and techniques for the forehand, backhand, overhead, and serve, as well as singles and doubles.

166 Intermediate Racquetball (1:1:0) Prerequisite: PHED 165 or permission of instructor. A practical course designed for the novice racquetball player. Course involves activities to teach students intermediate skills, including ceiling shots, kill shots, passing shots, back wall strokes, advanced serves, court positions, and tactics and strategies for singles and doubles.


201 Developmental Motor Patterns (3:3:0) Analyzes motor-skill development and prescription of activities from immature to mature stages.

202 Teaching Skilful Movement (3:3:0) Covers planning and presenting lessons on numerous motor skills using varied teaching strategies in a peer teaching setting.

230 Asian Martial Arts: Origin and Development (3:3:0) Introduction to martial arts of East, South, and Southeast Asia. Lectures address martial arts from a historical, philosophical, biographical, warfare, and sport perspective.

250 Water Safety Instruction (2:2:0) Prerequisite: PHED 150 and instructor evaluation. Fee required. Introduces planning, organizing, and executing American Red Cross Swimming and Water Safety courses. Focus is on educational methods, approaches, and skill development applicable to swimming and water safety instruction.

255 Basic Scuba Diving (2:2:0) Fee required. Provides training toward certification as an open water SCUBA diver. The course emphasizes the learning of snorkeling (free diving introduction) and SCUBA skills. Safe diving skills, the physics of diving, equipment care and maintenance, diving fitness, underwater navigation, record keeping, and other basic SCUBA knowledge will be covered in the course. On successful completion of the course, students will be qualified for open water certification by Scuba Schools International (SSI).
273 Net and Target Games (2:0:2) Open to BPRE and BSED PHED majors only. Skill and content knowledge in net and target games. Includes skill progression, strategies, officiating, and authentic assessment in games such as volleyball, golf, tennis, and badminton.

274 Dance and Educational Gymnastics (2:0:2) Open to BPRE and BSED PHED majors only. Skill and content knowledge in dance, rhythms, and educational gymnastics.

275 Field and Invasion Games (2:0:2) Open to BPRE and BSED PHED majors only. Skill and content knowledge in field and invasion games. Includes skill progression, strategies, officiating, and authentic assessment in activities such as softball, basketball, soccer, field events, and Ultimate Disc.

300 Kinesiology (3:3:0) Prerequisite: BIOL 124 and 125. Covers anatomical and mechanical study of human movement.

304 Sport, Culture, and Society (3:3:0) Prerequisite: PHED 200, or permission of instructor. Analyzes sport from educational, political, economic, and cultural perspectives.

306 Psychomotor Learning (3:3:0) Prerequisite: BSED status. Analyzes psychological aspects, learning theory, and practice conditions for learning motor skills.

308 Adapted Physical Education (3:3:0) Prerequisites: BSED status, and BIOL 124 and 125. Introduces disabilities in public schools. Covers national standards, federal legislation, IEPs, and developmental inclusion models.

364 Strength Training: Concepts and Applications (3:3:0) Prerequisites: BIOL 124 and BIOL 125. Provides students with an opportunity to develop an in-depth understanding of the principles of strength training and conditioning, including anatomical and physiological considerations, lifting techniques, equipment selection, program development/evaluation, and weightlifting safety.

365 Measurement and Evaluation of Physical Fitness (3:3:0) Prerequisites: BIOL 124 and 125. Covers selection, administration, evaluation, and construction of measurements and evaluation instruments and techniques in physical education. Also covers statistical analysis of data and survey of selected instruments.


404 Middle and High School Instruction in Physical Education (3:3:0) Prerequisites: PHED 201, 202, 273, 274, 275, 306, and 403; and BSED status. Examines school curriculum, assessment, content, and teaching practices for middle and high school physical education programs. Requires field experience.

410 Social/Psychological Aspects of Health and Fitness (3:3:0) Covers research, trends, and techniques of health and fitness from a behavioral perspective.

415 Student Teaching in Physical Education (12:0:12) Prerequisites: Completion of all courses in approved program, and acceptance into student teaching. Provides supervised clinical experience for a full semester in approved schools. Requires experiences in elementary (seven weeks) and secondary (seven weeks) school settings. Includes participation of one week in preservice workshops and related activities, and weekly seminar sessions.

442 Practicum in Physical Education (1–3:0:1–3) Prerequisite: 90 credits, or 60 credits and permission of instructor. Provides supervised professional practice in a selected area of interest. Students may repeat this course, but no more than 3 credits may be given. Each credit requires a minimum of 60 hours of participation in the specialty over a period of six weeks. Areas selected with faculty advisor approval.

450 Physiology of Exercise (4:3:1) Prerequisites: BIOL 124 and 125, and PHED 300. Covers human physiological responses to environmental changes and exercise.

480 Special Topics (3:3:0) Prerequisite: 60 credits. See course description in the Schedule of Classes. Selected topics reflect interest in specialized areas of exercise science or health promotion.

499 Independent Study in Physical Education and Fitness (1–3:1–3:0) Prerequisites: 90 credits, and permission of instructor. Study of a problem area in physical education research, theory, or practice under direction of faculty member. May be repeated, but no more than 3 total credits may be earned.

670 Analysis of Teaching in Physical Education (3:3:0) Presents variety of research techniques for studying teacher and learner behaviors in physical education, engaging the teacher as researcher and grant writer. Goal is to prepare teachers to be leaders in their field.

672 Curriculum and Assessment in Physical Education (3:3:0) Provides knowledge of curriculum models and assessment strategies in standards-based physical education program. Studies curriculum models such as sport education and adventure education. Examines traditional and alternative assessment.

673 Motor Development for Special Populations (3:3:0) Provides knowledge that focuses on individuals with orthopedic, sensory, and learning disabilities in physical education setting. Areas of focus include development of motor patterns and skills assessment, and planning and instruction for students with disabilities.

680 Mentoring and Supervising in Physical Education (3:3:0) Prerequisite: PHED 670. Prepares mentors and supervisors of preservice and in-service teachers in physical education. Topics include professional dispositions, assessment and evaluation, adult learners, counseling and communication, providing feedback, and reflection and inquiry into the profession.

**Physical Sciences (PSCI)**

**College of Science**

701 Frontiers of Physical Sciences (3:3:0) Prerequisite: admission to physical sciences doctoral program. Each semester, the course will cover between four and six topics considered to be at the frontiers of the physical sciences—the key questions that are of interest to researchers today. The topics will be chosen from interdisciplinary areas, such as nanoscience, astroparticle physics, nonlinear dynamics, and neuroscience. Approximately two to three weeks will be spent on each topic, and the specific topics may vary each semester. The course includes guest lectures given by faculty who are doing research in each area. Assignments include
readings from the current literature as well as projects and class presentations.

702 Research Methods (3:3:0) Prerequisite: admission to physical sciences doctoral program. This course trains students in research methodologies, techniques, and data analysis methods in the physical sciences. Covers approaches for outlining and synthesizing a problem, techniques for measurement and analysis, and methods used for data analysis and interpretation.

703 Frontiers of Physical Sciences (1:1:0) Prerequisite: admission to physical sciences doctoral program. This course combines invited seminars from faculty (internal and external) with graduate student seminars. Presentation at a seminar is a requirement for advancement to candidacy in the physical sciences doctoral program. May be repeated three times.

998 Dissertation Proposal (1–12:0:0) Prerequisite: permission of advisor. Covers development of a research proposal under the guidance of a dissertation director and the doctoral committee. The proposal forms the basis for the doctoral dissertation. May be repeated as needed, but no more than a total of 24 credits in PSCI 998 and 999 may be applied toward satisfying doctoral degree requirements. Out of 24, no more than 12 credits of PSCI 998 may be applied.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: admission to candidacy in physical sciences doctoral program. Doctoral research performed under direction of dissertation director. May be repeated as needed, but no more than a total of 24 credits in PSCI 998 and 999 may be applied toward satisfying doctoral degree requirements.

Physics (PHYS)

Physics and Astronomy

101 Light and Sound in Our World (3:3:0) Nature of light, color, sound, electromagnetic spectrum, optical instruments, mechanisms of vision and hearing, color addition and subtraction, synthesis of musical sounds, interference of waves, polarization, Doppler effect, lasers, holography.

102 Sports Physics (3:3:0) Introduction to laws of physics in context of sports. Physics topics to be studied include two-dimensional motion, forces, conservation of energy, and momentum in the application to sports. Sports include football, basketball, baseball, swimming, and tennis.

103 Physics and Everyday Phenomena 1 (4:3:3) For nonscience majors. The course uses basic physics concepts from the areas of mechanics and thermodynamics to explain a wide range of everyday phenomena, such as how we walk and drive, how a ship floats, how clothing keeps us warm, and why it rains when we have a low pressure system.

104 Physics and Everyday Phenomena 2 (4:3:3) Prerequisite: either PHYS 103 or permission of instructor. For nonscience majors. The course uses basic physics concepts from the areas of light, sound, electricity, magnetism, and modern physics to explain a wide range of everyday phenomena. Topics include how we speak, hear, and see, what to do if the circuit breaker keeps tripping, how your computer stores and displays data, how rainbows and northern lights form, and the basic nature of matter.

121 Uses of Physics (1:1:0) Introductory course intended for both majors and nonmajors. Describes the uses of physics to a number of disciplines and professions, including medicine, information technology, energy, and environmental technology.

122 Inside Relativity (1:1:0) Introductory course describing Einstein's theories of special and general relativity intended for majors and nonmajors.

123 Inside the Quantum World (1:1:0) Introductory course describing quantum theory intended for majors and nonmajors.

124 Experimental Explorations in Physics (1:0:2) Introductory nonmathematical course intended primarily for physics majors. Experimental studies of phenomena in mechanics, electricity and magnetism, and optics. Stresses development of familiarity with methods and techniques of measurement and with data evaluation.


161 University Physics I Laboratory (1:0:3) Corequisites: PHYS 160 and MATH 114. Experiments in mechanics.

225 Problems in Physics 1 (1–3:0:0) Prerequisite: 24 credits, and 2.50 GPA in physics and mathematics. Individual study of physics problems of current interest. May be taken three times for credit.

243, 245 College Physics (3:3:0), (3:3:0) PHYS 243 is prerequisite to PHYS 245. Two-semester basic physics course with emphasis on topics of classical and modern physics of particular importance to science majors. Principles of mechanics, heat, electricity, magnetism, optics, and atomic and nuclear physics are discussed.

244, 246 College Physics Lab (1:0:3), (1:0:3) Corequisites: PHYS 243 for 244, and 245 for 246. Laboratory portion of two-semester basic physics course.

251 Introduction to Computer Techniques in Physics (3:3:0) Prerequisite: PHYS 160. Introduction to using computers in physics based on examples from mechanics and astronomy.

260 University Physics II (3:3:0) Prerequisite: PHYS 160 with grade of C or better (2.00); corequisite: Math 213. Waves, electricity, and magnetism.

261 University Physics II Laboratory (1:0:3) Corequisites: MATH 213 and PHYS 260. Experiments in mechanics, electricity, and magnetism.

262 University Physics III (3:3:0) Prerequisite: PHYS 260 with grade of C or better (2.00); corequisite: MATH 214. Thermodynamics, optics, and modern physics.

263 University Physics III Laboratory (1:0:3) Prerequisite: PHYS 261; corequisite: PHYS 262. Experiments in optics and modern physics.

265 Advanced University Physics II Laboratory (2:0:3) Corequisites: MATH 213 and PHYS 260. Credit may be received for PHYS 261 or 265. Experiments in mechanics, electricity, and magnetism with emphasis on data analysis using spreadsheets and Matlab.

266 Introduction to Thermodynamics (1:1:0) Prerequisite: PHYS 260. Students may not receive credit for both PHYS
262 and 266. Laws of thermodynamics, kinetic theory of gases, heat engines, and entropy.

303 Classical Mechanics (3:3:0) Prerequisites: PHYS 262; MATH 214 or permission of instructor. Motion of a particle in one, two, and three dimensions; systems of particles; noninertial coordinate systems; and equations of Lagrange and Hamilton.

305/ECE 305 Electromagnetic Theory (3:3:0) Prerequisite: PHYS 260; corequisite: MATH 214. Interaction of static charges, interaction of stationary currents, electromagnetic induction, and Maxwell’s equations.

306 Wave Motion and Electromagnetic Radiation (3:3:0) Prerequisite: PHYS 262; corequisite: MATH 214. Vibrating string, plane waves, interference, diffraction, polarization, electromagnetic waves, dispersion, and relativity.

307 Thermal Physics (3:3:0) Prerequisite: PHYS 262. Classical concepts of energy and temperature, basic definitions, first and second laws of thermodynamics, properties of pure substances, and equations of state. Introduction to classical and quantum statistics and their application to physical systems.

308 Modern Physics with Applications (3:3:0) Prerequisite: PHYS 262; corequisite: MATH 214. Study of modern physics with emphasis on applications. Topics include introductory quantum physics; modern optics; lasers; binding and energy bands in solids; electrical, thermal, and magnetic properties of solids; semiconductors; radioactivity; nuclear reactions; radiation detectors; and applications of nuclear physics to other sciences.

310 Physics of Semiconductor Materials and Processing (3:3:0) Prerequisites: PHYS 160, 260, and 262; or permission of instructor. Survey of the electronic and structural properties of semiconductors and the physics of semiconductor processing. Topics to be discussed include crystal growth, crystal defects, thin films, thermal properties, lithography, and characterization.

326 Problems in Physics II (1–3:0:0) Individual study of physics problems of current interest. May be taken three times for credit.

328/ASTR 328 Introduction to Astrophysics (3:3:0) Prerequisites: PHYS 262 and MATH 214. Topics include physical concepts; magnitudes of stars; Hertzsprung-Russell diagram; stellar radiation; stellar structure and stellar evolution; white dwarfs, red giants, supernovas, neutron stars, black holes; interstellar matter, dust, and molecules; cosmic rays and magnetic fields; galactic structure, galaxies, quasars, and intergalactic matter; high energy astrophysics, cosmology, and general relativity; and models of the universe.

390 Topics in Physics (1–4:0:0) Selected topics in physics not covered in fixed content courses.

402/PHYS 402 Introduction to Quantum Mechanics and Atomic Physics (3:3:0) Prerequisite: PHYS 308, or permission of instructor. Experimental basis of quantum mechanics; the wave function; systems in one, two, and three dimensions.

405, 406 Honors Thesis in Physics (3:0:0) Prerequisites: 21 credits of physics courses including PHYS 262, 305, and 308; and admission to Physics Department Honors Program. PHYS 405 is a prerequisite for PHYS 406. Project chosen and completed under the guidance of a faculty member, which results in a thesis. An oral progress report is required for PHYS 405. Oral and written presentations are required for PHYS 406. Students may receive no more than 6 credits of PHYS 405, 406, 408, and 409.

407 Senior Laboratory in Modern Physics (3:0:9) Prerequisite: 21 credits of physics courses, and PHYS 305 and 308. Experiments in modern physics involving advanced techniques in electronics, optics, nuclear physics, and solid state. Typical experiments include the Frank Hertz Experiment, Hall Effect, electron paramagnetic resonance, and Mössbauer Effect. This course meets the writing-intensive requirement.

408 Senior Research (2–3:0:0) Prerequisite: 21 credits of physics courses. Work under guidance of faculty member on research project in experimental or theoretical physics. May be taken twice with permission of the Physics Department. Students may receive no more than 6 credits of PHYS 405, 406, 408, and 409.

409 Physics Internship (3:0:0) Prerequisites: 75 credits, 21 credits of physics courses, and permission of department. See department for other requirements and application procedures prior to enrollment. On-the-job experience for physics majors in industry or government laboratories including summer programs. Students may receive no more than 6 credits of PHYS 405, 406, 408, and 409.

416 Special Topics in Modern Physics (1:2:0) Prerequisite: 21 credits of physics courses. Topics of current interest in modern physics with emphasis on the breadth of physical understanding needed to approach many of today’s problems. The course will also review all of undergraduate physics through assigned problems from the GRE test.

417/GEOL 417 Geophysics (3:3:0) Prerequisites: GEOL 101, 102, 201, 301; MATH 113, 114; and PHYS 160. Corequisites: MATH 213 and PHYS 260, 261. Seismological and gravitational theory and application to an understanding of the Earth’s interior. Geology requirement may be waived for physics and engineering students with sufficient background.

428/ASTR 428 Relativity and Cosmology (3:3:0) Prerequisite: PHYS 214; and PHYS 303, 305, and 262; or permission of instructor. Special relativity; four-dimensional space-time; general relativity; non-Euclidean geometries, geodesics, and field equations; tests of general theory of relativity; black holes; cosmology; models of the universe; remnant blackbody radiation; big bang cosmology; thermodynamics; and the universe.

502/PHYS 402 Introduction to Quantum Mechanics and Atomic Physics (3:3:0) Prerequisite: PHYS 308, or permission of instructor. Experimental basis of quantum mechanics, the wave function, and systems in one, two, and three dimensions.

510 Computational Physics I (3:3:0) Prerequisites: PHYS 303 and 305. Study and development leading to computer simulations of various physical systems. Requires the study and development of computational techniques and numerical algorithms to obtain both numerical results and visualization of these results. Application to individual physical processes taking place in a variety of physical systems. In computational physics research, individual physical processes are only components of a larger simulation.
512/CSI 687 Solid State Physics and Applications (3:3:0)  
Prerequisite: PHYS 402 or 502. Crystal structures, bonding, lattice vibrations, the free electron model, metals, semiconductors and semiconductor devices, superconductivity, and magnetism.

513 Applied Electromagnetic Theory (3:3:0)  
Prerequisites: PHYS 305, 308; and MATH 313, 314 or equivalent. Classical electromagnetic theory with applications. Topics include electrostatics, magnetic fields and materials, electromagnetic wave propagation, waveguides, transmission lines, radiation, and antennas.

533/CHEM 620 Modern Instrumentation (3:3:0)  
Prerequisites: PHYS 513 and an electronics course. Topics include sensors for radiation, particles, electric and magnetic fields, pressure, and motion; electronic instruments, computer data collection, instrumentation noise and noise reduction methods, and specialized instrumentation systems for various areas of applied physics.

540 Nuclear and Particle Physics (3:3:0)  
Prerequisite: PHYS 402 or 502. Accelerators, detectors and related electronics; nuclear and elementary particle structure; symmetries and conservation laws; the electromagnetic, weak, and hadronic interactions; nuclear models; the quark model; and nuclear science and technology.

575/CSI 655 Atmospheric Physics I (3:3:0)  
Prerequisites: PHYS 305, 308; and MATH 313 or equivalent. Introduces basic physical and chemical processes that operate in the Earth’s atmosphere. Emphasis on those concepts that provide a global description of the current atmospheric state and those processes that relate to global change and atmospheric evolution. Topics include equilibrium structure, radiative transfer models, thermodynamics of various atmospheric layers, and the various processes defining these layers.

590 Selected Topics in Physics (1–6:0–6:0)  
Prerequisite: graduate standing, or permission of instructor. Selected topics from recent theoretical or experimental developments and applications. Satisfies needs of professional community to keep abreast of current developments.

600 Special Topics in Physics (1–6:0–6:0)  
In-service course to strengthen and update teachers’ knowledge of physics and astronomy.

611 Electro-optics (3:3:0)  
Prerequisites: PHYS 502 and 513. Optical modulators, display devices, types and operation of lasers, mode locking, Q-switching, photodetectors, optical fibers.

612 Physics of Modern Imaging (3:3:0)  
Prerequisite: PHYS 513. Study of imaging methods using acoustic and electromagnetic waves to probe extended objects, and mathematical transformations to produce images from scattered waves. Topics include classical imaging, physical optics, Fourier transform, holography, tomography, seismic mapping, underwater acoustic imaging and mapping, side-looking radar, antenna arrays, applicable computer methods.

613/CSI 780 Computational Physics II (3:3:0)  
Prerequisites: PHYS 303, 305, and 510; PHYS 502 or equivalent recommended. Study of diverse physical systems with emphasis on modeling and simulation. Study and development of numerical algorithms and techniques to obtain both numerical results and visualization of these results. Projects undertaken will draw from such areas as many-body orbital dynamics, molecular interactions, quantum systems, radiative transfer in high-temperature plasmas, stellar interiors, hydrodynamics, and cosmology.

614 Thermodynamics and Kinetics of Materials (3:3:0)  
Prerequisites: MATH 113, 114, 213, 307; PHYS 262 or 266, or permission of instructor. Advanced thermodynamics and physical kinetics with applications to materials science. The course covers an axiomatic formulation of thermodynamics, theory of phase transformations, kinetic theory of reactions and diffusion processes in solids, and interface phenomena. Possible applications considered in the course include processing and fabrication of semiconductor materials, metal oxidation, and corrosion. Diffusion-controlled phase growth in solid solutions, shape memory alloys, and small-size effects in physical properties of materials.

620 Continuum Mechanics (3:3:0)  
Prerequisite: PHYS 510. Study of continuum mechanics; topics include physical concepts, mathematical formulation and solution, elastic materials, ideal fluids, viscous fluids, waves in continuous media, turbulence, thermal convection, stability considerations, high-temperature gas flows, radiative processes for momentum and energy transport, shocks, and computational fluid dynamics.

630/BINF 740: Introduction to Biophysics (3:3:0)  
Prerequisite: undergraduate degree in physics or permission of instructor. Introduces biophysics, focusing on physical and chemical concepts and their relation to rapidly expanding interdisciplinary interfaces among biology, chemistry, and physics. Reveals multiscale nature of biophysics, and includes exploration of macroscopic and microscopic applications.

660/ASTR 660 Space Weather (3:3:0).  
Prerequisite: graduate standing, or permission of instructor. Overview of space weather including sun, heliosphere, magnetosphere, and ionosphere.

676 Atmospheric Physics (3:3:0)  
Prerequisites: PHYS 303, 305, and 308; and MATH 314. Covers the basic conservation laws of mass, momentum, and energy, and a scaling analysis of the equations of motion and thermodynamics. Balanced flows in the atmosphere are discussed. Concepts of circulation and vorticity; the role of the atmospheric boundary layer in mass, momentum, and energy transfer; synoptic scale motions; and the role of gravity and Rossby waves in controlling the general circulation of the atmosphere are covered.

684 Quantum Mechanics I (3:3:0)  
Prerequisites: PHYS 305, 308; MATH 313 and 314, or equivalent. Fundamental concepts, including one-dimensional solutions of Schrödinger’s equations, operators in Hilbert space, observables, propagators, and harmonic oscillators.

685 Classical Electrodynamics I (3:3:0)  
Prerequisites: PHYS 305, 308; MATH 313 and 314, or equivalent. Deals with static and dynamic properties of electromagnetic fields as described by Maxwell’s equations. Covers electrostatics, magnetostatics, boundary value problems, multipoles, time dependent fields, propagating wave solutions, and resonant structures.

701 Theoretical Physics (3:3:0)  
Prerequisites: PHYS 502, 510, and 513; or permission of instructor. Study of the physical basis for selection of particular mathematical tools in physics; topics include curvilinear coordinates, tensors, matrices, differential equations, special functions, complex variables, and group theory.
703 Seminar in Physics (1:1:0) Prerequisite: permission of instructor. A general seminar course that combines invited seminars from faculty (both internal and external) with graduate student seminars.

705 Classical Mechanics (3:3:0) Prerequisites: PHYS 502, 510, and 513; or permission of instructor. Study of classical mechanics; topics include variational principles, constrained motion, Lagrangian and Hamiltonian mechanics, canonical transformations, and applications (central forces, rigid-body motion, oscillations).

711/Chem 730/CSI 782 Statistical Mechanics (3:3:0) Prerequisites: PHYS 502 and 510, or permission of instructor. Topics include thermodynamics, kinetic theory, ensemble theory, quantum statistics, and applications.

728/CSI 788 Simulation of Large-Scale Physical Systems (3:3:0) Prerequisites: PHYS 613 or equivalent, and FORTRAN or other high-level language programming. Study of diverse large-scale physical systems with emphasis on the modeling and simulation of these multifaceted systems. Study and development of numerical algorithms and techniques to obtain both numerical results and visualization of these results. Projects will be drawn from such areas as many-body dynamics, molecular dynamics and interactions, atmospheric structure and dynamics, high-temperature plasmas, stellar structure, hydrodynamics systems, galactic structure and interactions, and cosmology.

736/Chem 736/CSI 783 Computational Quantum Mechanics (3:3:0) Prerequisite: PHYS 502 and 510, or permission of instructor. Study of the fundamental concepts of quantum mechanics from a computational point of view, review of systems with spherically symmetric potentials, many-electron-atom solutions to Schrodinger’s equation, electron spin in many-electron systems, atomic structure calculations, algebra of many-electron calculations, Hartree-Fock self-consistent field method, molecular structure calculations, scattering theory computations, and solid-state computations.

760/ASTR 760 Space Plasma Physics (3:3:0) Prerequisite: PHYS 622 or 513, or permission of instructor. Covers plasma processes involved in today’s space physics research, including different regimes of plasma; basic concepts in kinetic, fluid, and MHD plasmas; and existent waves in these media. Also covers basics of shocks, discontinuities, transport and acceleration of particles such as cosmic rays, reconnection, and MHD instabilities.

780/CSI 789 Advanced Selected Topics in Physics (3:3:0) Prerequisite: permission of instructor. Selected topics in physics not covered in fixed-content physics courses. May be repeated for credit as needed.

784 Quantum Mechanics II (3:3:0) Prerequisites: PHYS 684, or permission of instructor. Advanced topics in quantum mechanics. Covers rotations, angular momentum, 3D solutions to Schrodinger’s equations, symmetries, conservation laws, approximate methods, and spin mechanics.

785 Classical Electrodynamics II (3:3:0) Prerequisite: PHYS 685, or permission of instructor. Advanced topics in electrodynamics. Covers radiation, scattering and diffraction, special relativity, relativistic particle dynamics, Lorentz transformation, 4-vectors, transformation of fields, charges and currents, Thomas precession, retarded potentials, and radiation from moving charges.

796 Directed Reading and Research (1–6:0:0) Prerequisite: admission to master’s program, and permission of instructor. Reading and research on a specific topic in physics or related field under the direction of a faculty member. May be repeated as needed.

798 Research Project (3:0:0) Prerequisites: 9 graduate credits, and permission of instructor. Project chosen and completed under the guidance of a graduate faculty member, which results in an acceptable technical report. Graded S/NC.

799 Master’s Thesis (1–6:0:0) Prerequisites: 9 graduate credits, and permission of instructor. Project chosen and completed under the guidance of a graduate faculty member, which results in an acceptable technical report and oral defense. Graded S/NC.

998 Doctoral Dissertation Proposal (1–12:0:0) Prerequisites: admission to physics doctoral program and permission of advisor. Covers development of a research proposal under the guidance of a dissertation director and the doctoral committee. The proposal forms the basis for the doctoral dissertation. May be repeated as needed; however, no more than 24 credits in ASTR/Phys 998 and ASTR/Phys 999 may be applied toward satisfying doctoral degree requirements in the physics PhD program. Out of the 24, no more than 12 credits of ASTR/Phys 998 may be applied.

999 Doctoral Dissertation (1–12:0:0) Prerequisites: admission to doctoral candidacy in physics doctoral program and permission of advisor. Doctoral research performed under direction of dissertation director. May be repeated as needed; however, no more than 24 credits in ASTR/Phys 998 and ASTR/Phys 999 may be applied toward satisfying doctoral degree requirements in the physics PhD program.

Psychology (PSYC)

Psychology

100 Basic Concepts in Psychology (3:3:0) Prerequisite to all 200-, 300- and 400-level courses in psychology. Introduces psychology as a scientific discipline. Examines concepts and methods in learning, motivation, development, personality, and measurement.

110 Seminar in General Psychology (1:1:0) Corequisite: PSYC 100. Explores applications, implications, methods, and findings of psychology. Students must be enrolled concurrently in PSYC 100. In-class work includes discussion that enriches the PSYC 100 lecture material, exploration of controversial issues in psychology, use of technology to broaden knowledge of psychology, and in-depth discussions of topics on which instructor has special expertise. Short papers are required.

211 Developmental Psychology (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Review of major developmental theories including perspectives of childhood, adolescence, adulthood, and old age.

231 Social Psychology (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Study of human behavior development in a social matrix, including such topics as socialization, cultural behavior, group norms, and attitude formation.

260 Basic Research Methods in Psychology (1–3:0:0) Prerequisite: 6 credits of psychology or permission of instructor and department. Introduction to research methods.
in psychology in the context of assisting faculty with research; individualized sections by arrangement with faculty. Methods taught vary but generally include basic data collection and recordkeeping methods in research. Course culminates in a paper describing techniques learned. No more than six credits in PSYC 260, 350, and 460 can be used toward a psychology major.

300 Statistics in Psychology (4:3:2) Prerequisites: 6 credits of psychology and 3 credits of mathematics course work; or permission of instructor. Students are strongly encouraged to take PSYC 301 concurrently. Descriptive and inferential statistics in design, analysis, and interpretation of psychological research with practical application using computers in laboratory.

301 Research Methods in Psychology (3:2:2) Prerequisite: 6 credits of psychology, including PSYC 300 as prerequisite or corequisite, or permission of instructor. Students are strongly encouraged to take PSYC 300 concurrently. General research design in psychology, with an emphasis on experimental design and control. Topics include use of human participants in research, reliability and validity, observational methods, and survey and longitudinal designs. Laboratory work will include designing and running research studies and writing manuscripts using appropriate style and format. PSYC 301 is a writing-intensive course.

304 Principles of Learning (4:3:2) Prerequisite: PSYC 300 with grade of C or better, or permission of instructor. Principles of animal learning, including such topics as classical and operant conditioning, discrimination learning, and animal cognition. Laboratory projects require working with animal subjects. PSYC 304 is a writing-intensive course.

309 Sensation, Perception, and Information Processing (4:3:2) Prerequisite: PSYC 300 and PSYC 372, or permission of instructor. Principles of perception, including topics such as psychophysics, perceptual organization, perceptual learning, and perceptual constancies. Laboratory projects demonstrate and investigate perceptual phenomena. PSYC 309 is a writing-intensive course.

313 Child Psychology (3:3:0) Prerequisite: 6 credits of psychology or permission of instructor. Study of human psychological development from conception to adolescence including such topics as genetic factors, emotional and intellectual growth, and environmental influences.

314 Adolescent Psychology (3:3:0) Prerequisite: 6 credits of psychology or permission of instructor. Study of the biological and cultural changes accompanying adolescence, including the effect of these changes on emotional, intellectual, and social development.

317 Cognitive Psychology (3:3:0) Prerequisite: 6 credits of psychology or permission of instructor. An in-depth overview of important topics in cognitive psychology, including memory, attention, pattern recognition, problem solving, reasoning, and psycholinguistics.

320 Psychological Tests and Measurements (4:3:2) Prerequisite: PSYC 300 with grade of C or better, or permission of instructor. Examination and application of principles underlying the theory, interpretation, and administration of psychological tests, including a study of tests of intelligence, achievement, and ability.

321 Counseling Psychology (3:3:0) Prerequisite: PSYC 325 or permission of instructor. Review of the theories and methods in psychological counseling.

322 Behavior Modification (3:3:0) Prerequisite: PSYC 324 or permission of instructor. Examination of experimental principles of human and animal learning within theoretical framework of applied behavior analysis, including design, implementation, and evaluation of operant intervention programs across a wide variety of human situations.

323 Clinical and Social Psychology Research Techniques (4:3:2) Prerequisite: PSYC 300 with grade of C or better, or permission of instructor. Review and application of research techniques including interviewing, survey analysis, and process analysis. PSYC 323 is a writing-intensive course.

324 Personality Theory (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Introduction to classical and contemporary theories of personality, and comparative evaluation of major theories in terms of relevant studies.

325 Abnormal Psychology (3:3:0) Prerequisites: PSYC 100, and one of PSYC 211, 231, or 324; or permission of instructor. Study of development of abnormal behavior patterns, including such topics as methods of diagnosis and prevention of serious mental disorders such as psychosomatic disorders, psychoses, character disorders, and mental retardation.

326 Therapeutic Communication Skills (3:3:0) Prerequisite: PSYC 325 or permission of instructor. Introduction to understanding and use of basic therapeutic communication skills used in clinical and counseling psychology.

327 Psychology in the Community (3:3:0) Prerequisite: psychology major with minimum 6 psychology credits, and permission of associate chair for undergraduate studies. Corequisite: Enrollment in psychology course for which this is service learning component. Course comprises one-hour service learning component linked to selected psychology courses. Maximum 6 credits of PSYC 327, 328, 421, 422, 548, and 549 can be applied to the psychology major.

328 Psychology in the Community Laboratory (1:0:0) Prerequisite: psychology major with minimum 6 psychology credits and permission of course instructor and associate chair for undergraduate studies. Corequisite: Enrollment in psychology course for which this is service learning component. Course comprises one-hour service learning component linked to selected psychology courses. Maximum 6 credits of PSYC 327, 328, 421, 422, 548, and 549 can be applied to the psychology major.

330 Psychology of Adjustment (3:3:0) Prerequisite: PSYC 100 or permission of instructor. PSYC 330 cannot be taken for credit by psychology majors. Nature of effective and faulty patterns of adjustment. Factors in healthy and unhealthy personality development, unique motivation patterns of individuals, and influence of personally significant groups on adjustment. Resources for personal growth and application of contemporary psychological principles to achievement of increased intellectual, emotional, and social competence.

333 Industrial and Organizational Psychology (3:3:0) Prerequisite: PSYC 100, 300. Examination of application of psychological principles and methods to problems commonly encountered in business and industry.
350 Directed Reading and Research in Psychology (1–3:0:0) Prerequisites: PSYC 100 and 300, and permission of instructor and department. Library research in psychology, culminating in a substantial formal paper; individualized sections by arrangement with faculty. No more than six credits in PSYC 260, 350, and 460 can be used toward psychology major.

362 Psychology of Women (3:3:0) Prerequisites: PSYC 100 and BIOL 103, 104; or permission of instructor. Behavior and attitudes of women; influence of chromosomes and hormones on behavior, influence of culture on sex role differentiation, and theories of sex role development.

372 Physiological Psychology (3:3:0) Prerequisites: PSYC 100 with grade of C or better, and BIOL 103 and 104; or permission of instructor. Survey of neuroscience, including basic neuroanatomy, neural and synaptic transmission, neural mechanisms underlying normal and abnormal behavior, and biological mechanisms of drug action.

373 Psychological Physiology Laboratory (1:0:2) Prerequisite or corequisite: PSYC 372 or permission of instructor. Functional anatomy and physiology of the brain, including dissection of brain and eye, and a demonstration and practice in research methods for studying physiological mechanisms underlying behavior.

375 Brain and Behavior I (3:3:0) Prerequisites: PSYC 100 with grade of C- or better, and BIOL 103, 104; or permission of instructor. First half of comprehensive survey of neuroscience, including basic neuroanatomy, neural and synaptic transmission, neural mechanisms underlying normal and abnormal behavior, and biological mechanisms of drug action. Students may earn credit for 372 and either 375 or 376, but they may not earn credit for all three.

376 Brain and Behavior II (3:3:0) Prerequisites: PSYC 100 with grade of C- or better, and BIOL 103, 104; or permission of instructor. Second half of comprehensive survey of neuroscience, including basic neuroanatomy, neural and synaptic transmission, neural mechanisms underlying normal and abnormal behavior, and biological mechanisms of drug action. Students may earn credit for 372 and either 375 or 376, but they may not earn credit for all three.

379 Applied Cross-Cultural Psychology (3:3:0) Prerequisite: PSYC 100, or permission of instructor. A review of important landmarks in cross-cultural research, showing how this research impacts psychology as a discipline. Emphasizes an empirical approach to cross-cultural study and includes topics such as theoretical and empirical developments in cross-cultural psychology, development of coherent schemas to guide cross-cultural research and interventions, comparison of psychology's goals and assumptions in Western and other cultures, and integration of course materials into educational and career goals of students.

414 Behavior Disorders of Childhood (3:3:0) Prerequisites: PSYC 313 and 325, or permission of instructor. Review of the theories, methods, and research dealing with emotional and behavioral disorders of children.

415 Psychological Factors in Aging (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Examination of the sensory, perceptual, intellectual, and personality changes that occur in older people. Common adjustment problems as well as more serious adjustment difficulties are discussed. Applications of various personality theories of aging.

418/518 Death, Dying and Grieving (3:3:0) Prerequisite: PSYC 100. Advanced survey of processes of grieving and their relationship to death and dying. Topics include ways of dying, effects of death on loved ones, and care for the terminally ill.

421, 422 Undergraduate Practicum in Psychology (3:3:0), (3:3:0) Prerequisites: PSYC 325 and 326, and permission of Clinical Review Committee. No more than 6 credits in PSYC 327, 328, 421, 422, 548, and 549 can be used toward psychology major. Supervised experience in application of psychological principles requiring work in a nonclassroom situation.

423 Group Psychotherapy Techniques (3:3:0) Prerequisite: PSYC 324 or permission of instructor. Review of theory and methods of group therapy with emphasis on humanistic and interpersonal approaches, including applications to family therapy, alcoholism, and drug abuse.

435 Personnel Training and Development: A Psychological Perspective (3:3:0) Prerequisite: PSYC 230; prerequisite or corequisite: PSYC 320, or permission of instructor. Overview and critique of training methods used in industry from viewpoint of psychological theory, including simulations, on-the-job training, supervisory/leadership skills training, computer-assisted instruction, and programmed texts. Principles of needs analysis, program development, and program evaluation are discussed within framework of industrial psychology.

460 Independent Study in Psychology (1–3:0:0) Prerequisites: 18 credits of psychology including PSYC 301, with grade of C or better; 2.50 GPA in psychology; and written proposal approved before registration by instructor and department. No more than 6 credits in PSYC 260, 350, and 460 can be used toward psychology major. Advanced research methods in psychology in context of individual student projects or assisting with research on faculty projects; individual sections by arrangement with faculty.

461 Special Topics (3:3:0) Prerequisite: see course description in Schedule of Classes. Selected topics reflecting interest in specialized areas. Announced in advance.

465 History and Systems in Psychology (3:3:0) Prerequisite: 18 credits in psychology including PSYC 317, with grade of C or better, or permission of instructor. Historical background and major theoretical systems in modern psychology. Approaches include behaviorism, cognitive/information processing approaches, and psychodynamic theories.

466 Psychology of Intimate Relationships (3:3:0) Prerequisite: PSYC 100, 231; PSYC 324 recommended. Advanced survey of theories and research related to intimate relationships, including romantic relationships and those among family members and friends.

476 The Psychology of Working in Groups and Teams (3:3:0) Prerequisite: 60 credits including PSYC 100, or permission of instructor. Teaches knowledge and the skills to meet communication, interpersonal, and task-related challenges that arise when functioning in work teams. Through readings, classroom activities, and applied problem-solving exercises, students acquire or refine team-related competencies. Students study theory of group and team processes while
gaining insight from feedback on their behavior in exercises to become more effective team members.

472 Advanced Physiological Psychology (3:3:0) Prerequisite: PSYC 372, or permission of instructor. Rotating topics. Physiological mechanisms underlying behavior. Selected topics include neuronal bases of learning and memory, and biological bases of reinforcement and addiction. May be repeated once with approval of instructor.

490 Psychology Honors I (3:3:0) Prerequisite: admission to Psychology Department honors program. Review of topics and issues in psychology, including historical overview, theory and supporting data, and influences on behavior. Topics vary. May not be repeated.

491 Psychology Honors II (3:3:0) Prerequisite: PSYC 300, 301, and 490. Introduces advanced statistics, research methodologies, statistics packages, computing and information technology, and library technology appropriate for psychological research and pedagogy. Students required to complete proposal in preparation for admission to Psychology Honors III. May not be repeated.

492 Psychology Honors III (3:3:0) Prerequisite: PSYC 491, and approval of proposal for final honors project or thesis. Completion of final honors project or thesis. Students must complete project or thesis, and present oral defense to committee and poster to class. Students also expected to prepare proposal to present project or thesis at regional or national conference, or prepare manuscript for publication in appropriate journal. May not be repeated.

499 Senior Thesis (3:0:0) Prerequisite: psychology major with 90 credits, experimental psychology lab course, 3.00 GPA in psychology, PSYC 460, permission of instructor, and prior approval of thesis proposal. Directed research on topic agreed on by student and advisor. Students should take PSYC 460 with same advisor to develop thesis proposal before registering for PSYC 499. Students must complete thesis and defend it orally before advisor and two faculty members. With permission of department, students may take a second semester for maximum 6 credits.

506 Theories of Personality (3:3:0) Prerequisite: PSYC 324 or permission of instructor. Comparative review of prevalent theories of personality with special emphasis on fundamental models, and similarities and differences.

527 Introduction to Neurobiology (2:2:0) Prerequisite: completion of 60 credits, including PSYC 372 or BIOL 213 and 303. Introduction to neurobiology with overview of embryological development of nervous system in evolutionary context. Introduces regional and systems neuroanatomy by studying mammalian visual system with comparative perspective.

530 Cognitive Engineering: Cognitive Science Applied to Human Factors (3:3:0) Prerequisite: experimental lab course, or permission of instructor. Application of cognitive theory to understand and predict interactions among human cognition, artifact, and task. Discusses recent research and case studies that emphasize empirical research, analytical modeling techniques, systems design, and development of tools and methods.

531 Mammalian Neurobiology (3:2:3) Prerequisite: PSYC 327. Functional anatomy of brains of mammals, with emphasis on regional and systems neuroanatomy of humans. Anatomy correlated with material from clinical neuroscience where possible. Laboratory component includes brain dissections and clinical correlations.


541 Survey Research (3:3:0) Prerequisite: PSYC 300 or SOCI 221, or permission of instructor. Introduces theory, method, and practice of survey research; students complete survey research project.

548, 549 Practicum in Gerontology (3:0:0), (3:0:0) Prerequisite: completion of three of the required courses in gerontology certificate program, or permission of instructor. No more than 6 credits in PSYC 327, 328, 421, 422, 548, and 549 can be used toward psychology major. Practical experience in gerontological setting under supervision of qualified professional for 150 contact hours per 3 credits.

552 Histology/Histochemistry of the Brain (5:3:2) Prerequisite: PSYC 372 or equivalent. Explores conceptual basics and provides hands-on experience in techniques for studying brain tissue, including stereotaxic surgery, perfusion, sectioning, Nissl and myelin stains, enzyme histochemistry, immunohistochemistry, in situ hybridization, and quantitative receptor autoradiography.

556 Chemistry and the Brain (3:3:0) Prerequisite: PSYC 372, or permission of instructor. Fundamentals of general chemistry, atoms, molecules, and reactions, with emphasis on water solutions. Organic compounds and functional groups, biosynthesis and properties, and examples from nervous system. Also includes biopolymers and their roles in cellular and neuronal organization, ionic channels, neurotransmitter receptors, and psychoactive substances.

557 Psychometric Methods (3:3:0) Prerequisites: PSYC 611 and 612, or permission of instructor. Examines concepts of psychological measurement with emphasis on predictor test and criterion development. Discusses reliability, validity, and specialized techniques to develop tests of ability, interest, and personality.

558 Neuronal Bases of Learning and Memory (3:3:0) Prerequisite: PSYC 372, or permission of instructor. Examines neuronal mechanisms involved in learning and memory, in animals ranging from invertebrates to humans.

559 Behavioral Chemistry (3:3:0) Prerequisite: PSYC 372, or permission of instructor. Neurochemistry and neuroendocrinology, including neurotransmitter synthesis, genetic aspects of neural functioning, mechanisms of action of neurotransmitters and second messenger systems, regulation of neuroendocrine systems, neuroendocrine effects on behavior, and neuroimmunology.

560 Advanced Applied Social Psychology (3:3:0) Prerequisite: PSYC 231, or permission of instructor. Study of major trends in social psychological research with emphasis on ethical and practical problems posed by human experimentation. Topics include attitude measurement and change, conformity, social perception, and small group interaction.

561 Behavioral Biology of Substance Abuse (3:3:0) Prerequisite: PSYC 372 or equivalent. Overview of biological effects of substance abuse, and biological mechanisms underlying addiction. Topics include alcohol, cocaine,
marijuana, and other drugs; genetics of addiction; and neural systems underlying addiction and withdrawal.

591 Professional Seminar (1–3:1–3:0) Prerequisite: MA students in psychology. Each section limited to students in one concentration of MA program. See area coordinator for requirements for section in each track. May be repeated for total 3 credits only. Graded S/NC.

592 Special Topics (3:3:0) Special topics reflecting interests in specialized areas. Topic announced in advance.

597 Directed Reading and Research (1–3:0:0) Prerequisite: permission of instructor. Directed reading or research for MA students in psychology. Independent reading or research on topic agreed on by student and faculty member. May be repeated for maximum 6 credits. Maximum 9 credits of 597, 792, 798, and 799 may be applied to master’s degree.

611 Advanced Statistics (4:3:2) Prerequisite: screening test given on first evening of class. Test must be passed to take course. Open only to degree students. Integrates basic psychological statistics with overview of research methodology including experimental, quasi-experimental, field approaches, and measurement issues from advanced perspective. Lab work includes using computer packages for data handling and analyses. Students must enroll in 611 and 612 in sequential semesters.

612 Advanced Statistics (4:3:2) Prerequisite: grade of A or B in PSYC 611. Open only to degree students. Integrates basic psychological statistics with overview of research methodology including experimental, quasi-experimental, field approaches, and measurement issues from advanced perspective. Lab work includes use of computer packages for data handling and analyses. Students must enroll in 611 and 612 in sequential semesters.

614 The Psychology of Aging (3:3:0) Prerequisites: PSYC 100, and undergraduate or graduate course in aging. Review of the experimental literature in psychology of aging, including intellectual functioning, personality and adjustment, minor and major adjustment problems, and role changes in later life.

615 Language Development (3:3:0) Prerequisite: 3 credits of graduate development psychology, or permission of instructor. Seminar covering theory and research on acquisition of language, including biological and environmental influences and constraints; research methods; role of parents; individual and cultural differences; links between language and other domains of development including cognitive, behavioral, social, and emotional; language and the brain; animal language; bilingualism; and atypical language development.

617 Child Psychopathology (3:3:0) Prerequisites: PSYC 313 or 211, and 325. Intensive survey of major types of psychopathological disturbances of infancy and childhood.

619 Applied Behavior Analysis: Principles, Procedures, and Philosophy (3:3:0) Focuses on basic principles and procedures of applied behavior analysis; identification of factors that contribute to behavioral problems and improved performance; and procedures that can be used to minimize behavioral problems, improve performance, teach new behaviors, and increase probability of behaviors occurring under appropriate circumstances.

621 Applied Behavior Analysis: Empirical Bases (3:3:0) Focuses on basic content of applied behavior analysis, and teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs.

623 Applied Behavior Analysis: Assessments and Interventions (3:3:0) Prerequisites: PSYC 619 and 621, or EDSE 619 and 621. Further expands on basic content of applied behavior analysis, and teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs.

624 Applied Behavior Analysis: Applications (3:3:0) Prerequisites: PSYC 619 and 621, or EDSE 619 and 621. Expands capability to deal with more complex behavioral situations, enabling ability to relate to more sophisticated professional issues and environments.

625 Applied Behavior Analysis: Verbal Behavior (3:3:0) Prerequisites: PSYC 619 and 621, or EDSE 619 and 621. Further expands capability to deal with more complex behavioral situations, enabling ability to relate to more sophisticated professional issues and environments.

630 Developmental Disabilities (3:2:1) Prerequisite: 3 credits of graduate developmental psychology courses, or permission of instructor. Lectures, seminars discuss state-of-the-art and evidence-based information about developmental disabilities across life span with emphasis on mental retardation. Includes epidemiology, etiology, diagnoses, risk factors, treatment, supports, and prevention of developmental disabilities. Pertinent philosophical, ethical, and legal issues concerning this special needs population will be discussed. In addition to course work and assigned reading, students sign up for a 20-hour per semester practicum.

631 Industrial and Personnel Testing and Evaluation (3:3:0) Prerequisites: PSYC 300 and 320. Study of administration, scoring, and interpretation of standard tests used by industry for selection and assessment of personnel.

633 Evaluative Research in Psychology (3:3:0) Prerequisite: PSYC 300 or permission of instructor. Examines research techniques specifically designed to evaluate human effectiveness of organizations and mental health programs.

636 Survey of Industrial Psychology (3:3:0) Prerequisite: PSYC 300 or permission of instructor. Intensive survey of historical and current issues in major areas of applied (non-clinical) psychology.

638 Training: Psychological Contributions to Theory, Design, and Evaluation (3:3:0) Prerequisite: PSYC 636, or permission of instructor. Focuses on applying learning principles derived from psychological research in development of training models and techniques of skill acquisition. Discusses research designs and empirical results appropriate to training evaluation.

639 Survey of Organizational Processes (3:3:0) Prerequisite: PSYC 230 or 632. Trains at conceptual/theoretical and empirical levels in organizational processes. Includes individual, interpersonal, intragroup, and intergroup phenomena as they exist in context of organizational settings.

640 Techniques in Industrial/Organizational Psychology (3:3:0) Prerequisite: PSYC 300, or permission of instructor. Skills-oriented course enabling students to construct instruments and perform functions critical to both researchers and practitioners in industrial/organizational psychology. Focuses
on conducting job analysis interviews, developing and scoring task inventories, using critical incident and KSAO methods, and constructing performance appraisal and selection instruments.

645 Research Methods in Human Factors and Applied Cognition (3:3:0) Prerequisites: PSYC 330 and 611. Hands-on approach to selected current or classical human factors/applied cognition research methods; exact methods announced in advance. Potential methods include cognitive task analysis, usability evaluation methods, critical incident analysis, reliability analysis, workload measures, verbal protocol analysis, and engineering models of human performance. May be repeated for credit.

646 Issues and Methods in Longitudinal Developmental Research (3:3:0) Prerequisites: PSYC 611 and 612, and 6 credits of graduate developmental psychology. Examines techniques for measuring developmental change across lifespan.

648 Developmental Psychopathology (3:3:0) Prerequisite: 6 credits of graduate developmental psychology. In-depth look at emerging discipline of developmental psychopathology. Discusses specific disorders and contexts to illustrate how knowledge of normal development, deviant development, and maladaptive behavior illuminates principles underlying adaptive functioning.

652 Quantitative Methods II: Analysis of Variance (3:3:0) Prerequisites: PSYC 300 and either 304, 305, or 309. Basic concepts in experimental design, fundamental assumptions in analysis of variance, and analysis of variance and covariance designs. Reviews multiple comparison tests.

654 Naturalistic Methods in Psychology (3:3:0) Prerequisites: PSYC 300 and either 304, 305, or 309. Theory and techniques involved in studying people in their natural environment. Primary emphasis on quasiexperimental designs and methods of systematic observation.

666 Cognitive and Perceptual Development (3:3:0) Prerequisites: 6 credits of child psychology, and course in experimental psychology; or permission of instructor. Survey of theory and research on development of perception, memory, concepts, problem solving, intelligence, and academic skills in children.

667 Behavior in Small Groups and Teams (3:3:0) Prerequisite: PSYC 231. Theories, methods, and topics relevant to individual behavior in small group setting. Includes effects of individual on group, effects of group on individual, and interaction effects among individuals.

668 Personality: Theoretical and Empirical Approaches (3:3:0) Prerequisite: PSYC 324, or permission of instructor. Presents comprehensive overview of current theoretical and empirical approaches to personality. Emphasizes areas of special relevance to clinical, developmental, and industrial/organizational psychology.

669 Social and Emotional Development (3:3:0) Prerequisite: 6 credits of developmental psychology, or permission of instructor. Surveys theory and research relevant to development of social relationships, emotional expressiveness and regulation, aggressive and altruistic behaviors, sex roles, and morality. Emphasizes influences on such development, including parents, other adults, peers, siblings, and broader culture.

671 Role and Function of the School Psychologist (3:3:0) Open only to school psychology MA students, or by permission of instructor. Considers roles, functions of school psychologist in educational environment, including certification and ethical standards, issues, and trends.

673 Consultation and Behavior Modification (3:3:0) Open to practicing school psychologists and students in school psychology, or by permission of instructor. Examines theory and practice of behavior modification and consultation in school environment.

678 Topics in School Psychology (1–6:0:0) Open to practicing school psychologists and advanced students in school psychology, or by permission of instructor. Selected topics reflecting specialized area of school psychology. Content varies. May be repeated for total 9 credits.

684 Psychological Counseling Techniques (3:3:0) Open to practicing school psychologists or psychology graduate students with prior course in counseling. Application of various counseling approaches and techniques to school-age child and adolescent. Students gain experience in counseling techniques used in schools and contemporary practice.

685 Cognitive Neuroscience (3:3:0) Provides an overview of the neural basis of human mental functions. Uses neuroimaging (PET, fMRI, ERP's, TMS, etc.), computational, and information-processing methods to examine functions such as attention, memory, language, emotion, and decision making.

701 Cognitive Bases of Behavior (3:3:0) Open only to degree students. Surveys concepts in learning, cognitive, and affective processes, including theories and supporting data and their influences on behavior.

702 Biological Bases of Human Behavior (3:3:0) Open only to degree students. Surveys biological bases of behavior, including such topics as neural conduction, role of specific neurotransmitters, cortical functioning, and brain disorders.

703 Social Bases of Behavior (3:3:0) Open only to degree students. Surveys social influences on behavior, including group processes, person perception, and attitude formation.

704 Life-Span Development (3:3:0) Open only to degree students. Surveys theories and research regarding lifespan development and personality formation.

705 Historical and Philosophical Issues in Psychology (3:3:0) Open only to degree students. Important historical and systematic approaches to psychology and their relationship to the philosophy of science, structure of theory, and philosophical issues in psychology.

709 The Measurement of Intelligence (4:3:2) Open only to school psychology MA student. Prerequisites: department permission, and PSYC 617 or 822 and PSYC 320 or equivalent. Corequisite: PSYC 611. Administration, scoring, and interpretation of major infant, child, and adult intelligence tests, with emphasis on individual tests. Development of IQ tests, theories of intelligence, and current trends and developments in intellectual assessment.

710 Psychological Assessment (4:3:2) Open only to school psychology MA students. Prerequisites: satisfactory completion as certified by the School Psychology Committee; PSYC 617, 709, 822, or 810; and permission of department. Study
of major instruments used in clinical assessment and nature, problems, and predictive value; administration and scoring of major techniques for evaluation of personality; and principles of interpretation of these procedures.

712 Child Neuropsychological Assessments (3:3:0) Open to practicing school psychologists, school psychology graduate students, PhD developmental students, or by permission of instructor. Survey of basic theoretical and applied knowledge of conceptualization and assessment procedures of brain-behavior relationship in school-age child and adolescent. Problems involved in diagnostic assessment of children with various handicapping conditions such as learning disabilities, retardation, and emotional disturbances.

730 Practicum in Applied Psychology (1–6:0:0) Open only to degree students in psychology. Prerequisite: permission of department. Apply in writing to area coordinator 60 days prior to beginning of semester. Practical experience in organizational setting as assigned. PhD students may repeat course for maximum 15 credits; MA students for maximum 6 credits. Graded S/NC.

732 Attention and Performance (3:3:0) Prerequisite: PSYC 530, graduate experimental course in psychology, or PSYC 701. Human factors seminar focusing on theories, concepts, issues, methods, techniques, and research in the area of attention and performance.

733 Issues in Personnel Psychology (3:3:0) Prerequisite: PSYC 636 or permission of instructor. Examines psychological literature on job analysis, job evaluation and compensation, performance appraisal, training, and EEOL selection issues. Methodological and psychometric issues in interpretation and evaluation of personnel psychology research receive particular attention.

734 Seminar in Human Factors and Applied Cognition (6:3:0) Prerequisite: 6 graduate credits in human factors and applied cognition, or permission of instructor. Emphasizes current research and application of human factors, ergonomics, applied cognition, and applied perception. May be repeated for credit.

735 Psychological Perspectives on Organizational Development (3:3:0) Prerequisite: 3 graduate credits in industrial/organizational psychology, or permission of instructor. Theories and methods in industrial/organizational psychology as they relate to organizational change and development. Actual training in organizational diagnosis, change through supervised field work.

736 Research in Human Performance Assessment (3:3:0) Prerequisite: 3 graduate credits in industrial/organizational psychology, or permission of instructor. Reviews taxonomic issues in description and prediction of human performance. Discusses concepts and methods in assessment of human abilities. Emphasizes cognitive, psychometric, physical, and sensory-perceptual capacities required to perform human tasks.

737 Psychology of Human-Technology Interaction (3:3:0) Prerequisite: 6 graduate credits in human factors and applied cognition, or permission of instructor. Emphasizes current research and development in human-computer interaction, cognitive systems engineering, cognitive ergonomics, and cognitive engineering. May be repeated for credit.

739 Seminar in Industrial/Organizational Psychology (3:3:0) Prerequisites: PSYC 230 and 636, or permission of instructor. Rotating topics such as leadership theories and management development, and performance appraisal. Topics announced in advance. May be repeated for credit.

741 Psychology of Work Motivation (3:3:0) Prerequisite: PSYC 230 or permission of instructor. Examines psychological literature of need, cognitive, and reinforcement theories of motivation; organizational attachment (commitment, absenteeism, and turnover); job design and quality of work issues. Emphasizes methodological and psychometric issues in interpreting and evaluating work motivation research.

750 School Psychology Practicum (1–6:0:0) Open only to school psychology MA students. Prerequisite assessment courses: PSYC 709, 710, and 722; and testing experience in the Psychological Clinic. Apply in writing for permission of department 60 days prior to beginning of semester. Practical experience in school psychology.

754 Quantitative Methods III: Psychological Applications of Regression Techniques (3:3:0) Prerequisites: PSYC 611 and 612. Reviews psychological applications of regression techniques in variety of contexts including experimental, field, and survey settings.

756 Quantitative Methods IV: Multivariate Techniques in Psychology (3:3:0) Prerequisites: PSYC 611 and 612, or equivalent; PSYC 755 recommended. Surveys multivariate statistical techniques as applied to psychological research. Emphasizes analysis of complex designs and interpretation of multivariate data analyses resulting from computer processing.

757 Advanced Topics in Statistical Analysis (3:3:0) Prerequisite: PSYC 754. Focuses on noncognitive individual differences that predict performance. Published work discussed in seminar format with emphasis on conceptual development, methodological adequacy, and new directions.

758 Dispositional Predictors of Performance (3:3:0) Prerequisite: PSYC 636. Focuses on individual differences other than cognitive ability that predict performance. Papers discussed in seminar format with eye toward conceptual development and empirical review.

759 Applied Decision Making (3:3:0) Prerequisite: PSYC 611/612. Covers “basic applied” decision-making research. First half of course reviews basic psychological research on judgment and decision making; second half applies research to various practical problems. Overarching goal is to understand how basic decision-making literature can better inform applied research and practice.

766 Advanced Topics in Sensation and Perception (3:3:0) Prerequisite: PSYC 530 or 701. Emphasizes current research in sensation and perception. May be repeated for credit.

768 Advanced Topics in Cognitive Science (3:3:0) Prerequisite: PSYC 530 or 701. Emphasizes current research in cognitive science. Topics may include computational cognitive models, nature of expertise, diagrammatic reasoning, display-based problem solving, visual attention, decision
Making, goal-based versus event-based cognition, and situated action. May be repeated for credit.

780 Applied Developmental Psychology (3:3:0) Prerequisites: PSYC 704, or 3 credits of other graduate developmental psychology courses, and permission of instructor. Examines how developmental theory, knowledge base, and methodology can be used to promote health and welfare of individuals across lifespan. Topics include contemporary social issues and child development, research in applied settings, developmental assessment and intervention, and program evaluation.

786 Assessment and Treatment in Gerontology (3:3:0) Prerequisite: course in the psychology of aging, PSYC 320 and 423, or equivalent courses. Functional assessment of older adults including conceptual and methodological problems involved. Examines intervention strategies with older adults, including interviewing, group work with older persons, milieu therapy, reality therapy, and design of supportive environments.

790 School Psychology Internship (3–12:0:0) Prerequisite: completion of required courses in school psychology, and permission of program coordinator. Supervised field experience of one school year. Advanced school psychology student functions as full-time staff member in school system. Student completes paper on practical research project involving alternative school psychology role in school system. Enrollment is for total 9 credits (thesis option) or 12 credits (nonthesis option) in increments of 3 credits according to placement. Students enrolled in PSYC 799 are not required to complete the practical research project.

792 Practicum in Developmental Psychology, Biopsychology, and School Psychology (1–6:1:0) Prerequisites: 3 credits of graduate developmental psychology or biopsychology or advanced standing in school psychology. Open to degree students in developmental psychology, biopsychology, or school psychology MA or PhD programs. Interested students must apply to area coordinator 60 days before registration. Supervised experience in developmental psychology, biopsychology, or school psychology. Graded S/NC.

798 Thesis Proposal (1–6:0:0) Prerequisite: permission of instructor. Work on a proposal for master’s thesis. May not be repeated for credit. No more than 6 credits of 798 and 799 may be applied to master’s degree. Minimum 9 credits of 798, 799, 597, or 792 may be applied toward master’s degree. Graded S/NC.

799 Master’s Thesis (1–6:0:0) Research on approved master’s thesis topic under direction of thesis committee with approval of chair. Graded S/NC.

810 Psychological Assessment I (4:3:2) First of required two-course sequence that provides comprehensive coverage of principles, strategies, and techniques of psychological assessment. Emphasizes empirically supported methods. Open only to clinical psychology PhD students.

811 Psychological Assessment II (4:3:2) Second of required two-course sequence that provides comprehensive coverage of principles, strategies, and techniques of psychological assessment. Emphasizes empirically supported methods. Open only to clinical psychology PhD students.

816 Neuropsychological Assessment (3:3:0) Prerequisites: PSYC 702, 810, and 811; or 709 and 710. Nature of brain-behavior relationships in adults and children. Concentrates on major assessment techniques including Luria Nebraska, Halstead-Reitan, and Michigan Neuropsychological batteries.

822 Scientific Foundations of Clinical Psychology I (3:3:0) First of required two-course sequence that provides comprehensive coverage of major psychological problems, including review of empirically supported interventions. Open only to clinical psychology PhD students.

823 Scientific Foundations of Clinical Psychology II (3:3:0) Second of required two-course sequence that provides comprehensive coverage of major psychological problems, including review of empirically supported interventions. Open only to clinical psychology PhD students.

830 History, Systems, and Theories of Personality and Psychotherapy (3:3:0) Review of history, systems, and theories of clinical psychology emphasizing traditional theories of personality and psychotherapy.

831 Social-Cognitive Interventions in Clinical Psychology (3:3:0) Open only to clinical psychology PhD students. Survey of procedures for altering emotional distress and behavioral dysfunction within the conceptual framework of social cognitive theory and cognitive behavioral therapy.

832 Group, Marital, and Family Psychotherapy (3:3:0) Open only to clinical psychology PhD students. Prerequisites: PSYC 822, 823, and 830. Introduces major models of group, marital, and family functioning as well as current approaches to group, marital, and family psychotherapy.

833 Social And Cognitive Foundations Of Clinical Psychology (3:3:0) Open only to clinical psychology PhD students. Review of theory and research in social psychology (particularly social cognition) relevant to understanding psychological adjustment, adjustment problems, and clinical interventions.

840 Community Psychology I (3:3:0) First of required two-course sequence. Comprehensive coverage of history, concepts, and practice of community-clinical psychology, including community mental health theory, consultation, prevention, program planning and evaluation, and human services management.

841 Community Psychology II (3:3:0) Second of required two-course sequence. Comprehensive coverage of history, concepts, and practice of community-clinical psychology, including community mental health theory, consultation, prevention, program planning and evaluation, and human services management. Includes implementation of consultation project.

850 Teaching Practicum in Psychology (1:1:0) Workshop in effective teaching of selected undergraduate psychology courses. Required of and designed to guide graduate teaching assistants assigned to teach undergraduate course (not a lab) for first time. Topics include course planning, syllabus development, lecture resources, effective lecturing skills, use of audio visuals, leading of classroom discussion, construction and grading of exams, student writing, instructional technology, and handling of student questions and problems. Individual critiques of teaching.

880 Clinical Foundations (3:3:0) Open only to clinical psychology PhD students. Focus on basic clinical and interac-tional skills, including basic therapy skills, psychodiag-
notic interviewing, mental status exam, and interview management skills.

881 Practicum in Clinical Psychology (3:0:0) Supervised clinical work in a professional psychological services setting. Usually includes practice in psychological assessment and clinical interventions, but can also include supervision, consultation, and program evaluation.

885 Clinical Externship (0:0:0) Open only to clinical psychology PhD students in the third year or more of training. Individual placements in psychological assessment or psychotherapy service settings.

888 Clinical Supervision: Theory, Research, and Practice (3:3:0) Prerequisite: 6 credits of PSYC 881. Introduces students to theory, research, and practice of clinical supervision, with an emphasis on supervision of psychotherapy. Focuses on selecting effective supervision strategies, establishing and maintaining a positive supervisory relationship, and applying supervisory practices in accordance with current research and standards. Includes didactic and applied components.

890 Seminar in Professional Psychology (1–3:1–3:0) Open only to degree students. Each section limited to students in one concentration of PhD program. See area coordinator for requirements for section in each track. May be repeated for credit. Graded S/NC.

892 Special Topics in Psychology (3:3:0) Open only to PhD students. Selected topics reflecting specialized areas in psychology. Content varies. May be repeated.

897 Directed Reading and Research (1–3:0:0) Clinical psychology PhD students may not take this course for elective credit. Independent reading on topic agreed on by student and faculty member. May be repeated. May not be repeated for degree credit by students who also register for PSYC 799.

998 Doctoral Dissertation Proposal (variable credit) Work on research proposal that forms basis for doctoral dissertation. May be repeated. No more than 24 credits of PSYC 998 and 999 may be applied to doctoral degree requirements. Graded S/NC.

999 Doctoral Dissertation (variable credit) Research on approved dissertation topic under direction of dissertation committee. May be repeated. No more than 24 credits of PSYC 998 and 999 may be applied to doctoral degree requirements. Graded S/NC.

Public Administration (PUAD)

502 Administration in Public and Nonprofit Organizations (3:3:0) Graduate introduction to field of public administration. Focuses on structure, functions, and processes of executive branch agencies of national, state, and local governments. Emphasizes nonprofit organizations as co-actors with government in policy-making/policy implementation nexus.

504 Managing in the International Arena: Theory and Practice (3:3:0) Theoretical and empirical examination of international system that both affects and is affected by decisions, behaviors, and subsystems of state and nonstate (organizational) actors.


509 Justice Organizations and Processes (3:3:0) Examines structures, practices, and performance of organizations involved in administration of justice (law enforcement, courts and legal agencies, corrections, regulatory and related agencies, private organizations) Explores applicability of various theoretical perspectives on organizational processes, and considers extent to which processes operate as a system. Focuses on comparing formal goals and system expectations to actual practice.

510 Policing in a Democratic Society (3:3:0) Topics include police mission; impact of police subculture; defining, recognizing, and measuring good police work; moral hazards of policing such as corruption, brutality, and deception; promotion of integrity, discretion, and control; impact of police practices on crime and disorder; securing public support; and legitimacy of police, community policing, and other reforms.

611 Problem Solving and Data Analysis I (3:3:0) Prerequisite: passing grade on screening exam. Techniques, skills for public managers to solve policy-related problems or analyze policy-related data. Focuses on problem definition, research design, and problem solving under conditions of uncertainty in public sector.

612 Problem Solving and Data Analysis II (3:3:0) Prerequisite: PUAD 611. Techniques and skills for public managers to solve policy-related problems or analyze policy-related data. Focuses on data gathering and analysis, use of computers, systems theory and analysis, and operations research.

613 Economic Analysis in Public Administration (3:3:0) Prerequisite: PUAD 611. Covers major economic issues about role of markets and government in global world. Applies fundamental economic concepts such as cost benefit analysis to public sector.

615 Administrative Law (3:3:0) Covers law as guiding and controlling force in public-sector operations. Includes application of legal processes to administrative practices and situations, and administrative determination of private rights and obligations.

620 Organization Theory and Management Behavior (3:3:0) Considers behavior in context of public organization, and consequent changes required in management. Focuses on such issues as perception, attitude formation, motivation, leadership, systems theory, communication and information flow, conflict theory, and decision theory.


622 Program Planning and Implementation (3:3:0) Prerequisite: PUAD 620. Practical exploration of implement-
632 The NGO: Policy and Management (1–3:3:0)

Explores unique aspects of nonprofit organizations operating in intergovernmental management and network management. Introduces concepts and communications issues of nonprofit organizations and their effect on the sector and society as a whole.

633 Hazard Mitigation Policy (3:3:0)

Examines the complex interplay and policy approaches to hazard prevention and public goods and services through contracts. Emphasizes coordinating tasks and resources required for effective program implementation.

634 Management of International Security (3:3:0)

Examines intergovernmental management and network management during, response, recovery, and mitigation phases. Explores the principles and practices that promote effective disaster response operations and management. Examines nature of hazards, models for response operations in the United States and roles and responsibilities of various emergency management-related organizations.

635 Emergency Preparedness: Interagency Communication and Coordination (3:3:0)

Considers complex relationships between governments and across sectors and levels of government for effective emergency management in planning, response, recovery, and mitigation phases. Explores intergovernmental management and network management theories and research to understand the nature of interorganizational problems and potential models for collaboration.

636 The NGO: Policy and Management (1–3:3:0)

Explores unique aspects of nonprofit organizations operating in international, philanthropic, and socioeconomic environments, particularly in relief and development work. Examines relationships between NGO and U.S. and foreign governments. Covers international philanthropy; cross-cultural understanding; and key managerial concerns such as communications, planning, human resource management, control, group process, and project evaluation.

640 Public Policy Process (3:3:0) Prerequisite: PUAD 502.

Processes of making public policy, including detection of public issues, consideration of alternatives, and adoption and implementation of solutions. Highlights major actors in policy process, and environment within which they work.

642 Environmental Policy (3:3:0) Prerequisite: PUAD 640.

In-depth examination of environmental policymaking. Examines U.S. efforts from 1970 to present to mitigate pollution of nation’s air, land, and water; and addresses issues of global concern including biodiversity loss, ozone depletion, and climate change.

643 Public Policy Research (3:3:0) Prerequisite: PUAD 640.

Examines major concepts, designs, and methods used in applied policy research. Explores underlying logic of policy inquiry, and use of quantitative and qualitative techniques. Includes case applications of major styles of inquiry; and steps in planning, administering, and reporting policy research.

644 Public Policy Models (3:3:0) Prerequisite: PUAD 640.

Approaches to modeling policy problems. Includes analysis and comparison of dominant paradigms in policy sciences. Reviews assumptions and implications of different models and their utility for analysis, implementation, and evaluation.

651 Virginia Politics, Policy, and Administration (3:3:0) Prerequisite: PUAD 502.

Covers governmental agencies, legislative functions, executive leadership, staff agencies, state-local relationships, intrastate regionalism, administrative customs peculiar to Virginia.

652 Nonprofit Leadership and Change (3:3:0) Prerequisite: PUAD 502 or 505.

Examines the principles of leadership and the process of change within the context of the nonprofit sector and its role in the community. Looks at current changes and challenges within the nonprofit sector and their effect on the sector and society as a whole.

654 The Community, Marketing, and Public Relations (3:3:0) Prerequisite: PUAD 502 or 505.

Focuses on marketing concepts and communications issues of nonprofit organization as they apply to identifying market, ability to formulate public image and reputation, and capability to raise money and retain membership or volunteers.

655 Philanthropy and Fund Raising (3:3:0) Prerequisite: PUAD 502 or 505.

Examines history of philanthropy and relationship to nonprofit, government, and commercial sectors in United States. Studies principles of financial development including governance, development of organizational capacity, and identification of funding sources and donor motivations. Provides understanding of fundraising techniques that generate financial support for nonprofits, and context in which these methods may be used.

657 Association Management (3:3:0) Prerequisite: PUAD 502 or 505.

Practical application of management theory in context of professional and trade associations. Covers legal structures, tax-exempt status, and general organizational.
structure. Topics include volunteer management, budgeting and accounting practices in associations, fundraising, media relations, media and event planning, and human resource management.

659 Nonprofit Law, Governance, and Ethics (3:3:0)  
**Prerequisite:** graduate standing. Overview of nonprofit governance as well as basic contract, labor, and tax law issues within nonprofit corporation law. Covers relationship between board and executive, and ethics topics typical to nonprofit organizations such as self-dealing, fiduciary responsibility, and human resource issues.

660 Public and Nonprofit Accounting and Finance (3:3:0)  
**Prerequisite:** course open only to admitted MPA or association/nonprofit management certificate students. Studies fundamental normative debates in public and nonprofit financial management arena with focus on resulting implementation principles and techniques in governmental accounting, financial reporting, budget and revenue decisions, debt management, cash and investment management, pensions and employee benefits, and risk management.

661 Public Budgeting Systems (3:3:0)  
Survey focusing on policy and theoretical framework of revenue and expenditure choices at all levels of government. Topics include development, theories, structure of budgeting: political, economic, and managerial aspects of public budgeting; public policy implications; and budgetary reform movements and successes and failures.

662 National Budgeting (3:3:0)  
Examines formulation of overall national fiscal policy and budgetary priorities through presidential and congressional budget processes, including decisions over spending and revenues.

663 State and Local Budgeting (3:3:0)  
Introduces state and local government budgeting including principal actors and institutions inside and outside state and local governments that play role in budget development, appropriation, implementation, and auditing.

664 Nonprofit Financial Management (3:3:0)  
**Prerequisite:** course open only to admitted MPA or association/nonprofit management certificate students. Covers nonprofit financial management with attention to conflicts between social mission and financial entrepreneurship. Topics include mission, budgeting, fund raising, commercial programs, investments, accounting and information systems, financial reporting, auditing, and internal control.

670 Human Resources Management in the Public Sector (3:3:0)  
**Prerequisite:** PUAD 502. Overview of range and complexity of functions, responsibilities, and expectations of human resource staff and line managers in public sector. Focuses on human resources management in context of political, legal, and managerial systems. Human resource functions, such as hiring, performance, and development, are also presented.

671 Public Employee Labor Relations (3:3:0)  
Public employee labor relations, including unionization, representative elections, bilateral policy negotiations, administration of agreements, management rights, union and membership security, strike issue and grievance procedures, impact on public administration, and assessment of future developments.

680 Managing Information Resources (3:3:0)  
**Prerequisite:** admission to MPA program, or permission of instructor. Examines how managerial and analytical functions in public organizations can be performed via end-user computer applications. Provides in-depth coverage of selected database and decision support packages, and gives attention to logic and integration of application software.

691 Justice Program Planning and Implementation (3:3:0)  
**Prerequisites:** PUAD 502 and 509. Covers development and construction of organizational systems to implement government policies and programs. Emphasizes dealing with real-world challenges, constraints, and opportunities to create feasible plans, performance-monitoring systems, and secure multiple agency coordination. Applications of planning and implementation principles to actual projects in justice agencies.

700 Ethics and Public Administration (3:3:0)  
**Prerequisite:** admission to MPA program, and 18 credits. Topics of ethical dimensions including constitutionalism, democratic values and traditions, standards of conduct and ethics, and conflicting values of public officials and social equity of public programs.

701 Cross-Cultural and Ethical Dimensions of International Management (3:3:0)  
To be taken in final two semesters of MPA program. Examines normative issues in management of programs in international context. Emphasizes interplay of cultural, sociopolitical, legal, and ethical factors, and management and policy problems arising from conflicting goals, values, and inequities among nations and regions.

703 Third-Party Governance (3:3:0)  
**Prerequisites:** PUAD 502, 620, and 9 graduate credits. Examines design and management of government programs relying on other levels of government and private sector for delivery, with focus on such governmental tools as contracts, grants, loans, regulation, and tax credits.

720 Performance Measurement (3:3:0)  
Methods used by managers to systematically assess performance. Includes practical tools such as focus groups, survey research, cost/benefit analysis, benchmarking, and comparison methods for revealing outcomes and impacts. Prepares managers to use information more effectively in developing programs and services and formulating policy, and covers reporting techniques to communicate performance results.

727 Seminar in Risk Assessment and Decision Making (3:3:0)  
**Prerequisite:** 12 graduate credits. Examines decision making under risk and uncertainty. Readings introduce major intellectual perspectives on topic and are drawn from variety of disciplines, including biology, economics, law, and psychology. Emphasizes making actual decisions under uncertainty.

729 Issues in Public Management (1–3:1–3:0)  
**Prerequisites:** PUAD 502, and 9 graduate credits. Current issues in management of public organizations in contemporary American government. Includes practical applications of theories and analysis to managerial problems. Emphasizes competence in improving management in selected government settings. May be repeated with different topic.

730 Professional Development Workshop (1–3:1–3:0)  
Explores external and internal factors reshaping public and nonprofit organizations. Investigates processes and techniques that managers and staff can use to respond to rapid environmental change. Emphasizes case studies, and application of techniques and processes.
731 Homeland/Transportation Security Administration (3:3:0) Examines the terrorist attacks of 9/11, the vulnerabilities of the aviation security system at that time, reasons why elected leaders and officials did not act more decisively to improve security before 9/11, and the policy and administration responses to the 9/11 attacks, including the creation of the Transportation Security Administration and the Department of Homeland Security. Includes the development of radical Islam and the rise of Osama bin Laden and Al Qaeda.

738 Issues in International Security (1–3:3:0) Prerequisites: PUAD 504, and 9 graduate credits. Examines issues of topical interest in general area of international security. Possible topics include nuclear strategy, disarmament, American defense policy, and international terrorism. May be repeated with different topic.

739 Issues in International Management (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Examines significant current issues in public international management. Emphasizes practical applications of theories and analysis of problems in public international management arena, and competence in improving management practices in international management settings.

741 Policy Analysis (3:3:0) Prerequisites: PUAD 502, 611, and 640. Introduces concepts and techniques for formal policy analysis, development of skills in applying policy analysis techniques through case studies, and exploring legitimacy and utility of policy analysis.

742 Program Evaluation (3:3:0) Prerequisites: PUAD 502 and 611. Practical exploration of assessment techniques used in studying results of public programs and policies, including evaluation of implementation strategies and impacts. Draws on multiple approaches such as cost analysis, field research, experiments, productivity analysis, surveys and questionnaires, and qualitative studies.

743 Conduct of Justice Organizations at the Street Level (3:3:0) Prerequisite: PUAD 622. Examines the terrorist attacks of 9/11, the vulnerabilities of the aviation security system at that time, reasons why elected leaders and officials did not act more decisively to improve security before 9/11, and the policy and administration responses to the 9/11 attacks, including the creation of the Transportation Security Administration and the Department of Homeland Security. Includes the development of radical Islam and the rise of Osama bin Laden and Al Qaeda.

744 Internship (1–6:0:0) Prerequisite: 12 PUAD credits or permission of instructor. Contact internship coordinator one semester before enrollment. Credit determined by the department.

745 Leadership in Justice and Security Organizations (3:3:0) Prerequisite: PUAD 623. Examines leadership theories, and explores how changes have been successfully and unsuccessfully implemented in the past, and what change strategies appear to be most effective.

746 Directed Readings and Research (1–3:0:0) Prerequisites: 18 PUAD credits and permission of instructor. Reading and research on specific topic under direction of faculty member. Written report is required; oral exam covering research and report may be required. May be repeated once.

747 Changing Justice and Security Organizations (3:3:0) Prerequisite: JTCP 740/PUAD 790, or permission of instructor. Examines changes of changing justice organizations, how changes have been successful and unsuccessfully implemented in the past, and what change strategies appear to be most effective.

748 Environmental Politics (3:3:0) Evolution and current state of environmental policymaking. Includes history, strengths, and weaknesses of key U.S. environmental laws and central international environmental agreements. Introduces analytical approaches, including cost-benefit and risk analysis. Discusses economic incentives and normative considerations.

749 Issues in Justice Administration (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Examines contemporary problems such as education, criminal justice, transportation, land use, economic development, and environmental impact. May be repeated with different topic.

750 Federalism and Intergovernmental Relations (3:3:0) Prerequisites: PUAD 502 and 9 graduate credits. Examines broad trends in governance, including theory and practice of federalism, with particular focus on intergovernmental relations and changing roles of federal, state, and local governments. May include privatization, devolution, mandating, regulatory reform, and comprehensive federalism reform.

751 Issues in International Management (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Examines significant current issues in public international management. Emphasizes practical applications of theories and analysis of problems in public international management arena, and competence in improving management practices in international management settings.

752 Issues in Local Government Administration (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Examines contemporary problems such as education, criminal justice, transportation, land use, economic development, and environmental impact. May be repeated with different topic.
821 Doctoral Seminar in Theories of Organization and Bureaucracy (3:3:0) Prerequisite: PUAD 620 or equivalent, or permission of instructor. Examines key issues in organization theory and behavior. Issues include organization design; interorganizational coordination, intelligence and decision-making systems; leadership and motivation theories; and theories or organizations as agents of political and social change. Uses case studies.

840/PUBP 840 Research Seminar in Policy Governance I (2:2:0) to (4:3:1) (variable credit) Prerequisite: admission to doctoral program or permission of instructor. Surveys major institutions that formulate and implement public policy in United States. Examines translation of public preferences into public policy, and decisions about which societal and economic functions are most appropriately carried out by governments, and which are best accomplished by private institutions and individuals.

841/PUBP 841 Research Seminar in Policy Governance II (2–4:2–3:0–1) Prerequisite: admission to doctoral program. Second of two-semester sequence (PUAD 840, 841) in governance and public management policy concentration. Focuses on division of responsibilities among several levels of government, and between public and private sectors. Explores impact of these divisions on development of public policy in several policy areas, such as urban governance, environmental policy, and health care.

998 Doctoral Proposal Research (1–6:0:0) Prerequisite: permission of advisor. Work on a research proposal that forms basis for doctoral dissertation.

999 Doctoral Dissertation (1–24:0:0) Prerequisite: permission of participant’s dissertation committee. Registration for total credits may be spread over a multisemester contiguous period. PhD candidates must register for at least 3 credits each semester until dissertation completed.

Public Policy (PUBP)

School of Public Policy

501 Policy and Organizational Analysis (4:3:0) Prepares students to engage in systematic analysis, both qualitative and quantitative, and constitutes the basis for advanced analytical techniques. Emphasis on research design, information acquisition, application of data analysis techniques, and presentation, including writing for professional and lay audiences.

502 Governance and Policy Processes (4:3:0) Assesses governance processes in public and private organizational settings on the basis of economic and political standards such as efficiency, accountability, and responsiveness to societal needs in a rapidly changing global environment. Using cases, simulations, and fieldwork, students learn to evaluate the quality of institutional governance in specific venues and appraise implications for public policy.

503 Culture, Organization, and Technology (4:3:0) Focuses on the influence of culture in societal, political, economic, and technological processes, nationally and internationally. Culture is seen as dynamic and interactional. Using case studies, students learn pertinent approaches to the study of culture, from the analysis of organization and social networks to that of belief systems and identities. Students also develop practical skills in observation, participation, and intervention.

511 Quantitative Methods in Public Policy (3:3:0) Introduces students to the range of quantitative methods used for public policy analysis. Provides a broad foundation to prepare students for doing statistical analysis on the master’s level.

533 Topics in Public Policy Processes (1–3:3:0) Focuses on selected topics in public policy processes and procedures on an introductory level.

550 Topics in Public Policy (1–3:3:0) Focuses on selected topics in public policy not covered in fixed-content public policy courses.

555 Economics Math Workshop Short course covering math and calculus skills required for master’s level managerial economics course PUBP 720.

556 Writing Workshop A limited enrollment, noncredit, one-day workshop designed for master-level public policy students who want to improve their writing skills. Aimed at good writers who want to move to the next level of effectiveness. Taught by professional writers.

601 Theory and Practice of Regional Economic Development (3:3:0) Helps students develop real-world skills to be a successful economic developer, consultant, policymaker, or change agent in this rapidly changing environment. Designed to provide a framework for understanding regional and national economic growth and prosperity, and provide tools to conduct concrete analyses to help decision makers, clients, and constituents make better-informed decisions.

602 Regional Economic Development: Strategies and Applications (3:3:0) Introduces range of methods for tracking the performance of metropolitan economies, identifying opportunities for economic development, and assessing effectiveness of public and private investments designed to achieve region’s economic growth. Also examines strategies and case results of economic development plans and projects.

605 State and Local Government Policy and Economic Development (3:3:0) Examines state and local government policies and processes to promote local economic development, including institutional arrangements, financing and tax incentives, nonfinancial strategies and approaches, land use, environmental and other relevant regulations, and relationships across government and nongovernmental organizations.

650 Peace Operations I (3:3:0) First course of two-semester sequence on international peace operations. Focuses on emerging theory of peace operations, including peace-making activities of United Nations and other diplomatic initiatives; peace-building activities of international organizations and nongovernmental organizations; and peace support provided by international militaries.
651 Peace Operations II (3:3:0) Second course of two-semester sequence on international peace operations. Focuses on application of emerging theory of peace operations, including peace-making activities of United Nations and other diplomatic initiatives; peace-building activities of international organizations and nongovernmental organizations; and peace support provided by international militaries. Several guest lectures from past and present peace operations provide practical information for future staff of peace operations.

700 Theory and Practice in Public Policy (3:3:0) Theories of public policy emphasizing historical intellectual development, and role theory and ethics may play in public policy making. Assumptions made by policy professionals examined against broad range of philosophical, social, political, and economic imperatives affecting public policy environment.

702 Comparing Political Institutions (3:3:0) Examines political institutions and processes from comparative and international perspectives, and role of political environment in economic trade and investment policy decisions. Examines how generalizability, objective knowledge and understanding, and nature of evidence impact public policy.

703 Organizational Informatics in Public Policy (3:3:0) Helps policy professionals develop proficiency in technological skills necessary for effective practice by teaching latest developments in organizational informatics and web-based student-teacher interaction. Uses information technology to understand real-world policy problems.

704 Statistical Methods in Policy Analysis (3:3:0) Prerequisite: PUBP 501. Graduate-level introduction to statistical methods and techniques used in policy sciences. Topics include descriptive statistics, sampling and probability theory, graphical data display, estimation and significance testing, contingency tables, bivariate regression and correlation, and multiple regression, with introduction to computer-based statistical analysis.

705 Advanced Statistical Methods in Policy Analysis (3:3:0) Prerequisite: PUBP 704 or equivalent. Covers classical regression methods and their application to public policy analysis. Includes simple and multiple regression, analysis of variance, time series, and simultaneous equation structural models. Problems associated with applications include specification error, multicollinearity, qualitative variables, heteroskedasticity, serial correlation, and structural identification. Course develops analysis skills by discussing sample empirical studies and models using advance statistical computer software.

706 Environmental Decisions: Modeling Rational Judgment (3:3:0) Prerequisite: PUBP 705. Discusses decision aids for environmental or other policy makers to make and defend decisions soundly and economically. Integrates public policy and environmental science with decision analysis; for example, prescriptive models that quantify knowledge and values person or institution brings to bear on a decision. Applies simple aids, based on decision theory, to real consulting cases.

707 Budget Decision Making: Concepts and Practices in Economic and Financial Analyses (3:3:0) Studies analytical concepts and techniques used in public-sector overall budgetary and specific project decision making. Includes conceptual concerns and quantitative techniques used in benefit-cost analysis, capital budgeting, financial analysis, and various specialty applications, such as economic and fiscal impact analysis. These are all interrelated by the desire to measure the benefits versus the costs of various alternative public decisions. Attention is given to measuring results over time and the use of present value techniques. Assesses strengths and weaknesses of analytical techniques. Emphasizes the process of defining the appropriate stakeholders affected by decisions, the sources and quality of data, and the rigor of conducting studies.

709 Research Design and Writing (3:3:0) Helps students revise a draft scholarly paper into form acceptable in refereed public policy journal. Focusses on how to find researchable question, identify appropriate methods, build bibliography, outline argument, and find supporting evidence.

710 Topics in Public Policy (1–3:3:0) Focuses on selected topics in public policy not covered by fixed-content public policy courses.

711 Modeling Policy in Dynamic Environments (3:3:0) Introduces basics of policy making and decision analysis, with major focus on hands-on development and use of systems dynamics-based models.

712 Policy Systems Analysis and Management Science (3:3:0) Introduces analytical models and analysis to support decisions. Primary emphasis on understanding techniques of operation research and management science, cost benefits, and cost effectiveness for public decision-making. Using mathematical details of algorithms to solve models not emphasized except as it contributes to understanding reliability and validity of methodologies. Through case studies and computer solutions, offers appreciation of when, where, and how to use models. Students demonstrate their understanding of techniques by applying them to term research project on government program.

713 Policy and Program Evaluation (3:3:0) Examines how programs of public agencies are proposed, established, operated, and evaluated. Covers role of research in program evaluation process, including alternative methodologies for policy assessment. Considers demand estimation, supply and pricing of publicly produced goods and services, and role of subsidies in nonmarket environments.

714 Topics in Transportation Policy, Operations and Logistics (1–3:3:0) Issues in transportation policy, operations, and logistics in United States and abroad. Includes practical applications of theories and analysis to policy problems, and emphasizes competence in improving policy in selected domains. May be taken up to three times and simultaneously for sections addressing different subject matter.

715 Introduction to Transportation Systems (3:3:0) Transportation is a service that contributes substantially to well-being of advanced economies. Resource requirements and byproducts of transportation also pose sobering environmental challenges for society. Course examines history and development of transportation systems; contribution to and impact on society; institutions and practices that govern planning, design, construction, operation, maintenance, and retirement from service; and policy and managerial challenges, and tools and techniques for addressing them.

716 Transportation Operations and Logistics (3:3:0) Provides survey of issues, methods, problems, and strategies.
Topics include origins of logistics, industry structure, pricing, underwriting, rate making, compliance, inventory effects, just-in-time inventory management (JIT), materials requirements planning (MRP), customer service and order processing, sales functions and operations, dispatch and fleet manager functions and operations, rate-setting among three parties, typical electronic and paper document flow, routing and scheduling, route selection, satellite load tracking through dispatch-customer web inquiry, role of ITS in route selection, toll system use, congestion, training activities, and logistics markets.

717 Analysis for Transportation Managers (3:3:0) Introduces basic methods of transportation analysis and evaluation relating them to policy framework. Covers descriptive statistics, hypothesis testing, contingency tables (Chi-Square analysis), regression, optimization, demand elasticities, and gravity model. Also covers sources of transportation data and research design. Teaches mathematical base and logic of each technique, but primary emphasis is applying methods to relevant policy and management problems. Students required to complete series of assignments along with research proposal focused on applying one or more methods to problem of their own interest.

718 Transportation Planning and Policy (3:3:0) Introduces highway, rail, air, and water transport planning in the United States. Teaches legislative, organizational, fiscal, and political environment within which planning for transportation facilities and services takes place. Introduce technical and analytical methods for transportation planning. Focus is largely on public sector, but also considers commercial transport planning and role of private sector in helping to design, manage, and finance transport systems.

719 Transportation Law (3:3:0) Examines legal environment of transport. Topics include basic legal concepts and institutions, history and evolution of price and service regulation, environmental law and regulation, labor relations, and property.


721 Transportation Economics (3:3:0) Provides basis for understanding economics of transport system, and how transportation relates to urban and regional development. Treats transport generically, but includes case studies of specific modes.

722 Practicum in Transportation Policy, Operations, and Logistics (3:3:0) In-depth field study of ongoing transportation policy, operations, or logistics situations; and design and delivery of actions to manage or resolve problems and opportunities. Range of application areas depends on interests of student body and opportunities faculty identify for "clients" or real-world projects. Illustrative domain areas include surface transportation (highways and transit), airports, and aviation.

723 Metropolitan Transportation Policy (3:3:0) Recent changes in federal legislation have led to renewed importance for transportation policy and planning. Considerations of clean air, economic development, and changing urban form have greatly increased importance of well-planned transportation facilities and policies. Course introduces basic methods of transportation policy analysis and evaluation. Topics include data collection, simplified demand estimation techniques, transportation choice modeling, transportation supply analysis, and ex-ante and ex-post evaluation methods.

724 Intelligent Transportation Systems and Technology (3:3:0) Overview of intelligent transportation systems (ITS), which include wide range of information technology applications to surface transportation. ITS categories include traffic management, traveler information, fleet control, commercial vehicle regulation, transit, rural, and vehicle-control systems. Key institutional and policy issues involve the appropriate federal role in ITS; state and local government collaboration; public-private partnerships; how privacy interests can be protected as ITS surveillance and enforcement technologies become increasingly sophisticated; and how driver information systems, including cell phones, can be used to optimal advantage without burdening drivers with information overload.

725 International Transportation Logistics (3:3:0) Focuses on making efficient match between new demands on transportation, and ways demands can be met. Topics embody multidisciplinary approach to international transportation logistics drawing on economics, law, information technology, and network analysis. Includes international supply-chain management, global performance indicators, international intermodal transportation, air-freight logistics, new technologies, and border-crossing issues.

726 Telecommunications Policy (3:3:0) Examines salient issues associated with telecommunications and electronic commerce in context of public policy questions facing decision makers-in government, education, and business. Examples include privacy, electronic signatures, digital divide, bandwidth auctions, IP telephony, CRM, Bluetooth, and Internet taxation.

727 Transportation Evaluation (3:3:0) Transportation impinges on many aspects of life: economic, social, and political. Provision and operation of transportation services involves a wide range of trade-offs. Course looks at range of evaluation techniques and concepts applied in making decisions over such matters as transportation investments, transportation operating strategies, and public policy as it affects transportation. Considers theory and concepts as well as more detailed assessments of standard evaluation methods used in United States and elsewhere. Case studies reviewed in depth.

728 Fleet Operations (3:3:0) Overview of most important factors affecting fleet operations today. Topics include goals for government fleet operations and privately owned fleets, proforma cost analysis, fleet operations including route and vehicle and operator selection, asset-based versus non-asset based fleets, fleet design and make-up based on multiple objectives, scheduled maintenance requirements and trade-offs, shared capacity issues, reverse logistics policies, costs, operations, environmental constraints on fleets, fuel logistics, fleet decision-making, competitive and market challenges, and opportunities in fleet management.

729 Transportation Asset Management (3:3:0) Introduces main elements that have attracted significant attention over the past decade. Several developments have challenged traditional framework for transportation service delivery, including changes in transportation environment; shift in public’s attitude toward provision of public goods; and
extraordinary advances in communication and computer technologies. Adoption of transportation asset management poses significant challenges on both organizational structure and existing knowledge base within transportation agencies. Course provides overview of these challenges, and introduces theoretical frameworks within which challenges may be analyzed.

730 National Policy Systems and Theory (3:3:0) Provides inquiry into policy-making environment, organized around U.S. federal system. Examines nation’s policy systems and key components: actors, institutions of governance, outside groups, and other influential interests. Special emphasis on dynamic character of policy making. In addition, different policy theories discussed in context of current political realities.

731 Macroeconomic Policy Assessment (3:3:0) Covers monetary theory, theories of consumption and saving, budget deficits, economic growth, international finance, and monetary and fiscal policy. Investigates national income and product accounts, savings, employment, and investment, and alternatives to Keynesian principles. Evaluates theories of inflation, investment, capital accumulation, and nonproportional growth.

732 Transport and the Environment (3:3:0) Multi-disciplinary course examines implications of transportation and how public policy has attempted to handle them, and how policy may move in future. Looks at all modes of transportation and at most environmental ramifications. In addition to two faculty members, several guest speakers provide wider perspectives on particular issues.

734 Administrative Law and Public Policy (3:3:0) Covers administrative discretion, rule-making and agency proceedings, public participation, political accountability, regulatory processes, oversight, formal adjudication and informal action, lobbying agency administrators, and political and legal nature of the administrative process.

735 Lobbying and Interest Representation (3:3:0) To work effectively within a democratic political environment, policy analyst must understand contemporary methods used to influence policy. Course focuses on roles and techniques of organized influence, and its impact on policy.

736 The Global Information Economy and the Digital Divide (3:3:0) Discusses institutional, social, and policy issues involved in development of global information economy and society. Economic development needs, public institutional capacity, nongovernmental networks examined critically; course deals with implications of universal access to Internet and equality of use in areas such as online delivery of government services, privacy, online voting, and e-government. Focuses on efforts to ameliorate digital divide sponsored by major multilateral agencies. Emphasizes development of public policies for democratic governance in a complex networked world.

737 Cases and Concepts in E-Government (3:3:0) Electronic government has become a significant public policy issue worldwide. It offers the prospect of dramatic improvements in delivering government services, but also portends major debate about government intrusion. Course covers emerging public policy issues associated with electronic government: job displacement in public sector, privacy, procurement and supply chain management, voter profiling, scope of government services, challenges to “digital democracy,” Internet-based voting, land management, the “digital divide,” and others.

738 Information, Technology, and Institutional Change (3:3:0) Examines role and character of information in institutions as foundation to understanding role of IT in economy, society, and politics. Considers theories of and practice of information in institutions, organizations and markets, and assesses effects of information technology changes on key economic, social and political institutions such as firms, markets, communities, nonprofit organizations, and government.

739 Media and Public Policy (3:3:0) Explores complex relationship between media and public policy. Examines how these forces collide in our modern media, how coverage decisions regarding public policy are made in newsrooms, how advocates use and rely on the media to advance message, and how different media reflect different strengths and vulnerabilities.

741 U.S. Financial Policy Processes and Procedures (3:3:0) Examines design and operation of expenditure and revenue systems at federal, state, and local levels of U.S. government. Stresses mobilizing and allocating resources through planning, adoption, and execution of budget. Includes theory and policy objectives of tax and spending regimes and review of financial controls, performance measurement, cash and debt management, and accounting and financial reporting systems.

742 Transportation Safety and Security (3:3:0) Examines transportation safety and security from multimodal perspective for both passenger and freight. Topics include historical context and policy framework, regulation, institutional issues, new security arrangements for preventing organized terrorist attacks, infrastructure design, vehicle design, operating protocols, and information systems.

743 National Security Management and Policy (3:3:0) Examines hierarchies in national security from the president to military establishment, including National Security Council, secretary of defense, joint chiefs of staff, commanders-in-chief of unified and specified commands, and intelligence agencies. Covers policies involving national defense, peacekeeping operations, embargoes and other sanctions, defense conversion, and military acquisition policy. Also covers significant legislation affecting national security, such as National Security Act of 1947 and Goldwater-Nichols Act of 1986.

744 Federal Institutions and Management (3:3:0) Covers management and policy in federal government, examining policy problems within context of national system of governance, including political environment, evolution and constitutional framework of American government, U.S. Congress, executive branch from White House to agencies, and role of interest groups and political parties. Special attention to implementing legislation, regulatory process, and intergovernmental relations.

745 Transportation and the Environment (3:3:0) Multi-disciplinary examination of implications of transportation and ways public policy has attempted to handle them, and how policy may move in the future. Explores all modes of transportation and most environmental ramifications.

746 Maritime Transportation Policy, Operations and Logistics (3:3:0) Examines how international maritime
transportation system has evolved, and discusses current challenges and options for future developments. Maritime shipping is an ancient enterprise that has dominated transport since long before industrialization led to the development of steam propulsion, railways, motor trucks, and airplanes. Topics include globalization, e-commerce, just-in-time manufacturing, quick response capabilities, integrated logistic systems, and relevance of maritime transportation in light of emerging technological advances.

747 Air Transportation Policy, Operations and Logistics (3:3:0) Reviews evolution of various forms of air transport such as airlines, general aviation, and military aviation; and includes basics of airline economics, especially as they intersect with airline operations and the management of hub and spoke networks; air traffic control technologies and operations and their intersection with airline economics; safety and security technologies and regulations; future of various elements of air transportation; and effects of deregulation on air travel.

748 Public Transportation Policy, Operations and Logistics (3:3:0) Provides general system description for components comprising typical publicly funded transit property. Topics include organizational structure, historical context, budget development including operating and capital budgets, personnel and labor relations, regulatory framework, operations management (bus and commuter rail), reporting structure, customer service, and contracted operations. Also discusses current topics of interest, such as security of transit systems and transit’s role in air quality.

749 Highway Transportation Policy, Operations and Logistics (3:3:0) Highways have played central role in development of U.S. transportation system. Interstate highway system has revolutionized both freight and passenger transport. Course examines history and development of highway system, institutions responsible for development and ongoing operation, environmental impacts and efforts to mitigate them, the emerging emphasis on operations and management of highway system, and role in freight logistics and supply chain management system.

750 History of Military Operations Other than War (3:3:0) Focuses on history of military activity in support of noncombat missions. Uses historical examples of early days of United States and colonial histories of Western and Eastern powers. Also touches on use of military force in support of multinational peace operations.

751 International Police Operations (3:3:0) Analyzes role of international police monitors and domestic police forces in international peace operations. Focuses on how using international police monitors and developing indigenous law-enforcement capabilities can improve prospects for success of international peace operations. Examines origins, mandates, planning, and deployment of international civilian police forces; problems of coordinating international police operations with international military forces and local security forces; international role in developing democratically oriented police forces; relationship of police to the entire judicial system; and the need to continue assistance to all parts of the judicial system beyond initial intervention.

752 Infrastructure Finance (3:3:0) Covers planning, budgeting, and financing of infrastructure, including air, water and surface transportation, public utilities, and other major public works. Focuses on private capital markets for projects funding as well as domestic and international loan and grant programs.

753 Ethics in Public Policy (3:3:0) Inquiry into ethical and moral issues in public policy. Explores issues that are controversial and often confusing to public policy makers such as health care, secrecy in government, surrogate motherhood, and disability. Perspectives are national as well as global, and deal with impact of culture and politics on ethical dilemmas confronting society. Also looks at processes by which specific ethical systems are incorporated into governing bodies. Larger issues, such as war and peace, just and unjust wars, capital punishment, medical and legal ethics, and communitarian vs. individual liberties are also included, with emphasis on how they affect public policy.

754 Geographic Information Systems and Spatial Analysis for Public Policy (3:3:0) Introduces GIS including analytical tools to manipulate and study spatial data. Run mainly as a laboratory, with extensive hands-on experience. Focuses on public policy applications.

755 National Security Decision-Making Policy (3:3:0) Applies behavioral, economic, strategic, and other decision theories to U.S. government and other actors in historical national security crisis cases and current policy issues. Explores tension in decisions between rational goal seeking by actors vs. organizational process, and aims to develop usable decision tools.

756 Geostategic Assessment Policy (3:3:0) Geopolitical assessment of global threats to international order and security. First half of course focuses on geopolitical theories; elements of military power; and global social, demographic and political trends. Second half analyzes regional, political, military, economic, and social trends.

757 Public Policy in Global Health and Medical Practice (3:3:0) Introduces international medical policy. Covers globalization of health and medical policies directed at removing disparities, financing, ethical considerations of biomedical research, and use of emerging technologies.

758 Global Threats and Medical Policies (3:3:0) Explores medical and health governance, biosecurity and biosafety, health and natural and human-made disasters, humanitarian and emergency assistance, vaccine development, behavior and health, critical infrastructures, bioethics and resource allocations in global context.

760 Science and Technology Policy in the 21st Century (3:3:0) Investigates roles dynamic scientific research and technological innovation play in contemporary society. Focuses on design and analysis of alternative public policies intended to influence rate and direction of technological change in societies, and use of scientific and technical knowledge in public policy making. Uses historical and international comparative approaches to assess politics and pragmatics of science and technology policy. Includes material from policy evaluation and analysis, organization theory, economics of innovation, and sociology of science and technology. Applications focus on areas of concern to “new economy” such as biotechnology, networked telecommunications and computing, and globalization of technology-based production.

761 Social Capital and Public Policy (3:3:0) Looks at the literature on social capital, including classic works such as
Courses

Toqueville’s Democracy in America that, in effect, made use of the concept long before sociologist James Coleman brought it into wider use in the 1980s. One objective is to address questions such as the following: Is the concept merely a passing intellectual fad, or is social capital a useful concept for understanding political and economic behavior? Are there measures of social capital? Can the concept be plugged into economic models? Can social capital be introduced to improve our ability to fashion or improve specific social policies for crime, education, family, or social welfare?

762 Social Institutions and Public Policy (3:3:0) Limited government involvement in social policies changed drastically during the 1960s, with an explosion of social programs designed to ameliorate poverty, reduce crime, and eliminate racial segregation. These new social policies affect many institutions, including family, schools and colleges, criminal justice system, and government agencies. Many of these policies have been controversial, with debates over efficacy and whether they have cured or exacerbated social problems. Course examines evolution and status of selected American social policies, including civil rights policies, education reform, family policy, crime prevention, and other topics chosen by students. Readings and discussions on policy issues linked to readings and discussions on social theories and value systems that underpin social policies.

768 Education and Public Policy (3:3:0) Explores current issues and policy initiatives in education policy at federal, state, and local levels, with emphasis on education reform. Issues and topics vary. Typical policy issues include raising academic standards, high-stakes testing, alternative governance including school choice and voucher policies, teacher quality and certification, role of school resources in academic outputs, and equity topics.

770 Topics in Regional and Urban Development Policy (3:3:0) Explores leadership and institutional development in regional economic development. First part involves presentations by faculty members on conceptual, theoretical, and methodological traditions regarding leadership and institutional development. Second part focuses on issue of leadership in context of regional economic development.

771/SYST 691/EEP 601 Introduction to Enterprise Engineering and Policy (3:3:0) Provides overview of extended enterprise integration. Lectures focus on SAP architecture and R/3 standard software solution. Laboratory requires students to complete end-to-end implementation project with Great Plains Software midrange ERP solution, Dynamics C/S +. For modeling, students must demonstrate complete proficiency in Architecture of Information Systems (ARIS) methodology and supporting ARIS Toolset.

772/SYST 692/EEP 602 Decision Support for Enterprise Integration (3:3:0) Prerequisite: SYST 542 and 691 or equivalent. Lectures focus on using business intelligence to enhance competitive advantage, developing information-driven set of controls to improve profitability, and creating balanced business with aligned corporate direction and strategic intent. Examines solutions provided in ERP systems.

773/SYST 693/EEP 603 Supply Chain Integration and Management (3:3:0) Prerequisite: SYST 691 or equivalent. Lectures focus on two issues: supply chain integration from information technology perspective, and supply chain management from decision support perspective. Course motivation is merging of enterprise computing with operations research, primarily through customer and supply chain management systems. Topics include ERP/Web integration, advanced planning, and customer relationship management.

774/SYST 694/EEP 604 E-Commerce Architectures (3:3:0) Prerequisite: SYST 691 or equivalent. Introduces network and system architectures that support high-volume business to consumer web sites and portals. Provides insight into structure of modern web enabled storefront. Critical business and technology issues include Storage Area Networks (SANs), server clustering, load balancing techniques at server and network level, fault tolerance, and recovery of database and application servers.

775/SYST 695/EEP 605 Economics of Electronic Commerce (3:3:0) Prerequisite: SYST 691 or equivalent. Focuses on gaining competitive advantage through electronic commerce implementation; identification and growing of new market opportunities and electronic enabling of existing business relationships; and business-to-consumer relationships and economics of strategic procurement, ERP hosting, customer relationship management, catalog hosting, portal operations, and supplier management.

776/SYST 696/EEP 606 Customer Relationship Management (3:3:0) Prerequisite: SYST 691 or equivalent. Focuses on front office integration with back office, and value creation process that results. Modern world of e-commerce extends intraenterprise integration as implemented in Enterprise Resource Planning (ERP) systems to include external constituents such as customers, partners, and suppliers. Course focuses on modern system support for demand chain.

777/SYST 697/EEP 607 Critical Information Technology Infrastructures (3:3:0) Prerequisite: SYST 694 or equivalent. Design and implementation of high-speed network and application services in support of modern Enterprise Resource Planning (ERP) systems. Critical technologies include high-speed data communication, switched vs. routed data flow, workflow engines, business rule and web application servers, and load balancing technologies. Large-scale, web-enabled ERP system architecture examined in detail.

780 Evolution of the Washington Metropolitan Economy (3:3:0) Includes historical context, role of federal spending, tourism, technology sector, international business, regional organizations, local government policies, and forecasts. Evaluates development patterns in Washington, D.C., Northern Virginia, and suburban Maryland.

781 Entrepreneurship and Economic Development (3:3:0) A knowledge spillover theory of entrepreneurship is employed to link between theories of entrepreneurship and theories of innovation and regional development. Other interconnections are explored at the regional level as firms forge networks, clusters, and specialized markets. The public policy issues of these constructs, including competition policy, industrial policy, and cluster policy, are examined within a regional and global context.

782 International Financial Policy (3:3:0) Addresses theory of international finance, application to financial policy such as exchange rate regimes, and institutions of international finance. Covers operations of International Monetary Fund and World Bank, development of European Monetary Union, and debate over “international financial architecture.”
783 Global Governance (3:3:0) Surveys important issues in global governance given changes in contemporary world. Explores dynamics and complexity of formal and informal actors, institutional arrangements, organizations, and roles in process of governance in international sphere. Considers states, governmental and nongovernmental organizations, international regimes, social movements, regional associations, and multinational corporations as actors bearing on transnational authority. Examines various vehicles for international coordination and conflict in terms of relevance and opportunities for global governance.

784 Entrepreneurship, Economics, and Public Policy (3:3:0) To demonstrate that global capitalism is a process driven by entrepreneurship, students study the Austrian school of economics, which views capitalism as a process of creative destruction, as well as other economists who emphasize entrepreneurship and change. The course reviews the history of capitalism, focusing on the so-called industrial revolutions in Britain, Germany, Japan, and the United States, and on particular historical and current entrepreneurs.

785 Urban Development Economics (3:3:0) Examines changing structure and functions of urban economy, and develops skills and knowledge for evaluating and remedying conditions inhibiting local economic development. Includes case studies of redevelopment strategies, programs, and outcomes for inner-city neighborhoods, central and suburban business districts, waterfronts, and surplus military bases.

791 Advanced Field Research for Policy: Theory and Method (4:3:0) Teaches how to analyze the framing of policy questions and examine culture and organization at group, organizational, interorganizational, and societal levels. Covers case study research, open-ended interviewing, participant-observation, social network analysis, and historical and archival research.

792 Advanced Economic Analysis for Policy Research (4:3:0) Prerequisite: PUBP 720 or equivalent. Builds analytical skills in economic analysis for policy research for students with competence in elementary calculus. Reviews mathematical techniques and covers consumer theory, demand estimation and forecasting, production theory, cost-benefit analysis, technological change and productivity analysis, growth theory, market structure and competition, game theory, capital budgeting, and public sector’s role in the economy.

793 Large-Scale Database Construction and Management for Policy Research (4:3:0) Explores data resources for macro-comparative policy research, and how to use these to inform decision making and evaluate policy performance. Emphasizes how social science data is generated, coded, and managed; and methods for successful presentation of evidence in support of policy recommendations.

794 Internship (1–6:0:0) Prerequisite: 12 PUBP credits, or permission of instructor. Open only to students in SPP degree program requiring internship. Contact appropriate program director one semester before enrollment. Work-study programs with specific employers. Credit determined by appropriate degree program.

795 Final Project (1–3:0:0) Writing of capstone paper related to student’s program concentration, under guidance of three-person committee.

796 Directed Readings and Research (1–3:3:0) Independent reading and research at master’s or doctoral level on specific topic related to public policy as agreed to by student and faculty member.

799 Master’s Thesis (1–6:0:0) Prerequisites: degree candidacy in public policy master’s program; completion of required credits of graduate course work; and approval of thesis proposal by faculty advisor, two committee members, and program director. Individualized section form required. Original research endeavor related to student’s program concentration. Research must result in document meeting public policy and university standards. Graded S/NC.

800 Culture and Policy (2:2:0 to 4:3:1) Comparative overview of institutions and culture, focusing on ways United States is exceptional when compared with other mature industrial societies. Presents culture and social structure as explanatory variables in accounting for these differences. Provides overview of analytical methods used in comparative public policy research, and background on political environment in which international trade and investment decisions are made.

801 Macro Policy (2:2:0 to 4:3:1) Demonstrates how macroeconomic, technological, demographic, and social forces affect supply and demand for governmental services. Counterpart analysis of the impact of shifts in patterns of international trade, demographic composition of population, and trends in social structure. Builds awareness of need to factor alternative assumptions about macro environment into policy planning; shows how macro events can affect social welfare and policy performance indicators; and suggests how national income accounting analysis and simple macroeconomic models can help pinpoint impending trouble spots for public policy.

802 The Logic of Policy Inquiry (1–4:3:0) Prerequisite: enrollment in doctoral program in public policy. Defines policy research problems, questions, and hypotheses. Explores modes of policy research, analysis, and rhetoric, including interdisciplinary research strategies. Uses information sources to emphasize written communication of policy research results. Also discusses professional practice issues.

804 Multivariate Statistical Analysis in Public Policy (4:3:0) Prerequisite: PUBP 704 or equivalent. Explores multivariate techniques of contingency table analysis, reliability and validity assessment, factor analysis and scaling, multivariate regression and path analysis, analysis of variance and covariance, and other selected multivariate techniques. Emphasizes applying these techniques to real policy data using sophisticated statistical packages.

805 Public Policy Systems and Theory (4:3:0) Prerequisite: PUBP 730 or equivalent. Theories of public policy making, emphasizing discipline’s historical, intellectual and international development. Focuses on policy systems’ political and social dimensions, including agenda-setting, policy design, rationality, incrementalism, systems theory, scientific methods, and public choice theory. Applies theories to comparative systems of governance.

806 Advanced Management Science for Public Organizations (4:3:0) Prerequisite: PUBP 712 or equivalent. Primary emphasis is to understand techniques of operations research and management science, cost benefits, and cost effectiveness for public policy decision-making. Some familiarity with
elementary calculus and linear algebra helps with understanding mathematical basis of algorithms used to solve models, and reliability and validity of these techniques. Case studies and computer solutions help students understand when and how to use OR models.

810 Regional Development and Transportation Policy (2:2:0 to 4:3:1) Introduces and critiques theory and methods used in regional and transportation policy analysis. Explores central place, growth pole, and economic base theories as well as other theoretical constructs used in regional policy analysis. Introduces and examines methodological tools such as regional econometric modeling, multiobjective programming, shift-share analysis, economic base analysis, location quotient analysis, and input-output analysis. Examines selected regional and transportation public issues using theoretical and methodological constructs introduced in first part of course.

811 Applied Methods in Regional Development and Transportation Policy (2:2:0 to 4:3:1) Prerequisite: PUBP 810. Students develop research papers that investigate aspect of regional and transportation policy, with goal of producing publishable papers. Students develop focus of paper based on work done in first semester, and are expected to prepare two-page proposal followed by detailed proposal and finally, completed paper. Each is critiqued in the seminar, which is organized to conform to process of review and critique. Instructor works with students individually as well as in seminar sessions.

817 Policy Research Topics: Transportation Policy (2:2:0 to 4:3:1) Research workshop examining development of policy research and relevant methodologies linked directly to faculty and student interests. Students identify cutting-edge policy concerns and execute research program. The 4-credit version of course requires discussion section and research laboratory.

820 Technology, Science, and Innovation: Institutions and Governance (2:2:0 to 4:3:1) First of two-semester core seminar sequence required for public policy PhD students in science and technology policy concentration. Explores how political and economic institutions and cultural values shape policy, organization, and benefits of technological innovation and scientific research. Special emphasis on interaction between national institutions, and values and processes of globalization.

821 Analytic Methods for Technology, Science, and Innovation Policy (2:2:0 to 4:3:1) Second of two-semester core seminar sequence required for public policy PhD students in science and technology policy concentration. Covers major methodological approaches to study of technology, science, innovation, and public policy. Focuses on analytical inputs to policy-making, and assesses practical consequences in such areas as security, energy, environment, and health.

830 Comparative Socioeconomic Policy (1–4:3:0) Throughout the past century, numerous socioeconomic theories have competed for primacy. This course compares, contrasts, and analyzes some of the leading socioeconomic theories and policies and places them in a global context. The role of these theories in shaping current public policy is explored.

833 Topics in Public Policy (1–4:3:0) Focuses on selected topics in public policy not covered in fixed-content public policy courses.

834 Entrepreneurship, Growth, and Public Policy (1–4:3:0) Focuses on a closer consonance among entrepreneurship, geography, and economic growth. Studies the creation and incubation of new knowledge and features three theoretical fields: the new growth theory; the new economic geography; and the new economics of innovation. Develops a knowledge spillover theory of entrepreneurship. Examines public policy issues arising from these constructs, including competition, within a regional and global context.

835 Entrepreneurship, Creativity, and Innovation (1–4:3:0) Provides multidisciplinary foundation for the study of entrepreneurship, creativity, and innovation, and their effects on regional and national economic growth. Draws from seminal thinkers and emphasizes creativity and innovation. Examines how organizational change, institutional structure, and geographic clustering drive the development of regional and national economies. Explores these issues through the lens of the three Ts of economic growth: technology, talent, and tolerance.

840 U.S. Policymaking Institutions (2:2:0 to 4:3:1) First of two-semester sequence in governance and public management policy concentration. Examines major institutions that formulate and implement policy at national level. Emphasizes presidency, Congress, and executive branch bureaucracies. Also considers agenda-building institutions such as media, interest groups, political parties, and elections.

841 U.S. Policy-Making Processes (2:2:0 to 4:3:1) Second of two-semester sequence in governance and public management policy concentration. Analyzes major U.S. public policy processes. Attention to major instruments for implementing policy, including regulation, grants, tax policy, and market-based mechanisms; and how different methodologies are appropriate for understanding aspects of policy inquiry. Covers ethical and accountability aspects of policy, including federalism, intergovernmental relations, and state and local governance.

850 Seminar in Public Policy (1:1:0) Weekly colloquium series, required of public policy PhD students. Features variety of speakers from universities, government, and nonprofit sectors. Topics include policy formulation and analysis, and theoretical and methodological foundation.

860 Social Theory, Culture, and Public Policy (2:2:0 to 4:3:1) Covers major social and cultural theories that underlie public policies. Selections from classical and contemporary social theorists relevant to studying social change, social capital, and social organization. Focuses on interplay among culture, social institutions, social processes, and policy.

861 Culture and Social Policy Analysis (2:2:0 to 4:3:1) Applies social and cultural theories to policy topics, including methodological approaches and empirical studies. Emphasizes linkage between theory and empirical research, and methods appropriate for social policy study. Policy topics may include poverty and inequality, family, education, crime and corruption, immigration, and health.

862 Institutional Analysis and Policy (4:3:0) Policy analysts are increasingly cognizant of the influence of societal institutions in shaping public policy, not only in terms of policy design, but also as a determinant of implementation. This course reviews the growing literature regarding institutional analysis; furthermore, it considers the ways in which institutions help shape the policies that emerge within a given society and the context by which they are evaluated.
870 Organizational and Policy Aspects of Informatics (1–4:3:0) Examines effects of informatics on national and international policy; setting international policy on informatics; ethical and social change in governments and organizations; shaping national policy in informatics; industry growth; and research methods from various scientific disciplines.

871 Organizational and Information Technology Challenges of the Knowledge Society (1–4:3:0) Prerequisite: PUBP 870. Explores links of policy, managing organizations, and information technologies in postmodern era. Includes issues related to contradictions among conventional models of organizational and process design, policy and regulatory structures, ideologies, and information technologies. Provides framework for becoming more sophisticated analyst of policy, organizations, and information technology.

872 Managing Knowledge-Based, Information-Intensive Organizations (4:3:0) Deals with challenges of planning, creating, integrating, and managing contemporary information-technology enabled public and private sector organizations, and managing relationships between public and private enterprises enabled by information technology initiatives.

880 Global and International Public Policy I (4:3:0) Explores multiple dimensions of globalization and internationalization relative to public policy processes and consequences. Offers substantive insight into contemporary public policy dynamics from global and comparative perspectives. Accordingly, it examines a broad range of international cultural, political, technological, and economic policy issues, and their interactions and implications at all levels of analysis. Engages relevant theoretical and methodological approaches and debates to provide tools for analyzing various world problems and policies.

881 International Trade Policy (4:3:0) Addresses international trade theory, trade policy analysis, regional economic integration, and institutional arrangements governing world trade. Covers World Trade Organization (including constituent agreements in goods, services, intellectual property and trade-related investment measures), regional trade agreements such as NAFTA, dispute settlement regimes, and relations between trade and the environment.

997 Field Statement (1:1:0) Requires work on field statement in preparation for field exam. Must register in semester during which field exam will be taken. Requires permission of field committee chair. May not be repeated. Does not apply to credit degree requirements.

998 Research/Proposal for Dissertation (1–9:0:0) Requires work on research proposal that forms basis for doctoral dissertation. May be repeated, but no more than 24 credits of PUBP 998 and 999 may be applied to doctoral degree requirements.

999 Dissertation (1–9:0:0) Requires research on approved dissertation topic under director on dissertation committee. May be repeated, but no more than 24 credits of PUBP 998 and 999 may be applied to doctoral degree requirements.

Reading Education (EDRD)

300 Literacy and Curriculum Integration (3:3:0) Note: This course is intended as an introduction to educational issues and is not applicable in Mason’s graduate-level teacher education programs. Introduces K–12 content area reading, writing, and language arts. Emphasizes integration of reading and other language arts across curriculum. Field experience required.

301 Facilitating Literacy in School or Community Settings (3:3:0) Corequisite: Requires 45 clock hours of school-based field experience during course. Provides knowledge, teaching strategies, and support for students working with developing readers and writers. Emphasizes implementation strategies that foster literacy development; incorporation of trade books and technology resources into individual and small group work; and reflection. School-based field experience required.

419 Literacy in the Content Areas (3:3:0) Prerequisites: EDCI 473 and EDCI 483. Corequisite: EDCI 490. Assists students in understanding the language and literacy process as it applies to teaching in middle and high schools. Focuses on instructional strategies to support literacy development, including adaptations for culturally diverse and exceptional learners.

500 In-Service Educational Development (1–6:1–6:0) Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

501 Literacy and Curriculum Integration, PK–12 (3:3:0) Introduces PK–12 content area reading, writing, and language arts. Emphasizes integration of reading and other language arts across curriculum; instructional planning; needs of diverse learners. Field experience in public schools required.

558 Literacy in the Content Areas, PK–12 (3:3:0) Focuses on research-based introduction to PK–12 content area reading, writing, and language arts that meet state and national guidelines. Enables teachers to understand literacy needs of their students in content areas, and provide appropriate instruction.

597 Special Topics in Education (1–6:1–6:0) Prerequisite: admission to program in Graduate School of Education. Provides advanced study on selected topic or emerging issue in American or international education. May be repeated for credit with GSE permission.

614 Teaching Reading in the Secondary School (3:3:0) Emphasizes reading and writing in content areas; reading and writing causes, classroom diagnosis, and remediation of reading problems; study skills; and rates of reading.

615 Reading/Writing for Multilingual Students (3:3:0) Prerequisite: EDCI 516 and 519, or permission of instructor or advisor. Develops instructional competencies in reading and writing approaches for students from culturally and linguistically diverse backgrounds. Examines teaching reading and writing across curriculum, biliteracy acquisition, historical and current approaches for second language learners, preliteracy skills for younger and older English language learners, and special issues in developmental and diagnostic reading for language minority students.

619 Literacy in Content Areas (3:3:0) Prerequisites: Methods I (EDCI 567, 569, 572, or 573) and Methods II (EDCI 667, 669, 672, or 673). Corequisite: EDCI 790 Internship. Offers understanding of language and literacy process as it applies to teaching in secondary schools. Emphasizes reading and writing in content areas, and instruc-
620 Reading/Writing in Foreign/World Languages (3:3:0)
Prerequisite: EDCI 516 and 519, or permission of instructor or advisor. Introduces reading and writing processes in foreign and second languages, research on reading comprehension, and effective teaching and assessment approaches for students in PK–12 schools. Topics include reading goals and standards for foreign language learning, sociocultural perspectives, multimedia computer-assistance, research on related strategies and skills, and performance-based assessments.

630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood (3:3:0)
Prerequisite: admission to the literacy emphasis, or permission of program coordinator. Advanced study of literacy theory, research, and practice as it relates to younger learners. Addresses sociocultural, cognitive, linguistic, psychological, and developmental influences on children’s literacy. Includes reading, writing, and oral communication.

631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood (3:3:0)
Prerequisites: EDRD 630 and admission to the literacy emphasis, or permission of program coordinator. Advanced study of literacy theory, research, and practice as it relates to adolescents and adults. Addresses sociocultural, cognitive, linguistic, psychological, and developmental influences on literacy. Includes reading, writing, and oral communication.

632 Literacy Assessments and Interventions for Groups (3:3:0)
Prerequisites: EDRD 630 and 631; admission to literacy emphasis, or permission of the program coordinator. Provides literacy assessments and interventions for groups of learners. Includes exploration of assessment tools for classrooms and large populations. Class members conduct related practica in their own classrooms or specified field settings.

633 Literacy Assessments and Interventions for Individuals (3:3:0)
Prerequisites: EDRD 630, 631, and 632; admission to literacy emphasis; or permission of program coordinator. Provides literacy assessments and interventions for individuals. Includes diagnosis and remediation for learners who find reading and writing difficult. Requires assigned practicum experience.

634 School-Based Leadership in Literacy (3:3:0)
Prerequisites: EDRD 630, 631, 632, and 633; admission to literacy emphasis or permission of program coordinator. Prepares reading specialist as a school leader. Expands knowledge of literacy gained in prerequisite courses, and applies it to professional development work with teachers at their own site.

635 School-Based Inquiry in Literacy (3:3:0)
Prerequisites: EDRD 630, 631, 632, 633, and 634; admission to literacy emphasis; or permission of program coordinator. Capstone course in literacy emphasis focusing on research-based inquiry related to literacy in school settings. Includes review of literature and teacher inquiry project.

636 Supervised Literacy Practicum I (1:1:0)
Prerequisites: EDRD 630, 631; corequisite: EDRD 632. Supervised literacy practicum that requires students to engage in 30 practicum hours and five seminar hours.

637 Supervised Literacy Practicum (2–3:2–3:0)
Prerequisites: EDRD 630, 631, 632; Corequisite: EDRD 633. Supervised literacy practicum that requires students to conduct assessments of and provide instruction to struggling readers.

658 Advanced Reading Methods and Language Acquisition, Elementary (3:3:0)
Prerequisite or corequisite: EDRD 558. Provides research-based introduction to literacy for children in grades K–6. Emphasizes oral language, reading process, literacy development, integration of reading across the curriculum, culture connections, and families and literacy.

797 Advanced Topics in Education (1–6:1–6:0)
Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with CEHD approval.

829 Advanced Foundations of Literacy Education (3:3:0)
Prerequisite: EDUC 800, EDRS 810, or permission of instructor. Examines foundational theory, research, and methodology related to literacy. Includes historical and theoretical foundations; research methodologies; and issues such as literacy acquisition, beginning reading, comprehension, struggling readers, and language diversity.

830 Foundations of Literacy: Birth through Later Childhood (3:3:0)
Prerequisites: EDUC 800 and EDRS 810. Explores theory, research, and practice related to emergent literacy and literacy development during childhood. Topics include literacy acquisition and development; historical trends in theories of literacy development; psychological and linguistic, sociocultural, and instructional influences on literacy development; vocabulary development; role of narrative and scripts on linguistic development; authentic tasks and assessment and early literacy; and development in academically diverse children.

831 Foundations of Literacy: Adolescence through Adulthood (3:3:0)
Prerequisites: EDUC 800 and EDRS 810. Explores theory, research, and practice related to adolescent and adult literacy. Topics include influences on adolescents’ and adults’ literacy practice and development, current and historical understanding of literacy, connections between literacy and learning in the content areas, and needs of diverse learners. Students review common core research literature and topics of individual interest.

832 Seminar in Emerging Trends and Issues in Literacy (3:3:0)
Prerequisites/corequisites: EDUC 800, EDRS 810, or permission of instructor. Explores emerging trends and issues related to literacy research methods, processes, practices, and policies. Students analyze literacy research and develop a research proposal on a topic of personal interest.

Religious Studies (RELI)

Religious Studies

100 The Human Religious Experience (3:3:0)
Examines main forms of religious expression as embodied in several important religious traditions in contemporary world. Investigates religious experience; myth and ritual; teachings and
scripture; ethical, social, and artistic aspects of religion; and nature and function of religion in human society.

211 Religions of the Near (Middle) East (3:3:0) Focuses on Judaism, Christianity, and Islam from historical, comparative, and cross-cultural perspectives. May also include modern developments of those faiths such as Mormonism and Baha’ism, as well as Zoroastrianism and religions of ancient Near Eastern cultures.

212 Religions of the Orient (3:3:0) Surveys religions of India, Hinduism, Jainism, Sikhism, Buddhism, and the religions of the Far East, China, and Japan, including Daoism, Confucianism, Shinto, from origins to present.

231 Religion in America (3:3:0) Religious heritage in American culture, growth of denominations and sects, and interrelationship of religion and sociopolitical life.

235 Religion and Literature (3:3:0) Explores the relationship between religion and literature in different times and cultures, the influence of religion on literary works, and how literature expresses major religious themes such as death and immortality, divine will and justice, suffering and human destiny, and religion and state.

272 Islamic Religious Life (3:3:0) Introduces basic religious beliefs and practices of Islam, with view to diverse manifestations of Islamic culture in different ethnic and social contexts. Provides overview of essential rituals of Islamic life, mystical practices of Sufis, certain popular forms of religious practice, sources and application of Islamic law, and distinctive Islamic artistic and literary forms.

317 The Daoist Tradition (3:3:0) Explores philosophical ideas, spiritual orientation, religious practice, and social and political values in Daoist tradition reading classic Daoist texts including Dao De Jing, Chuang-tzu, and other sources. Discusses Daoism in light of comparative and cross-cultural studies for global understanding of issues on concepts of nature, human nature, and good and evil.

337 Mysticism: East and West (3:3:0) Prerequisite: 3 credits in religious studies, or permission of instructor. Comparative treatment of major expressions of mysticism in East and West through exploration of various ways of understanding mystical experience. Readings and discussion emphasize one or more of the Eastern (Hinduism, Buddhism, Taoism, Zen) and Western (Judaism, Christianity, Islam) traditions.

341 Global Perspectives on Spirituality and Healing (3:3:0) Prerequisite: RELI 211, or permission of instructor. Cross-cultural investigation of human understandings of relationship between spirituality and health. Beliefs about spiritual causes of sickness and health and spiritual techniques of healing in variety of world cultures placed in context of religious beliefs of those cultures.

350 Religion and History of Ancient Israel (3:3:0) Prerequisite: RELI 211, or permission of instructor. Examines religion and history of ancient Israel from origins around 1250 BCE to Babylonian Exile in 587 BCE. Topics include debate on historical value of Biblical narratives, extra-Biblical texts mentioning Israel, move from polytheism to monotheism, archaeology and artifacts, and development of Israel’s unique religious and historical self-understanding.

351 Religions of the Ancient Near East (3:3:0) Examines religions of ancient Near East, ancient Egypt, Mesopotamia, Levant (Syria-Palestine), or Asia Minor. Selection of religion depends on instructor.

352 Judaism from Exile to Talmud (3:3:0) Prerequisite: RELI 211, or permission of instructor. Examines Jewish religion, history, and literature from the Babylonian Exile to third century C.E. Special attention to development of Hebrew Bible, Apocalyptic and Apocryphal literature, belief in resurrection and final judgment, Dead Sea Scrolls, Jewish sects, and emergence of Christianity and Rabbinic Judaism.

356 Jesus and the Gospels (3:3:0) Prerequisites: 3 credits in philosophy and religious studies, or permission of instructor. Examines Gospel accounts of Jesus in context of first century Christianity. Applies variety of historical and literary methods to gain understanding of Jesus and history and theology of early church.

370 Judaism: Life and Thought (3:3:0) Prerequisite: RELI 211 or 251, or permission of instructor. Studies Judaism from ancient times to present. Covers topics such as religious, historical, and literary origins of Judaism B.C.E., Rabbinic Judaism, Jews in Mediaeval Christian and Islamic societies, Kabbalistic (mystical) Judaism, Jews and the Enlightenment, persecutions of Jews culminating in Holocaust of 20th century, contemporary American Judaism, and relations among Jews, Christians, and Muslims.

371 Classic Jewish Texts (3:3:0) Jewish life and practice have always been centered on ongoing interpretation of classic texts, such as Tanakh (“Old Testament”), Talmud (Oral Law), Midrash (readings of the Bible) and the Kabbalah (mystical teachings) Course provides survey and introduction to major texts of Judaism.

372 American Judaism (3:3:0) Surveys Jewish religious life focusing on various types of American Judaism such as orthodox, conservative, reform, reconstructionist, as they have developed historically and continue to evolve. Emphasizes issues and challenges facing contemporary Judaism.
373 Varieties Of Jewish Expression (3:3:0) Investigates different ways Jews have addressed religious, historical, and existential situations, with special reference to literature, philosophy, historical and polemical writing. Also includes visual arts and new media. Course may cover one theme or problem in several different periods, or concentrate on one geographical/linguistic area or historical period. Topics may include Holocaust, Jews in Muslim Spain, Post-War American Judaism. May be taken more than once with permission of instructor.

374 Islamic Thought (3:3:0) Prerequisite: RELI 211, 3 credits in religious studies, or permission of instructor. Examines Islamic views on fundamental issues in religious thought, such as nature of God, nature of man, and relationship between God and man as reflected in both divine revelation and human religious vocation. Investigates intellectual approaches to these problems within Islamic tradition, including those of theological, philosophical, and mystical thinkers.

375 Qur'an and Hadith (3:3:0) Prerequisites: 3 credits in philosophy and religious studies, or permission of instructor. Explores two primary sources of Islamic belief and practice: Qur’an and Hadith. Discusses thematic structure and literary quality, and examines theological and moral issues. Also introduces various methods of interpretation and critical analysis applied to texts in both Islamic and Western scholarship. Lecture and discussion.

376, 377 Special Topics in Religious Thought (3:3:0), (3:3:0) Prerequisite: 3 credits in philosophy or religious studies, or permission of instructor. Selected topics from a philosophical perspective.

381 beginnings of Christianity (3:3:0) Examines early Christian church from time of Jesus to 700 C.E. Covers internal development of Christianity as it formed official doctrines and institutions, and external relations of Christians with followers of other religions in Roman Empire. Special attention to reasons for success of Christianity in Roman world.

401 Death and the Afterlife in World Religions (3:3:0) Prerequisites: 60 credits including 6 credits in religious studies or permission of instructor. Examination of the rituals, practices and beliefs regarding death and the afterlife in world religions past and present. Emphasis placed on cross-cultural and comparative aspects.

402 Religious Fundamentalism and Violence (3:3:0) Prerequisite: 60 credits including 6 credits in religious studies, or permission of instructor. Studies origins and development of fundamentalism and violence in global religions, with special emphasis on contemporary manifestations and potential for resolution.

403 Scripture and Authority in World Religions (3:3:0) Prerequisites: 60 credits including 6 credits in religious studies, or permission of instructor. Examines origins, development, and role of Scripture (religious texts) in world religions, concentrating on issues of divine inspiration, authority, authenticity, and canon.

405 Religion, Values, and Globalization (3:3:0) Prerequisite: 60 credits including 6 credits of religious studies, or permission of instructor. Explores diverse value systems, ethical norms, and teaching found in different religious traditions and cultures. Examines assumption that globalization is attempt to universalize Western culture.

407 Women in the World’s Religions (3:3:0) Prerequisites: 60 credits, 6 credits of philosophy or religious studies. Seminar course offering theoretical and comparative study of role of women in six of the major religious traditions of the world—Judaism, Christianity, Islam, Hinduism, Buddhism, and Chinese religions.

408 Ritual and Drama in Global Religions (3:3:0) Prerequisites: 60 credits including 6 credits in religious studies, or permission of instructor. Explores religious rituals and drama in selected world religions. Emphasizes ritual and drama spanning divine and human realms, actualizing myth, presenting beliefs and shaping lives of believers. May consider religious themes in modern drama.

420, 421, 422, 423 Seminar (3:3:0) Limited to students in the religious studies track of philosophy major, but others may be admitted if topic is sufficiently close to field of study. Topics vary.

425, 426 Independent Study (3:3:0), (3:3:0) Limited to students in religious studies track with 60 credits and 15 credits of religious studies, and permission of department.

490 Comparative Study of Religions (3:3:0) Prerequisite: 9 credits in religious studies including RELI 211 and 212, or permission of instructor. Cross-cultural examination of comparative aspects of religious phenomena. Examines significance of religious phenomena from diverse religious and cultural perspectives, and investigates patterns of religious phenomena that have appeared in world cultures and civilizations. Can be repeated for credit when specific topics are different.

591 Special Topics in Religious Studies (3:3:0) Special topics in religious studies of central interest in that field: historical, current, interdisciplinary, and cross-cultural. Topics selected by importance in field of religious studies, and pertinence to role of religion in social, political, and ethical concerns.

630 Approaches to the Study of Religion (3:3:0) Prerequisites: graduate standing, or permission of instructor. Examines study of religion as academic discipline. Evaluates various intellectual approaches and methods used in study of religious phenomena.

631 Sacred as Secular in Modern Spirituality (3:3:0) Prerequisite: graduate standing, or permission of instructor. Investigates nature of sacred and categories of sacred and secular in human experience. Both duality and interconnectedness of sacred and secular explored to facilitate fresh understanding of essential unity of human religiosity and spirituality.

632 World Religions in Conflict and Dialogue (3:3:0) Prerequisite: graduate standing or permission of instructor. Explores reasons for instances of global religious conflicts and examines ways of engaging in interreligious dialogue. Investigates religious pluralism as an effective means for dialogue.

633 Ethical Perspectives of World Religions (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines how perceptions of ultimate reality shape ethical values and behaviors of various religious traditions. Addresses problems in interpretation of authoritative foun-
dalional teachings in contemporary contexts. Special attention to non-Western religions.

634 Christianity and the Cultures of Rome (3:3:0) Prerequisite: graduate standing, or permission of instructor. Investigates rise of Christianity from small Jewish sect to official state religion of Roman Empire. Considers internal development, and relations with other religions and cultures in Roman world.

635 World Religions in Transition and Transformation (3:3:0) Explores transitions and transformations in selected world religions as they respond to and influence forces of cultural change, social values, and the crises of history. Fresh or modified constructions of the sacred and their relationship to world and humans will be examined. May be repeated for up to 6 credits.

636 Religion and the Natural Environment (3:3:0) Explores contemporary religious thought on the morality and ethics of environmental responsibility. Begins with an exploration of this issue in Western Christian thought and examines religious approaches to the environment in the traditional and contemporary thought of other major world religions, including Judaism, Islam, Hinduism, Buddhism, and the Chinese traditions.

641 Drama in the World’s Religions (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines how drama is used in religions of world, past and present, to enact myths, convey concepts, and involve worshippers. Studies ritual dramas, mystery, morality, passion plays, plays that explore profoundly religious themes.

642 Sacred Language, Scripture, and Culture (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores how sacred languages and scriptures develop in major global religious traditions: study of grammar, syntax, and morphology of sacred languages; issues of inspiration, authority and canon. Also examines cultural dimensions of sacred language. May be repeated once when languages are different.

Russian (RUSS)
Modern and Classical Languages

Placement: See Academic Testing section of Admission chapter.

101 Elementary Russian I (3:3:1) For students with no knowledge of Russian. Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

102 Elementary Russian II (3:3:1) Prerequisite: RUSS 101 or permission of department. Continuation of RUSS 101. Lab work required.

110 Elementary Russian (6:6:1) Introduces elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Students may not receive credit for RUSS 110 if they have received credit for RUSS 101, 102, or 109. Lab work required.

109 Intensive Elementary Russian (6:6:2) Equivalent to RUSS 101 and 102 taught in single semester. Recommended for students who desire intensive introduction. May not be taken for credit in combination with RUSS 101 and 102. Lab work required.

199 Russian Language and Culture for Students and Professionals (3:0:0) Designed for English-speaking specialists in humanities, sciences, and business studies in Russia. Covers range of topics, including elementary Russian phonetics and grammar, basic conversation, and Russian etiquette. Course theme is language needs of foreigners who happen to be traveling and conducting business activities in Russia. Acquaints students and professionals with cultural framework that forms indispensable backdrop to daily activities in Russia. Students become increasingly confident and effective in their ability to engage Russians from all walks of life in daily informal and professional conversation in the Russian language.

201 Intermediate Russian I (3:3:1) Prerequisite: RUSS 102, 109, appropriate placement score, or permission of department. Further development of skills in listening, speaking, reading, and writing. RUSS 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate Russian II (3:3:1) Prerequisite: RUSS 201, appropriate placement score, or permission of department. Application of language skills to reading, composition, and discussion. Lab work required.

209 Intensive Intermediate Russian (6:6:2) Prerequisite: RUSS 102, 109, appropriate placement score, or permission of department. Equivalent to RUSS 201 and 202 taught in a single semester. May not be taken for credit in combination with RUSS 201 or 202. Lab work required.

210 Intermediate Russian (3:3:1) Prerequisite: RUSS 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Russian-speaking regions. Lab work required.

250 Gateway to Advanced Russian (3:3:0) Prerequisites: RUSS 210, appropriate placement score, or permission of department. Integration of advanced intermediate-level Russian grammar, reading, writing, listening and speaking skills with the development of research skills and critical thinking about authentic texts from contemporary media. Taught in Russian.

302 Russian Conversation and Composition (3:3:0) Prerequisite: RUSS 202, or permission of instructor. Development of students’ ability to express themselves orally on topics of current interest and everyday situations; composition provides practice in more difficult forms of expression.

303 Russian Advanced Conversation (3:3:0) Prerequisite: RUSS 202 or equivalent. Development of oral proficiency, including current colloquial expressions.

310 Readings in Russian Literature (3:3:0) Prerequisite: RUSS 202, or permission of instructor. Readings of Russian literary works in original language with lectures, discussions, and exam in Russian.

311 Contemporary Russian Short Fiction (3:3:0) Prerequisite: RUSS 202 or equivalent. Reading and discussion of recent short stories by best-known Russian writers of today. Readings in original language, with lectures and discussion in Russian.

325 Major Russian Writers (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Study of works of major Russian writers in translation. Course work in English. Writers to be studied vary. May be taken toward
fulfilling general requirement in literature for baccalaureate degrees. May be repeated once for credit when course content is different.

326, 327 A Survey of Russian Literature (3:3:0), (3:3:0) Prerequisite: 60 credits, or permission of instructor. RUSS 326 surveys Russian literature from its beginning to 1880. RUSS 327 surveys Russian literature of late 19th and 20th centuries. Course work in English. May be taken toward fulfilling general requirement in literature for baccalaureate degrees.

353 Russian Civilization (3:3:0) Prerequisite: 60 credits, and completion or concurrent enrollment in all other required general education courses. Civilization and culture of Russia and former Soviet Union. Includes films, slides and music in addition to readings and lectures. Course work in English.

354 Contemporary Post-Soviet Life (3:3:0) Prerequisite: 60 credits, or permission of instructor. For non-Western majors. Reading, translation, and discussion of Russian materials in fields of history, politics, geography, and sociology.

401 Readings in the Social Sciences (3:3:0) Prerequisite: 15 credits of Russian or equivalent. Reading, translation, and discussion of Russian materials in fields of history, politics, geography, and sociology.

407 Russian Drama and Theater (3:3:0) Prerequisite: 60 credits, or permission of instructor. Development of Russian theater including directing techniques in Moscow Art Theater. Reading and discussion of major Russian plays of 19th and 20th centuries. Course work in English; knowledge of Russian not required.

410 Russian Poetry (3:3:0) Prerequisite: 15 credits of Russian or equivalent. Historical development of Russian poetry and representative works of major poets. Reading in Russian; course work in English and Russian.

470 Topics in (Post) Soviet Film (3:3:0) Prerequisite: 60 credits, or permission of instructor. Russian, Soviet, and post-Soviet films selected by type, period, or director with emphasis varying from year to year. Required viewings, student discussion, and written critiques. May be repeated once with permission of department or film studies advisor.

480, 481 Fourth-Year Russian (3:3:0) Prerequisite: RUSS 380, 381, or equivalent; or permission of instructor. Advanced work in major grammatical and lexical topics of Russian. Application of theoretical principles in guided written and oral exercises.

490, 491 Independent Study (1–3:0:0), (1–3:0:0) Prerequisites: Russian studies major with 90 credits and permission of instructor. Research and analysis of selected problem in language, literature, or culture in consultation with member of Russian studies faculty.

499 Seminar on Russian Literary and Critical Bibliography (3:3:0) Prerequisites: Russian studies major with 90 credits and permission of instructor. Comprehensive bibliographic survey of major primary and secondary works of Russian literature and criticism.

School of Management (SOM)

100 Business in American Society (3:3:0) Provides students with a foundation for understanding the role of business in society by exploring the nature and history of business enterprise, the social context of business, and the interaction of individuals with business by selecting current events in business and analyzing the content as well as the impact of the reported activities.

301 Business Models: A Learning by Writing Introduction (3:3:0) Prerequisites or corequisites: C or better in OM 210, and ACCT 203. Introduces fundamentals of business models, and writing as learning tool. Interrelationships among accounting, finance, information systems, marketing, and operations are subject of several “learning by writing” deliverables. Fulfills writing intensive requirement for SOM majors. Taught in lecture/recitation format; requires attendance at weekly lecture and weekly recitation.

492 Undergraduate Internship (3:3:0) Opportunity to gain practical, professional experience in conjunction with academic development. Internship is an important part of academic and career preparation. May be used as elective credit, but may not be repeated.

498 Capstone Course: Advanced Business Models (3:3:0) Prerequisites: ACCT 301, BULE 302, OM 301, FNAN 301, MGMT 301, MIS 301, and MKTG 301; and senior standing. Advanced integrated exploration of business models and industry dynamics that uses case analyses to assess competition, organizational strategy, and firm performance. Students examine strategic change in organizations from multiple perspectives, integrating knowledge from core course work into several papers and major presentation. Students receive coaching from area business leaders as they complete their presentations. Fulfills synthesis requirement for SOM majors.

Social Work (SOCW)

Social Work

110 Global Perspectives on Human Rights (3:3:0) Open to social work and nonsocial work majors; does not count toward the social work degree requirements. Explore awareness about human rights issues around the world. Students will become familiar with current debates about human rights, especially whether rights should be culturally determined. The role of the United Nations, governmental, and nongovernmental organizations including social service organizations will be presented. Emerging issues including the rights of children; the rights to food, shelter and health care; and racial and economic equality will be emphasized.

200 Introduction to Social Work (3:3:0) Introduces historical roots of social work profession and social welfare. Person-in-environment perspective discussed as framework for social work knowledge, values, and skills. Initial course in social work curriculum introduces social work profession, professional values, ethics, fields of practice, and settings in which social workers are employed. Highlights profession’s commitment to diverse and at-risk populations and social
and economic justice. Presentations by social work professionals in different fields of practice supplement classroom lecture, discussion, and small-group exercises.

301 Laboratory in Interpersonal Communication (4:4:0) 
Prerequisites: SOCI 101, PSYC 100, and sophomore standing; or permission of instructor. Emphasizes experiential learning of biological, psychological, social, and cultural influences on behavior of those who need and those who give help. Students examine their own behavioral and learning patterns, values, ethics, and attitudes to increase ability to understand and help clients. Service learning of at least 60 hours required.

323 Human Behavior in the Social Environment I (3:3:0) 
Prerequisites: SOCI 101, BIOL 103, and PSYC 100; or permission of instructor; completion or concurrent enrollment in all other required general education courses work. Social systems approach unifying and integrating concepts and knowledge from biology, anthropology, sociology, and psychology about human behavior. Applications to professional practice, from social work literature to field experience.

324 Human Behavior in the Social Environment II (3:3:0) 
Prerequisite: SOCW 323 with a minimum grade of C, or permission of instructor. Examines social systems theories as they pertain to study of macro systems. Focus of study involves families, social group, formal organization, and community. Student apply theoretical concepts to contemporary social problems.

351 Social Policy and Social Justice I (3:3:0) 
Prerequisites: SOCI 101 and GOVT 103; or permission of instructor. Introduces social welfare policy, including historical development, central concepts, institutional nature, and origins of social work as profession. Analyzes service delivery systems and role of social work profession in bringing about social and economic change.

352 Social Policy and Social Justice II (3:3:0) 
Prerequisite: SOCW 351 with minimum grade of C, or permission of instructor. Analyzes various social welfare policies and their development; examines how policies have emerged in response to social problems arising out of changing social, political, economic, and cultural influences.

357 Methods of Social Work Intervention I (3:3:0) Open to majors only. Prerequisites: SOCI 101, 200 (or corequisite), and PSYC 100; or permission of instructor. Social work practice from systems perspective. Particular emphasis on problem-solving activities with Microsystems. Analyzes common core of knowledge, values, and skills essential to social work practice to gain insight into social work functions and role of social worker as change agent.

358 Methods of Social Work Intervention II (3:3:0) Open to majors only. Prerequisite: 60 credits, or permission of instructor. Continues generic problem-solving model, focusing on group and macro intervention systems, settings, and skills. Emphasizes working with both treatment and task groups. Group processes, such as goal formulation, contract setting, composition, and termination necessary for effective worker intervention, are part of knowledge base. Field service of 40 hours required.

359 Junior Seminar (1:1:0) Prerequisite: SOCW 301; corequisite: must be taken simultaneously with SOCW 358. Provides opportunity to integrate theory, research, and practice in area of group work. Time is allotted to process successes and obstacles, and to share issues, knowledge, and skills learned in service learning site. Forty hours of service learning are required.

400 Legal and Ethical Issues in Human Services (3:3:0) 
Prerequisite: 45 credits, or permission of instructor. Overview of ethical and legal issues related to human services professions. Topics include responsibility, competence, duty to warn, confidentiality, professional relationships, and research. Emphasizes models of ethical decision making and critical thinking.

410 Alcohol and Substance Abuse: Policies and Programs (3:3:0) 
Prerequisite: 45 credits, or permission of instructor. Primary issues related to alcoholism and drug abuse including key concepts, theories, policies, and research regarding use and abuse of alcohol and other drugs. Emphasizes impact of policies and programs on well-being of ethnic minority and disadvantaged service populations.

415 Child and Family Welfare (3:3:0) 
Prerequisite: 45 credits, or permission of instructor. Emphasizes viewing human development and child and family welfare services critically, holistically, and contextually. Integrates ecological systems, human rights, and empowerment perspectives for understanding delivery systems and persons in relation to their environment across levels from individual to global. Provides overview of existing child welfare system with focus on current issues, challenges, and at-risk populations.

417 Integrative Methods in Social Action and Social Change (3:3:0) For social work majors only. Prerequisites: SOCW 301, 357, 358, 359, 452, 453. Uses generalist social work practice concepts with large systems and provides students with a hands-on opportunity to apply concepts and principles of intervention with large systems. Students will work with organizations and communities on a local, national, or global level to promote social action and social change. The course will also focus on evaluating interventions addressing the social justice needs of diverse, at-risk and oppressed populations.

423 Social Work with Children and Adolescents (3:3:0) 
Prerequisites: 45 credits, or permission of instructor. Major needs of children and adolescents, and implications for social work practice. Problems of family and peer group relationships, occupational choice, sexual and scholastic adjustment, and special problems of racial and cultural alienation, alcohol and drug abuse, and delinquency. Reviews various theoretical orientations and evidence from research. Analyzes both individual and group approaches to counseling and treatment.

425 Planning and Organizing for Community Change (3:3:0) 
Prerequisite: 45 credits, or permission of instructor. Designed for senior social work students with interest in pursuing community organization as professional career specialty. Provides basic understanding of community organization and planning, with special emphasis on conducting needs assessment in community. Students examine environmental context in which administrative and community practice occurs. Explores role of social workers as planners and agents of social change.

430 Social Work and the Law (3:3:0) 
Prerequisite: 45 credits, or permission of instructor. Introduces social worker’s role in legal system, and familiarizes students with
Courses

legal processes and application to issues of interest to social workers and clients, including child abuse, foster care, reproductive rights, juvenile justice, and legal rights of the poor, women, and minorities.

435 An Intergenerational Approach to Aging (3:3:0)
Prerequisites: 45 credits, or permission of instructor. Surveys issues related to working with aged, their families, and care providers. Studies biological, psychological, and sociocultural aspects of aging, and unique problems with service delivery to aged persons. Examines forces that impinge on aged person, and explores critical issues related to extended life span, family changes, institutionalization, and role of aged persons in society. Students increase their sensitivity and knowledge of aged individuals through intergenerational lens.

452 Senior Seminar I (2 credits)
Open only to social work majors. Prerequisites: SOCW 200, 301, 323, 324, 351, 352, 357, 358, and 359 with grade of C or better and recommendation of faculty. Concurrent with Senior Practicum I (SOCW 453), provides integrative team experience to support field experience and provide opportunities to demonstrate required competencies through special assignments.

453 Senior Practicum I (3 credits)
Open only to social work majors. Prerequisites: SOCW 200, 301, 323, 324, 351, 352, 357, 358, and 359 with grade of C or better and recommendation of faculty. Supervised learning experience (practicum) under guidance of qualified faculty liaisons and professional staff designated and approved by director of field education. Designed to facilitate practice with individuals, families, groups, and communities. Students spend two full days weekly in practicum sites. Requires concurrent seminar (SOCW 452) participation and faculty-agency visits.

454 Senior Seminar II (2 credits)
Prerequisites: SOCW 452, 453, 471. Concurrent with Senior Practicum II (SOCW 456), continuation of integrative team experience designed to support practicum experience and provide opportunities to demonstrate required competencies through special assignments.

456 Senior Practicum II (3 credits)
Prerequisites: SOCW 452, 453, 471. Continuation of supervised learning experience (practicum) begun in SOCW 453. Students spend two full days weekly in practicum sites supervised by faculty liaisons and qualified professional staff designated and approved by director of field education. Requires concurrent seminar participation (SOCW 454) and faculty-agency visits.

471 Research in Social Work (3:3:0)
Prerequisites: SOCI 313 or PSYC 300; 6 credits of social work courses; senior standing; or permission of instructor. Must be completed with minimum grade of C. Principles and theory underlying scientific inquiry. Emphasizes use of research in social work practice, steps in conducting research, and research efforts in developing and evaluating social work knowledge and skills.

475 Selected Topics in Social Work Policy (3:3:0)
Prerequisite: 45 credits, or permission of instructor. In-depth study of special areas of social work of interest to students, faculty, and social work community. Topics vary.

483 Selected Approaches to Social Work Intervention (3:3:0)
Prerequisite: 45 credits, or permission of instructor. Opportunity to examine personal use of different approaches to social work intervention currently employed in practice settings. Students use technical skills with clients that these approaches require. May be taken more than once for credit. Topics vary.

499 Independent Study in Social Work (1–3:0:0)
Prerequisites: 60 credits and research proposal approved by instructor before enrollment. Investigates research problem in field of social work.

598 Special Topics in Social Work (1–6:1–6:0)
Prerequisite: upper-level undergraduate or graduate standing.

623 Human Behavior and Social Systems I (3:3:0)
Prerequisite: graduate standing. Ecological approach to behavior of individuals, families, groups, organizations, and communities. Integrates and applies theories from psychology, sociology, biology, and anthropology to study of infants, children, and adolescents. Emphasizes human diversity.

624 Human Behavior and Social Systems II (3:3:0)
Prerequisite: SOCW 623. Continues study of human behavior and diversity by exploring application of development theory and ecological principles to those in young adulthood, middle adulthood, and older adulthood.

630 Forensic Social Work Practice (4:4:0)
Prerequisites: SOCW 624, 652, 658, and 673. Explores the social work role in legal processes relating to such issues as family violence, child custody, behavioral health, disabilities, aging, and juvenile/criminal justice. Apply skills in forensic interviewing, risk assessment, expert testimony, mitigation, mediation, treatment, victim advocacy, and multidisciplinary collaboration.

640 Advanced Clinical Practice (4:4:0)
Prerequisites: SOCW 624, 652, 658, and 673. Prepares students at the advanced level to apply diagnostic, assessment, prevention, treatment and intervention skills with individuals, families and groups in clinical mental health and health settings. Trains students in Differential Diagnosis and Assessment using the Revised Diagnostic and Statistical Manual (DSM IV-TR). Currently accepted treatment interventions within the context of contemporary social work theory are also presented.

645 Community-Centered Clinical Practice (4:4:0)
Prerequisites: SOCW 624, 652, 658, and 673. Students use an ecosystems framework for assessment, risk-reduction, prevention, and intervention with communities in a local, national, or international context. Possible areas of exploration include violence prevention and intervention, suicide prevention and intervention, emergency response efforts, and behavioral health or wellness interventions at the community level.

651 Social Policies, Programs, and Services (3:3:0)
Prerequisite: graduate standing. History of American social welfare policy and social work profession. Explores political, economic, social, cultural, and ideological influences on policy-making with emphasis on consequences for populations at risk. Introduces historical policy analysis.

652 Influencing Social Policy (3:3:0)
Prerequisite: SOCW 651. Introduces students to the knowledge, skills, and values needed to influence policy outcomes. Explores the role of social workers in electoral politics and policy advocacy. Students gain skills in legislative research, coalition building, testifying, constituent organizing, and lobbying, while
developing strategies for promoting social justice through policy change.

657 Direct Social Work Practice I (3:3:0) Prerequisites: graduate standing and open only to students enrolled in MSW degree program. Corequisite: SOCW 672. Introduces role of social workers as change agents and the core knowledge, values, and skills that guide social work practice with individuals, families, small groups, organizations, and communities.

658 Direct Social Work Practice II (3:3:0) Prerequisites: SOCW 657 and graduate standing. Open only to students enrolled in MSW degree program. Corequisite: SOCW 673. Continuation of social work theory and practice with individuals, families, groups, organizations, and communities. Emphasizes intervention, evaluation, follow-up and termination, with attention to incorporating social work knowledge, values, and skills.

670 Communication and Technology for Social Work Practice (3:3:0) Prerequisite: graduate standing. Studies various forms of written communication pertinent to social work practice. Examines impact of audience, status, culture, and purpose on effective professional writing.

671 Research Methods for Social Workers (3:3:0) Prerequisite: SOCW 624 and 652. Examines role of scientific inquiry in social work. Emphasizes construction and use of measurement instruments, data collection, analysis, and interpretation, and application of computer technologies relevant to social work practice.

672 Foundation Field Practicum and Seminar I (3:0:0) Corequisite: SOCW 657. Supervised social work learning experience in human service agencies. Students complete 20 hours per week in field practicum, and attend monthly seminar in which they share learning and integrate theory with practice.

673 Foundation Field Practicum and Seminar II (3:0:0) Prerequisite: SOCW 672. Corequisite: SOCW 658. Continuation of supervised social work learning experience begun in SOCW 672. Students spend 20 hours per week in field practicum, and attend monthly seminar in which they share learning, process experiences, and integrate theory with practice.

675 Selected Topics in Clinical Practice (3:3:0) Prerequisites: 30 credits or permission of instructor. In-depth study of special topics related to clinical social work practice at the individual, family, small group, or community level.

676 Selected Topics in Social Work and Social Change (3:3:0) Prerequisite: 30 credits or permission of instructor. Critical examination of special topics related to understanding and improving community and societal conditions through policy practice, program development, and social action.

680 Clinical Field Practicum (6:0:0) Prerequisites: SOCW 673, 630, 640, 643, and 688. Supervised social work learning experience four days per week. Students placed in public, nonprofit or for-profit mental health and health venues reflecting specific interests in advanced clinical practice with individuals, families and groups, community-centered clinical practice or forensic social work.

681 Clinical Field Seminar (3:0:0) Corequisite: SOCW 680. Assists students in critically analyzing their field experiences in the application of mental health assessment and interventions, working with individuals, families, groups, and communities. Students are expected to apply social work knowledge, values, and skills from their advanced clinical course work.

684 Social Work and the Law (4:3:0) Prerequisites: SOCW 624, 652, 658, and 673. Students engage in close analysis of judicial opinions to explore the role of the courts in creating public policy. Areas of inquiry include the role of social workers in the legal system, the nature of legal proceedings, and how the law shapes policy in relation to issues affecting children, youth, families, older adults, women, minorities, people in poverty, and other vulnerable populations.

685 Organizational Leadership for Social Workers (4:3:0) Prerequisite: SOCW 624, 652, 658, and 673. Examines functions and structure of human service organizations in context of service delivery. Development of theoretical knowledge, professional ethics, and skills in administration, leadership, management, organization, and supervision.

687 Empowering Communities for Change (4:3:0) Prerequisite: SOCW 624, 652, 658, and 673. Explores social work interventions at community level, including organizing, planning, and development. Strategies for mobilizing community members, using community organizations, formulating coalitions, engaging in participatory planning, and social and economic development.

688 Advanced Research in Social Work (3:3:1) Prerequisites: SOCW 624, 652, 658, 671, and 673. Explores social work intervention research, needs assessment, formative and summative program evaluation, and cost analyses. Discusses applications of systematic inquiry at the practice, organizational, and policy levels. Addresses ethical, pragmatic, and political considerations; qualitative approaches; quality performance; evidence from empirical research; and evaluation design.

690 Social Change Field Practicum (6:0:0) Prerequisites: SOCW 673, 684, 685, 687, and 688. Supervised social work learning experience four days per week. Students placed in public, nonprofit, or for-profit venues reflecting specific interests in agency supervision, organizational management, community change, electoral policies, or social policy.

691 Social Change Field Seminar (3:0:0) Corequisite: SOCW 690. Processing of field practicum experiences; analysis of successes and challenges; application of social work knowledge, values, and skills from across the curriculum. Culminates in professional presentations by students.

697 Thesis Project Seminar (3:3:0) Provides structured opportunity for students to work with each other and faculty in developing their final MSW thesis projects. Integrates and applies learning from all previous course work, emphasizing knowledge, skills, and values related to research, clinical practice, policy, community practice, and organizational leadership. Social work ethics, empowerment of populations at risk, and systems transformation will be explored. In addition to group meetings, students will meet individually with their faculty mentors.

699 Independent Study in Social Work (1–3:0:0) Prerequisite: graduate standing. Investigates research problem in field of social work.
Sociology (SOCI)

Sociology and Anthropology

101 Introductory Sociology (3:3:0) Introduction to basic sociological concepts. Examines aspects of human behavior in cultural framework including: individual and group interaction, social mobility and stratification, status and class, race and gender relations, urbanism, crime and criminology, and social change and reform.

102 Introduction to Sociological Inquiry (3:3:0) Offers introduction to sociology through conduct of original student research, informed by small group and classroom discussion of sociological ideas and methods exemplified by seminal texts. Especially recommended for students considering majoring in sociology, as well as students interested in studying sociology as a liberal art. Students may not receive credit for both SOCI 101 and 102.

120 Globalization and Society (3:3:0) Examines and analyzes important global issues and processes. Considers historical development of globalization, and implications for different societies and cultures. Investigates perceptions of global processes by different cultures and nations, and efforts of international institutions to address social, political, economic, and cultural changes in global society. Students may not receive credit for both SOCI 120 and GLOA 101.

300 Social Control and Human Freedom (3:3:0) Examines how various social institutions function to organize and regulate society. Topics include family, education, ideology, law, media, work, governmental planning, and stratification. Serves as a foundation of many specialized courses offered by department, especially those that focus on control of crime and delinquency.

301 Criminology (3:3:0) Focuses on causes and meaning of crime, with emphasis on adults. Patterns of criminal behavior, including property crimes, violent crimes, organized crime, white-collar crime, and victimless crime. Critical assessment of criminal justice system as a response to crime.

302 Sociology of Delinquency (3:3:0) Examines social factors involved in development of delinquency, including family, political economy, schooling, community environment and culture. Examines various theories of delinquency; rates of delinquency in relation to age, race, gender and social class; and legal system that addresses causes, consequences, and policies of punishment and rehabilitation.

303 Sociological Research Methodology (3:3:0) Prerequisite: SOCI 101 or 102, or permission of instructor. Introduces empirical design in sociological research: historical development, research design, sampling, methods of gathering data, sociometric scales, analysis and interpretation of results, and research reporting.

304 Sociology of Work and Occupations (3:3:0) Analysis of how societies structure work and allocate economic functions among different groups and classes. Topics include historical and cross-cultural variations in work, human consequences of industrialization, and impact of transition to post-industrial society. Special emphasis on changing position of professional employees and social factors that affect distribution of opportunity among various groups, and growing significance of technology for the nature of work.

305 Sociology of Small Groups (3:3:0) Characteristics, structure, and processes of small group dynamics; theories and models of group analysis, techniques of observation and research in small groups; research theory and application of small group knowledge to such natural groups as mutual aid self-help groups, families, juvenile delinquent gangs, and task groups in work sites.

307 Social Movements and Political Protest (3:3:0) Explores process by which people organize to resist current social arrangements and create alternative institutions, policies, or leadership. Historical and contemporary case studies of domestic and global change used to explore how, why, and to what effect various groups have organized to reject status quo and create social change.

308 Racial and Ethnic Relations (3:3:0) How race and ethnicity have been shaped by the policies and practices in Western and non-Western societies. Background given on evolution of racial and ethnic sentiments from Western colonial period in African, Asian, Middle Eastern and Latin American countries as well as contemporary U.S. racial and ethnic relations. Explores how changing demographic racial patterns may affect future definitions of race and ethnicity.

309 Marriage, Families, and Intimate Life (3:3:0) Focuses on family in history and family forms in contemporary societies. Looks at interaction within families, and relationship between society and families.

310 Sociology of Deviance (3:3:0) Analyzes macro- and microlevel deviance-producing processes, meaning and control of deviance, and major theoretical approaches to deviance.

311 Classical Sociological Theory (3:3:0) Prerequisite: 9 credits of sociology including SOCI 101, or permission of instructor. Explores sociological tradition through readings and discussions of ideas drawn from writings of selected sociological thinkers such as Comte, Marx, Weber, Durkheim, and others.

312 Qualitative Research Methods (3:3:0) Prerequisite: 9 credits of sociology including SOCI 101 or 102, or permission of instructor. Introduces ethnography, fieldwork methods, interviewing, life histories, and other qualitative methods to generate data about cultures in which various groups and classes are immersed. Students learn by applying qualitative methods to term projects, developed under guidance of instructor.

313 Statistics for the Behavioral Sciences (4:3:2) Prerequisite: SOCI 101, or permission of instructor. Fundamentals of applied statistics as used in behavioral science to include descriptive statistics, inferential statistics, correlation-regression, analysis of variance, factor analysis, nonparametric statistics, and practical experience with calculators in applying statistical analysis to actual problems of the behavioral sciences.

314 Sociology of Culture (3:3:0) Contemporary examination of culture as aspect of symbolic order, social institutions, and everyday practices of social life. Introduces range of different approaches to sociological study of culture with emphasis on problems of cultural difference and narrative aspects of culture in institutions of democratic society.

315 Sex and Gender in Contemporary Society (3:3:0) Changing conceptions of sex roles, both female and male, in contemporary society. Using historical and comparative data,
considers differential socialization of males and females in relation to changing social structure in which it takes place.

320 Social Structure and Globalization (3:3:0) While focusing on nature and process of change in human society, considers social impact of political, economic, and environmental change and how lives are shaped by complexities of global social forces. Examines specific global issues such as conflict and security; economic disparity; ecological deterioration; populations and migration; legitimization of commerce; diffusion of innovations; and impact of class, status, and power in modern societies.

326 Armed Conflict and Conflict Resolution (3:3:0) Examines political, economic, and sociocultural reasons why countries engage in armed conflict. Conflicts within and between states are explored with special focus on consequences for global, regional and local instability, loss of life and limb, and fragmentation of social, political, and economic fabric of societies. Examines various approaches to conflict resolution.

332 Sociology of Urban Communities (3:3:0) Urban community: historical development, demography, and ecology of metropolitan areas; urbanism as a way of life; emergence of suburbia; and future of cities.

340 Power, Politics, and Society (3:3:0) Analyzes how power is defined, attained and sustained in society. Students analyze political power as related to social realities such as democratic elections, class conflict, elite networks, power-sharing, protest, and revolution.

350 Community, Diversity, and Democracy: A Practicum (3:3:0) Develops practical skills for reducing prejudice and building community within diverse workplaces, educational and civic organizations and local neighborhoods. Specific skills taught empower individuals to be effective communicators across differences, work with controversial issues and build multicultural coalitions.

352 Social Problems (3:3:0) Sociological analysis of the problems of modern society, including those related to stratification, urbanism, family and kinship, cultural change, and deviant behavior.

355 Social Inequalities (3:3:0) Studies class structures and implications for individuals and groups in U.S. society. Explores issues of race and ethnicity, language and immigration status, sex and gender, social class, age, and sexual orientation. Students critically examine theory and research that explores construction, experience, and meaning of such differences.

360 Youth Culture and Society (3:3:0) Introduces sociology of youth and youth culture. Investigates social, economic, and political realities of youth as a group and different groups of youth, including youth cultural production, formation of youth culture, and youth identities in variety of social settings.

373 The Community (3:3:0) Examines small to moderately sized communities ranging through village, rural community, small town, and city subcommunity. Latter category includes city localities, ethnic villages, and suburban communities.

377 Art and Society (3:3:0) Introduces the many ways in which art reflects social tendencies, comments on social problems, and contributes to discussions about wide range of social issues. Students attend theatrical performances and visit exhibition spaces on campus, and learn to analyze what they experience through both aesthetic and sociological approaches. Explores contemporary issues such as debates about artistic freedom and public morality, commercialization of art, and relationship between cultural and social hierarchies.

382 Education in Contemporary Society (3:3:0) Studies education as social institution and its function as socialization agency for social stability and social change. Emphasizes influences of social class elements on educational process, and social organization of the U.S. public school system.

383 Human Services in Society (3:3:0) Analyzes human services emphasizing government-sponsored, nonprofit organizations and informal voluntary services, and their interrelationships with health care and welfare systems. Comparative analysis of services in other societies. Observation in service agencies.


390 Sociology of Health, Illness, and Disability (3:3:0) Examines social context of health, illness, and disability; relationships of health care professionals and patients; and structure and delivery of health care in different medical systems.

395 Issues in Sociology (3:3:0) Prerequisites: 90 credits, and 12 credits of sociology. Opportunity to apply to contemporary relevant issues the theoretical perspectives and methodological skills previously learned.

399 Independent Study (1–3:0:0) Open to sociology majors only. Prerequisites: 6 credits of sociology including SOCI 101, and approval of written proposal. Individual study of sociological topic of interest to student.

402 Sociology of Punishment and Corrections (3:3:0) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. Theories explaining forms of punishment systems; punishment and corrections as products of historical, cultural, and political changes; differences by race and gender in punishment and corrections. Problems of social control and violence in prisons, alternative rehabilitation, and community prevention strategies.

405 Analysis of Social Data (4:3:3) Prerequisite: 60 credits, SOCI 313 or permission of instructor. Overview of management and analysis of empirical social science data, including file construction, scaling and measurement, data transformation, and treatment of missing data. Emphasizes manipulation, management, and analysis of data sets using computers.

410 Social Surveys and Attitude and Opinion Measurements (3:3:0) Prerequisites: SOCI 303 and 313 or equivalents, or permission of instructor. Surveys research methods and techniques to collect, measure, and analyze social data, attitudes, and opinions with special emphasis on using computer software, Internet, and other information technologies for social research. Highlights ethical issues for social research, computing, and information technology.
412 Contemporary Sociological Theory (3:3:0) Prerequisite: 12 credits of sociology including SOCI 101 and 311, or permission of instructor. Analyzes contemporary sociological theorists such as Parsons, Merton, Mills, Berger, and Gouldner in terms of their relationship to major schools of contemporary sociological theory.

414 Sociology of Language (3:3:0) Prerequisites: 60 credits and 3 credits of sociology, or permission of instructor. Interaction of language and social structure. Focuses on language as revealing culturally specific rules of interpretation; sex, class, race, and setting of specific uniformities in producing talk; and language as it constrains individuals.

416 Internship in Sociology (3:0:0) Prerequisite: 21 credits of sociology, including Research Methods, or permission of instructor. Intended to promote learning in application of sociological knowledge, and build skills in different work settings. Students work in approved setting as applied sociologists. Required: minimum 40 hours of work for each credit.

421 Field Work in Social Change (3:3:0) Prerequisite: 6 credits of sociology or permission of instructor. In-depth investigation of planned social change through field work internship with change organization of student’s choice. Groups may be involved in influencing peace, environment, civil rights, consumer protection, poverty, or other public issues. Topics include ideologies, targets, organizational structures, opposition, and strategies of change.

441 The Sociology of Aging (3:3:0) Prerequisite: 6 credits of sociology, or permission of instructor. Aging from a sociological perspective. Topics include demographic trends and aging population in America, social construction of life stages and creation of “old age,” cultural labeling, and human resistance.

450 The Holocaust: The Construction of Social History through Survivor Testimonies (3:3:0) Prerequisite: 60 credits, or permission of instructor. Examines Holocaust, destruction of European Jewry, through testimonies of survivors and narratives of historians. Topics include historical and cultural circumstances that encouraged German anti-Semitism; rise of Nazism; ghettoization of Jews in Poland; Jewish life in ghettos; European Jews under Nazi occupation; Jewish resistance; Christian rescuers; invasion of Russia and mobile killing units; life in hiding and passing, forced labor camps and concentration camps; responses of United States and world; and reflections on Holocaust today. Also considers eyewitness testimony, memory, narrative, and literature.

471 Prevention and Deterrence of Crime (3:3:0) Prerequisite: 60 credits, in-service status, or permission of instructor. Theoretical and practical strategies for crime prevention and deterrence. Social, environmental, and mechanical developments. Police, courts, and correctional elements of law enforcement in terms of current effectiveness and future potential for crime prevention.

475/575 Women and the Law (3:3:0) Prerequisite for 475: 60 credits, or permission of instructor. Prerequisite for 575: undergraduate senior status in sociology or graduate standing. Analyzes changing position of women in law from legal and sociological perspectives. Focuses on how law defines and regulates women’s rights in variety of areas such as employment, marriage and divorce, reproduction and control of one’s body, and violence against women. Explores social and economic consequences of various legal doctrines, and compares laws and policies in United States with those in other countries.

480, 481 Honors Seminar in Sociology I, Honors Seminar in Sociology II (3:0:0), (3:0:0) Prerequisite: admission to sociology honors program, and permission of instructor. Linked, sequential courses, normally given by the same instructor. SOCI 480 involves application of theoretical and methodological knowledge to analysis of social issue that serves as course’s central theme. SOCI 481 culminates in preparation and presentation of substantive research paper.

482 Honors Internship in Sociology (3:0:0) Prerequisites: admission to Sociology Honors Program and permission of instructor. Provides hands-on experience in sociology and opportunity to do research in approved work settings. In addition to 120 hours of field work (for 3 credits), students meet at discretion of instructor to plan their research and share ongoing field work experiences.

483 The Sociology of Higher Education (3:3:0) Prerequisite: 60 credits. Exposes students to sociological theory and research on evolution of higher learning in United States; explores social forces that have shaped the distinctively American approach toward higher education and have led to transformation of higher education in contemporary society. Particular attention to relation between universities and elites within surrounding society; linkage between education and industry; norms and values that are presupposed by educational institutions; and bearing of sports on values and traditions of higher education.

492 Sociology of Organizations (3:3:0) Theories, analysis of types of organizations from informal voluntary associations to large complex ones. Explores nonprofit organizations and alternatives to bureaucracies, such as feminist collectives, cooperatives, self-help groups, and social movement organizations. Students do field work in organizations applying theories and concepts to observations.

499 Independent Research in Sociology (1–4:0:0) Prerequisite: 18 credits of sociology including SOCI 311, 313, and 412; 3.00 GPA in sociology; and research proposal approved by instructor and department chair before enrollment. Investigation of sociological problem according to individual interest, with emphasis on research.

503 Sociology of Law (3:3:0) Prerequisite: undergraduate senior status in sociology, graduate standing, or permission of instructor. Classical and contemporary sociological theories applied to law and legal institutions. Social relations between law and community, special group interests, social change, and social deviance. Case studies. Consideration of legal profession.

505 Sociology of Sex and Gender (3:3:0) Prerequisite: undergraduate senior status in sociology, graduate standing, or permission of instructor. Advanced study of sex roles in contemporary society. Using historical and comparative data, examines perceived, prescribed, and actual sex differentiation in social, political, and economic roles.

515 Applying Sociology (3:3:0) Prerequisite: undergraduate senior status in sociology or graduate standing. Overview of the ways sociologists have applied theoretical and methodological skills and understanding in sociological practice in nonacademic settings.
516 Internship in Sociology (1–6:1–6:0) Prerequisites: 21 credits of sociology including research methods, or permission of instructor. Learning experience in the application of sociological knowledge and skills in different work settings. Students work in approved setting as applied sociologists. Minimum 40 hours of work for every 1 credit.

523 Racial and Ethnic Relations: American and Selected Global Perspectives (3:3:0) Prerequisite: undergraduate senior status in sociology, graduate standing, or permission of instructor. Demographic purview of U.S. racial and ethnic groups; racial and ethnic groups as human-social-minority groups. Factors making for minority status including personality factors, group cultural factors; reactions of racial, ethnic minorities to minority status; programs, methods, social movements, and philosophies seeking to change minority group status.

530 Methods and Logic of Social Inquiry (3:3:0) Prerequisite: undergraduate senior status in sociology, or graduate status and undergraduate statistics and research methodology, or permission of instructor. Emphasizes gathering, interpreting, and evaluating scientific evidence. Develops critical-thinking skills by using set of rules and logical criteria for evaluating social science research. Covers logic of scientific inquiry, including various data collection methods, such as observational research and experiments, types of variables, causality, and how to distinguish between good and bad research in published literature.

531 Statistical Reasoning (3:3:0) Prerequisite: graduate standing and undergraduate statistics and research methodology, or permission of instructor. Intermediate treatment of statistical methods used in analyzing social data. Topics include sampling, inference, hypothesis testing, analysis of variance, linear regression, and correlation. Introduces logic of multivariate analysis.

550 The Holocaust (3:3:0) Prerequisite: undergraduate senior status in sociology, or graduate status. Examines Holocaust, destruction of European Jewry, through testimonies of survivors and narrators of historians. Topics include historical and cultural circumstances that encouraged German anti-Semitism; rise of Nazism; ghettoization of Jews in Poland; Jewish life in ghettos; European Jews under Nazi occupation; Jewish resistance; Christian rescuers; invasion of Russia and mobile killing units; life in hiding and passing, forced labor camps, and concentration camps; responses of United States and world; and reflections on Holocaust today. Also considers eyewitness testimony, memory, narrative, and literature.

590 Gender, Race, and the Natural World (3:3:0) Prerequisites: undergraduate seniors, graduate standing, or permission of instructor. Advanced study of links among gender, race, and nature using social-psychological framework, original sources, and seminar discussion format. Analyzes ideologies that underpin interlocking narratives of gender, race, and nature; and examines role of science in production of those ideologies.

599/NURS 611 Issues in Sociology (3:3:0) Prerequisite: undergraduate senior status in sociology, or graduate status. Contemporary topics in sociology including sociological theory, crime and delinquency, advanced research methods, social and cultural change, urban sociology, medical sociology, sociology of aging, and rural sociology. May be taken only once for credit.

605 Gender and Social Structure (3:3:0) Reviews theories explaining the development and maintenance of gender. Using historical and comparative data, examines perceived, prescribed, and actual sex differentiation in social, political, and economic roles. Begins with gender as a social structure and then examines contemporary research as support or refutation for variety of theoretical paradigms. Includes discussion of gender in intimate relationship and the public sector.

607 Criminology (3:3:0) Prerequisite: graduate standing, or permission of instructor. Crime and crime causation. Topics include social basis of law, administration of justice, and control and prevention of crime.

608 Juvenile Delinquency (3:3:0) Prerequisite: graduate standing, or permission of instructor. Sociology of adolescent behavior. Sociological factors that determine which behaviors and social categories of adolescents are likely to be labeled and treated as delinquent.

609 Sociology of Punishment and Corrections (3:3:0) Prerequisite: graduate standing, or permission of instructor. Explores development of modern penal system as interpreted by various perspectives, including Durkheim, Marx, Weber, Foucault, Elias, and Garland. Explores recent trends and problems, including social control and violence in prisons, race and gender disparities in punishment, alternative rehabilitation, and prevention strategies.

611 Classical Sociological Theory (3:3:0) Prerequisite: graduate standing or permission of instructor. In-depth examination of major issues in classical (pre-1930) sociological theory. Analyzes Durkheim, Marx, Weber, Mead, and others; and emphasizes social and intellectual context of their theories.

612 Contemporary Sociological Theory (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines schools in contemporary sociological theory such as structural-functionalism, conflict, exchange, symbolic interactionism, ethnomethodology, humanist sociology, and critical theory. Analyzes contemporary theorists in relation to schools.

614 Sociology of Culture (3:3:0) Prerequisite: graduate standing, or permission of instructor. Analyzes 20th century debates in American culture and cultural politics, with emphasis on art and popular culture, news media, and competing notions of “the public.” In-depth readings in cultural sociology cover variety of theoretical and methodological approaches.

616 Internship in Sociology (1–6:1–6:0:0) Prerequisite: graduate standing. Provides learning experiences in application of sociological knowledge and skills in different work settings. Students work in approved setting as applied sociologists. Each credit requires minimum of 40 hours of work.

619 Conflict and Conflict Management: Perspectives from Sociology (3:3:0) Prerequisite: graduate standing in sociology or conflict analysis and resolution, or permission of instructor. Deals with sociology of conflict. Presents major sociological theories of conflict such as those of Marx, Weber, Simmel, Dahrendorf, Coser, and Collins. Stresses role that sociological conflict theory plays in undergirding conflict management practices.
620 Methods and Logic of Social Inquiry (3:3:0) Prerequisite: undergraduate statistics and research methodology, or permission of instructor. Emphasizes gathering, interpreting, and evaluating scientific evidence. Covers logic of scientific inquiry, including the application of various research designs and data collection methods. Develops critical-thinking skills by using set of rules and logical criteria for evaluation of social science research. Focus both on how results are obtained and disseminated via research reports.

630 Analytic Techniques of Social Research (3:3:0) Prerequisite: graduate standing and undergraduate statistics and research methodology, or permission of instructor. Focuses on general linear model and multiple regression analysis in nonexperimental data. Topics include logic of causal analysis, multicollinearity, influential observations, categorical independent and dependent variables, violation of assumptions, missing data, structural equation and measurement models, and discrete multivariate analysis.

631 Survey Research (3:3:0) Prerequisites: SOCI 530 and 531, or permission of instructor. Introduces theory, method, and practice of survey research design and analysis. Students complete survey research project.

632 Evaluation Research for Social Programs (3:3:0) Prerequisite: SOCI 530 and 531, or permission of instructor. Studies methodological issues related to evaluation of social programs. Explores conceptual and research design issues in relation to social programs, particularly delivery of social services. Includes examination of methods used to assess need for programs, impact of delivery systems, and efficiency and effectiveness of social programs.

633 Special Topics in Sociology (3:3:0) Prerequisite: graduate standing, or permission of instructor.

634 Qualitative Research Methods (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines basic research methods involving observational techniques and procedures used in description and analysis of patterns, configurations, ethos, eidos, structures, functions, and styles typical of whole societies and cultures. Emphasizes case studies, unobtrusive methods, participant observation, long-term residence, choices of observer status role, recording data, uses of technical equipment, key informants, interviewing techniques, and ethical considerations in employing such methods and procedures.

635 Environment and Society. (3:3:0) Prerequisite: graduate standing. Overview of human ecology and environmental sociology, emphasizing selected topics. Focuses on theory, since theory makes it possible to generalize from understandings derived in an analysis of a particular problem and apply them to other problems.

636 Statistical Reasoning (3:3:0) Prerequisite: undergraduate statistics and research methodology, or permission of instructor. Intermediate treatment of quantitative analytic techniques used in sociology. Topics include sampling, inference, hypothesis testing, analysis of variance, and bivariate and multiple correlation and regression. Introduces logic of multivariate analysis. Focus on how results are obtained and disseminated via research reports.

640 Social Theory and Social Policy (3:3:0) Prerequisite: graduate standing, or permission of instructor. Major theories of social organization and social change as means of understanding social policy development. Concentration is on social policies in American society.

650 Issues in the Sociology of Health, Illness, and Disability (3:3:0) Prerequisite: graduate standing, or permission of instructor. Social context of disease and medical care, position of professions in medical care structure, delivery of medical care, and physician-patient relationship under different systems of practice.

651 (551) Health Care Systems (3:3:0) Prerequisite: graduate standing, or permission of instructor. Changing health care systems are rapidly affecting patient providers and health and quality of life of society. Offers analysis and theories of change in health care systems, and impacts on society and various stakeholders. Examines for-profit and nonprofit organizations and their impacts, and offers comparative cross-cultural analysis of health care systems.

660/860 Historical and Comparative Sociology (3:3:0) Prerequisite: graduate standing, or permission of instructor. Seminar in theory and methods of historical and comparative sociology, primarily for students with background in sociological theory and methods. Examines basic approaches and research data of history and sociology, surveys development of field, and analyzes exemplary studies.

686 Sociology of Aging (3:3:0) Prerequisite: graduate standing, or permission of instructor. Analyzes sociological issues in aging, including class and cultural factors, problems of work, retirement, attachment and loss, and ageism. Examines different theories of aging.

692 McDonilization of Organizations (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines classical and contemporary theories and analysis governing formal organizations, their development, and characteristics and relationships to society. Considers alternative conceptualizations to bureaucracy such as learning organizations, self-help groups, feminist collectives, cooperatives, and social movement organizations. Nonprofit, governmental, and business organizations are dissected.

696, 697 Independent Study (3:0:0), (3:0:0) Prerequisite: graduate standing, or permission of instructor. Offers analysis and research literature chosen by student and instructor.

711 Classical Sociological Theory (3:3:0) In-depth examination of major issues in classical (pre-1930) sociological theory. Analyzes Durkheim, Marx, Weber, Mead, and others; and emphasizes social and intellectual context of their theories.

712 Contemporary Sociological Theory (3:3:0) Examines schools in contemporary sociological theory such as structural-functionalism, conflict, exchange, symbolic interactionism, ethnmethodology, humanist sociology, and critical theory. Analyzes contemporary theorists in relation to schools.

730 Analytic Techniques of Social Research (3:3:0) Prerequisite: undergraduate statistics and research methodology, or permission of instructor. Introduces multiple regression and causal analysis to sociological researchers, with a focus on obtaining and disseminating results. Moves from linear regression to the general linear model with several variables, its extensions, assumptions, and regression diagnostics. Examines the use of dummy variable and the analysis of interaction effects. Considers systems of equations and nonlinear outcomes.
797 Sociology Colloquium (3:3:0) Prerequisite: graduate standing or permission of instructor. Public forum for the presentation and discussion of contemporary sociological research.

799 Thesis (1–6:0:0) Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study in sociology. Program of studies designed by student’s discipline director and approved by student’s doctoral committee, which brings student to participate in current research of discipline director and results in paper reporting original contributions of the student. Enrollment may be repeated.

801 Proseminar in Public and Applied Sociology (3:3:0) The first of a two-semester core sequence devoted to the philosophical, historical, theoretical, and methodological dimensions of public and applied sociology within the United States. Traces the evolution of the field during the 20th century, from its inception in the Chicago school and the studies of W.E.B. Du Bois to more recent formulations, as these bear on the interplay between social scientific knowledge and public decisions and debates.

802 Proseminar in Public and Applied Sociology, II (3:3:0) The second in a two-semester sequence that provides students with an introduction to the theories, methods, and practice of public and applied sociology as they are relevant to issues of societal and community importance. Builds on the historical and contextual understandings of the first semester by examining contemporary issues and challenges such as university and community relationships, activism and research, ethical dilemmas of engaged research, and methodological debates.

803 Institutions and Inequality (3:3:0) Analyzes the interrelations between social inequalities and institutional structures, including markets, the press, prisons, mental institutions, cultural organizations, and corporations.

804 Sociology of Globalization (3:3:0) Addresses the social, political, cultural, and economic process of globalization. Explores the limits on globalization during the precapitalist era, the relation between the internal structure of imperialist societies, theoretical debates over the contemporary world system, the relation between cities and globalization, and the link between globalization and social inequality within both developed and developing societies.

805 Sociology of Development (3:3:0) Examines the connections among inequality, conflict, social justice, and human rights in an age of globalization. Drawing on case studies from around the world, examines institutional and structural violence and inequality as they relate to state, corporate, and military power; international law and order; welfare and social policy; global justice; regionalism, multilateralism, and transnationalism; environmental protection; gender inequality; ethnic conflict; resource wars; and national security policy before and after September 11th.

807 Sociology of Human Rights (3:3:0) Examines the connections among inequality, conflict, social justice, and human rights in an age of globalization. Drawing on case studies from around the world, examines institutional and structural violence and inequality as they relate to state, corporate, and military power; international law and order; welfare and social policy; global justice; regionalism, multilateralism, and transnationalism; environmental protection; gender inequality; ethnic conflict; resource wars; and national security policy before and after September 11th.

998 Doctoral Dissertation Proposal (1-6:0) Prerequisite: successful completion of all course work and doctoral comprehensive exams. Work on research proposal for doctoral dissertation. Course may be repeated once for credit for total of 6 credits. Graded S/NC.

999 Doctoral Dissertation (1-12:0) Prerequisite: Successful completion of SOCI 998. Doctoral dissertation research and writing on approved dissertation topic under direction of committee. Maximum of 12 credits may be applied toward degree. Graded S/NC.
Sociology and Anthropology (SOAN)

500 Communicating across the Disciplines (3:3:0) Prerequisite: admission to MAIS concentration in global interaction. Provides an introduction to the range of disciplinary perspectives and their combinations necessary for analyzing and acting on critical research policy needs in the global arena. Using case examples from recent and contemporary events, students will analyze data, assess alternative policy and program approaches, and evaluate the relative contributions of different disciplines and fields, including the way those disciplines and fields vary across different national traditions and between the national and international levels.

510 Culture and Globalization (3:3:0) Prerequisite: SOAN 500. Provides continuing exposure to the range of disciplinary perspectives necessary for understanding crucial issues in the global arena. Through case examples, focuses on the intersections of culture and globalization. Analyzes existing data and assesses alternative policy and program approaches; illuminates interactions between globalization and culture.

670 Special Topics in Sociology and Anthropology (4–8: 0–8:0–8) Prerequisite: graduate standing, or permission of instructor. Provides cross-disciplinary, pedagogical format in Department of Sociology and Anthropology. Covers variety of pedagogical formats, such as combining ethnographic field techniques taught in anthropology with sociological-based urban issues, or providing archaeological laboratory analyses with grounding in statistical techniques proposed by department faculty.

Software Engineering (SWE)

Computer Science

332 Object-Oriented Software Design and Implementation (3:3:0) Prerequisite: CS 211. In-depth study of software design and implementation using a modern, object-oriented language with support for graphical user interfaces and complex data structures. Topics covered will be specifications, design patterns, and abstraction techniques, including typing, access control, inheritance, and polymorphism. Students will learn the proper engineering use of techniques such as information hiding, classes, objects, inheritance, exception handling, event-based systems, and concurrency.

421 Software Requirements and Design Modeling (3:3:0) Prerequisite: CS 211. An introduction to concepts, methods, and tools for the creation of large-scale software systems. Methods, tools, notations, and validation techniques to analyze, specify, prototype, and maintain software requirements. Introduction to object-oriented requirements modeling, including use case modeling, static modeling, and dynamic modeling using the Unified Modeling Language (UML) notation. Concepts and methods for the design of large-scale software systems. Fundamental design concepts and design modeling using UML notation. Students participate in a group project on software requirements, specification, and object-oriented software design.

432 Design and Implementation of Software for the Web (3:3:0) Prerequisite: MATH 125 and CS 211. Teaches how to develop software for web applications. Covers client-server computing, theories of usable graphical user interfaces, and models for web-based information retrieval and processing. Goals are to understand how to design usable software interfaces and implement them on web, learn how to build software that accepts information from users across web and returns data to user, and understand how to interact with database engines to store and retrieve information. Specific topics are HTML, CGI programming, Java, Java applets, Javascripts, and Java servlets.

437 Software Testing and Maintenance (3:3:0) Prerequisites: CS 211 and Math 125. Concepts and techniques for testing and modifying software in evolving environments. Topics include software testing at the unit, module, subsystem, and system levels; developer testing; automatic and manual techniques for generating test data; testing concurrent and distributed software; designing and implementing software to increase maintainability and reuse; evaluating software for change; and validating software changes.

443 Software Architectures (3:3:0) Prerequisite: SWE 421. This course teaches how to design, understand, and evaluate software systems at an architectural level of abstraction. By the end of the course, students will be able to recognize major architectural styles in existing software systems, describe a system’s architecture accurately, generate architectural alternatives to address a problem and choose from among them, design a medium-sized software system that satisfies a specification of requirements, use existing tools to expedite software design, and evaluate the suitability of a given architecture in meeting a set of system requirements.

510 Object-Oriented Programming in Java (3:3:0) Prerequisites: undergraduate courses or equivalent knowledge in programming in a high-level language. This course introduces students to programming in the Java language. Topics include problem-solving methods and algorithm development, program structures, abstract data types, simple data and file structures and program development in a modular, object-oriented manner. Introductory use of OO language features, including data hiding, inheritance, polymorphism, and exception handling. Goals include design and development of Java classes and class type hierarchies. An introduction to Java servlets and applets is included. Emphasis on program development is reinforced through several programming projects. Credit cannot be applied to a graduate degree in the Volgenau School or the BS degree in computer science.

619 Object-Oriented Software Specification and Construction (3:3:0) Prerequisites: SWE foundation courses or equivalent. In-depth study of software construction using modern, object-oriented language with support for graphical user interfaces and complex data structures. Specifications, design patterns, and abstraction techniques, including procedural, data, iteration, type, and polymorphic. Information hiding, classes, objects, and inheritance. Exception handling, event-based systems, and concurrency.

620 Software Requirements Analysis and Specification (3:3:0) Prerequisites: SWE foundation courses or equivalent. In-depth study of methods, tools, notations, and validation techniques for analysis, specification, prototyping, and maintenance of software requirements. In-depth study of object-oriented requirements modeling, including use case modeling, static modeling and dynamic modeling with Unified Modeling Language (UML) notation. Students participate in a group project on software requirements, specification, and object-oriented software design.
prerequisite in group project on software requirements and specification using modern method.

621 Software Modeling and Architectural Design (3:3:0)
Prerequisite: SWE 619, with 620 recommended, or permission of instructor. MSCS students may substitute CS 540 and 571 for SWE 619. Concepts and methods for architectural design of large-scale software systems. Introduces fundamental design concepts and design notations. Presents, compares several design methods. In-depth study of object-oriented analysis and design modeling using the Unified Modeling Language (UML) notation. Students participate in group project on object-oriented software design.

622 Distributed Software Engineering (3:3:0)
Prerequisites: SWE foundation courses or equivalent. Hands-on introduction to techniques and programming interfaces for distributed software engineering. Networking protocols at several layers. Construction of distributed and concurrent software using network protocol services. Applications of Internet and Web-based software.

623 Formal Methods and Models in Software Engineering (3:3:0)
Prerequisites: SWE 619, or permission of instructor. Formal mechanisms for specifying, validating, and verifying software systems. Program verification through Hoare’s method and Dijkstra’s weakest preconditions. Formal specification via algebraic specifications and abstract model specifications, including initial specification and refinement towards implementation. Integration of formal methods with existing programming languages, and the application of formal methods to requirements analysis, testing, safety analysis, and object-oriented approaches. Formal methods using the Object Constraint Language (OCL).

625 Software Project Management (3:3:0)
Prerequisites: SWE foundation courses or equivalent. Lifecycle and process models; process metrics; planning for a software project; mechanisms for monitoring and controlling schedule, budget, quality, and productivity; and leadership, motivation, and team building.

626 Software Project Laboratory (3:3:0)
Prerequisites: SWE 619, 620, and 621; or permission of instructor. Covers requirements analysis, design, implementation, and management of software development project. Students work in teams to develop or modify software product, applying sound principles of software engineering. Uses both Industrial, academic standards to assess quality of work products.

630 Software Engineering Economics (3:3:0)
Prerequisite: SWE 625. Covers quantitative models of software lifecycle, cost-effectiveness analysis in software engineering, multiple-goal decision analysis, uncertainty and risk analysis, software cost estimation, software engineering metrics; and quantitative lifecycle management techniques.

631/CS 631 Object-Oriented Design Patterns (3:3:0)
Prerequisite: SWE 619 or 621, or CS 540 or 571; or graduate course in object-oriented programming or equivalent. Principles of object-oriented design through design patterns. Studies selection of appropriate object-oriented structure after system requirements or requirements specification of software system have been developed. Design patterns created in logic view of software system. Studies generalized design solutions for generalized software design problems, and reuse of design patterns. Once developed, design patterns may be specified in any object-oriented language.

632 User Interface Design and Development (3:3:0)
Prerequisite: SWE 619, or CS 540 and 571, or permission of instructor. Principles of user interface design, development, and programming. Includes user psychology and cognitive science, menu system design, command language design, icon and window design, graphical user interfaces, web-based user interfaces.

637 Software Testing (3:3:0)
Prerequisite: SWE 619, or permission of instructor. Concepts and techniques for testing software and assuring its quality. Topics cover software testing at the unit, module, subsystem, and system levels; automatic and manual techniques for generating and validating test data; testing process; static vs. dynamic analysis; functional testing; inspections; and reliability assessment.

641/SYST 621 Systems Architecture for Large-Scale Systems (3:3:0) See SYST 621.

642 Software Engineering for the World Wide Web (3:3:0)
Prerequisites: SWE 619, or CS 540 and 571, or permission of instructor. Detailed study of engineering methods and technologies for building highly interactive web sites for e-commerce and other Web-based applications. Presents engineering principles for building Web sites that exhibit high reliability, usability, security, availability, scalability, and maintainability. Teaches methods such as client-server programming, component-based software development, middleware, and reusable components.

645 Component-Based Software Development (3:3:0)
Prerequisite: SWE 619, or CS 540 and 571, or permission of instructor. Introduces concepts and foundations of software component and component-based software. Detailed study of engineering principles of modeling, designing, implementing, testing, and deploying component-based software. Also explores state-of-the-art component technologies.

699 Special Topics in Software Engineering (3:3:0)
Prerequisite: permission of instructor. Special topics not occurring in regular SWE sequence. May be repeated for credit when semester topic is different.

720 Advanced Software Requirements (3:3:0)
Prerequisites: SWE 620 and 621. State-of-the-art and state-of-the-practice in software requirements engineering. In-depth coverage of selected methods, tools, notations, or validation techniques for the analysis and specification of software requirements. Includes project investigating or applying approaches to requirements engineering.

721 Reusable Software Architectures (3:3:0)
Prerequisites: SWE 620 and 621. Investigates software concepts that promote reuse of software architectures. Studies influence of object technology on software design and reuse. Investigates Domain Modeling methods, which model the application domain as a software product family from which target systems can be configured. Covers reusable software patterns including architecture patterns and design patterns, software components, and object-oriented frameworks.

723 Precise Modeling (3:3:0)
Prerequisite: SWE 621. Discusses ongoing advances in modeling techniques for software design, including precision, performance, security and safety aspects; and UML, its meta-models, and proposed enhancements such as Object Security Constraint Language,
Object Temporal Constraint Language, QoS Profiles and the theory behind them.

727 Quality of Service for Software Architectures (3:3:0)
Prerequisite: SWE 621 or permission of instructor. This course builds on acquired skills for modeling architectures, and focuses on the relationship between architectural patterns and qualities of service (QoS). By the end of the course, students will be able to elicit the QoS preferences of stakeholder; recognize major architectural styles and the QoS tradeoffs that each presents; design for, and reconcile competing QoS requirements; and evaluate a given architecture with respect to a set of QoS requirements.

763 Software Engineering Experimentation (3:3:0)
Prerequisite: SWE 619, or permission of instructor. Detailed study of scientific process, particularly using experimental method. Examines how empirical studies are carried out in software engineering. Reviews distinction between analytical techniques and empirical techniques. Other topics include experimentation required in software engineering, problems that can be solved using experimentation, methods used to control variables and eliminate bias in experimentation, and analysis and presentation of empirical data for decision making.

781 Secure Software Design and Programming (3:3:0)
Prerequisites: SWE 619, or permission of instructor. Theory and practice of software security, focusing in particular on some common software security risks, including buffer overflows, race conditions and random number generation, and on identification of potential threats and vulnerabilities early in design cycle. Emphasizes methodologies and tools for identifying and eliminating security vulnerabilities, techniques to prove absence of vulnerabilities, ways to avoid security holes in new software, and essential guidelines for building secure software: how to design software with security in mind from the ground up and to integrate analysis and risk management throughout the software life cycle.

796 Directed Readings in Software Engineering (3:3:0)
Prerequisite: permission of instructor. Analysis and investigation of contemporary problem in software engineering. Requires prior approval by faculty member who supervises student’s work. Written report also required. Maximum 6 credits may be earned. To register, students must complete independent study form, available in department office. It must be initialed by faculty sponsor and approved by department chair.

798 Research Project (3:3:0)
Prerequisite: 18 credits applicable toward MS. Master’s degree candidates undertake a project using knowledge gained in MS program. Topics chosen in consultation with a faculty sponsor. Prior approval required by faculty sponsor who supervises student’s work. To register, students must complete an independent study form, available in department office. It must be initialed by the faculty sponsor and approved by the department chair. Research project is chosen under guidance of full-time graduate faculty member, resulting in written technical report.

799 Thesis (6:0:0)
Prerequisite: permission of advisor. Research project completed under supervision of faculty member, which results in technical report accepted by three-member faculty committee. Report must be defended in oral presentation. To register, students must complete independent study form, available in department office. It must be initialed by faculty sponsor and approved by department chair.

825/IT 825 Special Topics in Web-Based Software (3:3:0)
Prerequisite: SWE 642. Advanced topics in specifying, designing, modeling, developing, deploying, testing, and maintaining software written as web applications and web services. May be repeated with change in topic.

Spanish (SPAN)

Modern and Classical Languages

101 Elementary Spanish I (3:3:1)
For students with no knowledge of Spanish. Introduction to Spanish, including elements of grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

102 Elementary Spanish II (3:3:1)
Prerequisite: SPAN 101, appropriate placement score, or permission of department. Continuation of SPAN 101. Lab work required.

105 Review of Elementary Spanish (3:3:1)
Prerequisite: appropriate placement score, or permission of department. Review of elements of Spanish for students who have studied Spanish previously. May not be taken for credit in combination with SPAN 102 or 109. Lab work required.

109 Intensive Elementary Spanish (6:6:2)
Equivalent to SPAN 101 and 102 taught in a single semester. Recommended for students who desire an intensive introduction to Spanish. May not be taken for credit in combination with SPAN 101, 102, or 105. Lab work required.

110 Elementary Spanish (6:6:1)
Introduces elements of grammar, vocabulary, oral skills, listening, speaking, reading, and writing. Students may not receive credit for SPAN 110 if they have received credit for SPAN 101, 102, or 109. Lab work required.

201 Intermediate Spanish I (3:3:1)
Prerequisite: SPAN 102, 105, 109, appropriate placement score, or permission of department. Further development of skills in listening, speaking, reading, and writing. SPAN 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate Spanish II (3:3:1)
Prerequisite: SPAN 201, appropriate placement score, or permission of department. Application of skills to reading, composition, and discussion. Lab work required.

209 Intensive Intermediate Spanish (6:6:2)
Prerequisite: SPAN 102, 105, 109, appropriate placement score, or permission of department. Equivalent to SPAN 201 and 202 taught in a single semester. May not be taken for credit in combination with SPAN 201 or 202. Lab work required.

210 Intermediate Spanish (3:3:1)
Prerequisite: SPAN 110 or appropriate placement score. Continuation of the development of basic components of the language, with focus on listening, speaking, reading, and writing skills. Introduces students to the cultures and histories of Spanish-speaking regions. Lab work required.

250 Gateway to Advanced Spanish (3:3:0)
Prerequisites: SPAN 210, appropriate placement score, or permission of department. Integration of advanced intermediate-level Spanish reading, writing, listening, and speaking skills, as well as the development of critical thinking about authentic texts from around the globe. Taught in Spanish.
301 Grammar and Syntax (3:3:0) Prerequisite: SPAN 202, 209, appropriate placement score, or permission of instructor. In-depth review of Spanish grammar and syntax. Extensive practice in controlled and free writing with emphasis on fundamental difficulties and points of interference that exist between English and Spanish.

302 Reading and Writing Skills Development (6:6:0) Prerequisites: SPAN 202 or 209, appropriate placement score, or permission of instructor. Development of ability to write on topics of current interest. Readings provide examples of each topic and the necessary vocabulary for compositions. Introduces reading strategies and provides practice in the reading of different kinds of texts.

305 Spanish in Context I (3:3:0) Prerequisites: SPAN 250 or equivalent, or permission of instructor. Students cannot receive credit for SPAN 305 if they receive credit for SPAN 309. Integrated content-based approach to the study of Spanish, designed to promote oral and written abilities, as well as critical understanding of Latin American, Latino, and/or Spanish histories and cultures. Includes vocabulary-building activities, grammar review and practice, assigned readings in a variety of genres, critical cultural analysis, in-class discussions, written essays, and the viewing of films. Conducted in Spanish.

306 Spanish in Context II (3:3:0) Prerequisites: SPAN 305 or equivalent, or permission of instructor. Students cannot receive credit for SPAN 306 if they receive credit for SPAN 309. Continuation of SPAN 305.

309 Intensive Spanish in Context (6:6:0) Prerequisites: SPAN 250 or equivalent, or permission of instructor. Students cannot receive credit for both SPAN 309 and SPAN 305 or 306. Intensive content-based approach to the study of Spanish, designed to promote oral and written abilities, as well as critical understanding of Latin American, Latino, and/or Spanish histories and cultures. Includes vocabulary-building activities, grammar review and practice, assigned readings in a variety of genres, critical cultural analysis, in-class discussions, written essays, and the viewing of films. Conducted in Spanish.

315 Spanish for Heritage Speakers (3:3:0) Prerequisites: appropriate placement score or permission of instructor. Designed for students who have some communicative ability in Spanish, normally acquired in the home, who want to improve their reading and writing abilities while developing a critical understanding of Latin American, Latino, and/or Spanish histories and cultures. Course components include orthography and vocabulary activities, grammar review and practice, assigned readings in a variety of genres, critical cultural analysis, in-class discussions, written essays, and the viewing of films.

321 Introduction to Spanish Culture (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Designed for nonmajors. History, culture, economic and social development, and scientific and artistic achievements that have contributed to the formation of modern Latin America. Course work in English. Credit may be earned in either SPAN 322 or 461, but not in both.

322 Introduction to Latin American Culture (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Designed for nonmajors. History, culture, economic and social development, and scientific and artistic achievements that have contributed to the formation of modern Latin America. Course work in English. Credit may be earned in either SPAN 322 or 461, but not in both.

323 Field Study in Hispanic Culture (1–3:6:0) Prerequisite: 60 credits or permission of instructor. Study tour to area of Spanish-speaking world. Students must attend a series of lectures before the tour, and must consult with the designated faculty member on a research project on a topic in Hispanic culture resulting in paper or report.

324 Study Abroad in Spanish (3:3:0) Prerequisite: SPAN 202, 209 or equivalent, or permission of instructor. Study at an academic institution in a Spanish-speaking country including classroom studies with professors from the host country and field experiences.

325 Major Hispanic Writers (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Designed for nonmajors. Study of the works of major Hispanic writers in translation. Writers studied vary. Course work in English. May be taken toward fulfillment of the general requirement in literature for baccalaureate degrees. May be repeated for credit with permission of department.

326 Treasures of Spanish American Literature (3:3:0) Prerequisite: advanced oral and written proficiency in Spanish, to be determined by the instructor. Designed for nonmajors. Introduction to the major themes, trends, and cultural context of Latin American literature. Writers studied vary. May be repeated for credit with permission of the department.

329 Special Topics in Spanish and Latin American Literature (3:3:0) Prerequisite: ENGL 101, or permission of instructor. Designed for nonmajors. Course work in English. May be taken toward fulfillment of the humanities requirement in literature for baccalaureate degrees. May be repeated once for credit.

351 Oral Spanish (3:3:0) Prerequisite: SPAN 202, 209 or equivalent; appropriate placement score; or permission of instructor. Development of oral expression on topics of current interest and everyday situations, including written assignments. Not open to native speakers.

370 Spanish Writing and Stylistics (3:3:0) Prerequisites: SPAN 306 or 309, or 315, or permission of instructor. Improves writing skills by covering formal and stylistic concepts of the Spanish language. Includes practice and exposure to different textual genres in an interdisciplinary fashion. Includes common doubts concerning spelling, expression, and style; business Spanish; journalistic Spanish; academic Spanish; and creative writing. Conducted in Spanish.

385 Introduction to Spanish Linguistics (3:3:0) Prerequisite: SPAN 301, 302, or advanced ability in Spanish; or permission of instructor. Introduces study of Spanish linguistics, including phonetics, phonology, morphology, syntax, pragmatics, historical linguistics, and sociolinguistics. Combines discussion of theoretical issues with linguistic analysis of Spanish. Conducted in Spanish.

388 Introduction to Latina/o Studies (3:3:0) Prerequisites: SPAN 335 or 336, and SPAN 370, or equivalents. Completion or concurrent enrollment in all other required general education courses. Interdisciplinary approach to the study of U.S. Latina/o cultural production, designed to promote critical thinking in understanding Latina/o histories, literature, and cultures. Conducted in Spanish.
390 Introduction to Hispanic Literary Analysis (3:3:0)  
Prerequisite: SPAN 302, or permission of instructor.  
Required course that prepares students for the study of Hispanic literatures. Introduces basic terminology of literary analysis and provides practice in the examination of texts in the major genres: poetry, narrative, and drama.

400 Spanish for the Professions (3:3:0)  
Prerequisites: SPAN 302, or permission of instructor. Advanced study of the language needed for use in a specific profession, such as translation, business, social service, or health professions. May be repeated for credit with change of topic.

425, 426 Independent Study (1–3:0:0), (1–3:0:0)  
Prerequisites: Spanish major with 90 credits, and permission of instructor. Research and analysis of a selected problem in literature or linguistics in consultation with a department member. Maximum of 6 credits of independent study may be applied to fulfillment of major requirements.

430 Spanish in the United States (3:3:0)  
Prerequisites: SPAN 302 and 351, or advanced ability in Spanish, or permission of instructor. Covers both formal and sociolinguistic aspects of Spanish spoken in the United States. Gives a foundation in issues such as linguistic variation, language choice, the relationship among race, ethnicity, and language; official language policies; individual and societal bilingualism; and language diversity in education.

451 Advanced Oral Spanish (3:3:0)  
Prerequisites: 9 credits of SPAN at 300 level or above, or permission of instructor. Development of vocabulary and strengthening of conversational skills through class discussions and oral and written reports based on contemporary themes. Not open to native speakers.

452 Advanced Written Spanish (3:3:0)  
Prerequisites: 9 credits of SPAN at 300 level or above, or permission of instructor. Development of skills required in writing Spanish. Guided and original compositions. Grammatical structures reviewed and supplemented with individual corrections.

455 Spanish-English Translation (3:3:0)  
Prerequisites: SPAN 370 and ENGL 302, or permission of instructor. Introduction to the history, theory, analysis, and practice of Spanish-English and English-Spanish translation. Includes literal versus free translation; denotation and connotation; Spanish-English and English-Spanish translation. Includes a discussion of sociocultural and political issues surrounding the teaching of Spanish in the United States. Covers learning objectives, critical pedagogy, course design, grammar instruction, task-based language teaching, computer-assisted language learning, materials evaluation, and assessment.

480, 481 Special Topics in Spanish (3:3:0), (3:3:0)  
Prerequisites: SPAN 452, or permission of instructor. Study of a selected theme in Hispanic literature, culture, or linguistics. May be repeated for credit with change of topic.

483, 484 The Literature of Spain I, II (3:3:0)  
Prerequisites: SPAN 390 and 452 or permission of instructor: SPAN 483. Examines the main periods, trends, genres, and most representative works of the Spanish peninsular literature from its beginnings to the end of the Golden Age. SPAN 484 studies Spanish literature from 1700 to the present.

488 The Literature of Spanish America (3:3:0)  
Prerequisites: SPAN 390 and 452, or permission of instructor. Survey of the literature of Spanish America. Study of texts that are representative of the colonial, romantic, modernista, avant garde, and contemporary periods.

490 Internship in Spanish (1–6:0:0)  
Prerequisites: 9 credits in Spanish at the 300 level, or permission of instructor. Qualified students work with area schools, social service programs, government agencies, interest groups, museums, or corporations. Specific arrangements must be made with, and approved by, a member of the Spanish faculty during the semester prior to enrollment.

497, 498 Senior Honors Tutorial (3:0:0), (3:0:0)  
Prerequisites: Spanish major with 90 credits, cumulative GPA of 3.00, and GPA of 3.00 in major field. Students meeting these requirements are admitted to candidacy on submission of a letter of application to the department Honors Committee in the second half of the junior year. A faculty recommendation and an interview by the Honors Committee are also required. First semester involves weekly meetings with a faculty member to discuss readings from a comprehensive list prepared by the Spanish faculty. In the second semester, independent research and completion of an honors essay under the supervision of a member of the Spanish faculty are required.

500 History of the Spanish Language (3:3:0)  
Scientific study of the evolution of the Spanish language from its origin in Vulgar Latin to its present forms.
501 Applied Spanish Grammar (3:3:0) Analysis of Spanish grammar as a basis for teaching language skills. Terminology and methodology for the teaching of syntax are stressed.

502 Hispanic Sociolinguistics (3:3:0) Introduction to sociolinguistics with emphasis on bilingualism and language contact in the Spanish-speaking world including the United States.

505 Applied Spanish Stylistics (3:3:0) Study of creative writing, its form and expression, through text analysis from selected genres: novel, essay, drama, short story, and poetry. Practice in creative writing through exercises, composition, and workshops.

510 Introduction to The Graduate Study of Literature in Spanish (3:3:0) Prerequisite: graduate standing in master’s program in foreign languages, or permission of instructor. Study of the nature of literary work and analysis of critical approaches to literature with an emphasis on texts written in Spanish. Course is a requirement for master’s students of Spanish in their first year of study.

520 Studies in Medieval Spanish Literature (3:3:0) Study of a major work or a literary genre of this period.

525 Studies in Renaissance Literature (3:3:0) Study of a literary movement or selected authors of the Spanish Renaissance.

530 Studies in the Literature of the Golden Age (3:3:0) Study of a literary genre or a major author of Spanish literature of the Golden Age.

540 Studies in 20th-Century Literature (3:3:0) Study of a writer, genre, theme, or movement of this period.

545 Studies in Hispanic Literature (3:3:0) Study of major writers in a particular generation or movement.

551 Special Topics in Spanish (3:3:0) Special studies in Spanish or Latin American language, literature, or culture. Specific topics are announced in advance. May be repeated for credit with permission of department.

560 Studies in Spanish American Poetry (3:3:0) Study of major poets of a given period. Literary and social atmosphere of the period are emphasized.

565 Studies in Spanish American Drama (3:3:0) Study of playwrights who have made a major contribution to the development of the genre.

576 Advanced Translation (3:3:0) Prerequisite: graduate standing or permission of instructor. Advanced work in translation of selected texts from diverse fields. Comparative terminology, sight translation, and précis writing. Emphasis on the function and technique of documentation in translation. Translation from Spanish to English and from English to Spanish.

580 Contemporary Hispanic Institutions (3:3:0) Study of 20th-century cultural, social, and political institutions in Spain and Spanish America with emphasis on language and terminology used to describe their functions, regulations, and conditions.

635 Seminar in Don Quixote (3:3:0) Study of Don Quixote and major critical approaches to the work.

650 Seminar in Twentieth-Century Drama (3:3:0) Study of major dramatists in the generation of 1898 and contemporary theater.

655 Seminar in Twentieth-Century Prose (3:3:0) Study of major writer, theme, or movement in novel or essay.

670 Seminar in Spanish American Prose (3:3:0) Study of a selected theme, movement, or author in the novel, short story, or essay.

675 Seminar in Literature and Art (3:3:0) Comparative analysis of a literary theme or style in relation to other media (painting, architecture, film) for an integral understanding of the arts.

680 Seminar in Literature and Society (3:3:0) Study of a literary topic, a genre, or selected authors in relation to a given economic, social, or political system in Spain or Latin America.

685 Seminar in Literature and Ideas (3:3:0) Study of major ideological-philosophical themes and their artistic expression in literature.

798 Directed Reading and Research (3:0:0) Open only to degree students who have completed at least 18 credits. Reading and research on a specific project under the direction of a department member. Oral or written report required.

799 Thesis (1–6:0:0) Students who take SPAN 798 and then elect thesis option receive 3 credits for SPAN 799 on completion of thesis. Students who do not take SPAN 798 receive 6 credits for SPAN 799 on completion of the thesis. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study in Spanish. Studies designed by student’s discipline director and approved by student’s doctoral committee that prepare student for research and writing in area of interest in discipline. Enrollment may be repeated. See also FRLN course listings.

Special Education (EDSE)
Graduate School of Education

401 Introduction to Special Education (3:3:0) Provides a survey of current knowledge on individuals with disabilities within the context of human growth and development across the life span. Content includes historical factors, legislation, etiology, characteristics, needs, educational strategies, assessment, and support services of and for individuals with disabilities ranging from mild and moderate to severe levels of varying disabilities. Includes the impact of disabilities on academic, social, and emotional performances. Field experience required.

402 Classroom Management and Applied Behavior Analysis (3:3:0) Focuses on identifying, recording, evaluating, and changing social and academic behaviors of special and diverse populations. Explores theories of classroom management and various approaches to management, including use of technological advances. Emphasizes developing classroom and individual behavior management plans.

403 Language Development and Reading (3:3:0) Prerequisites: EDSE 401 and EDSE 440. Identifies literacy skills for typical students, and describes reading, language,
and writing instruction for students with mild disabilities who access the general curriculum. Topics include emergent literacy skills, phonemic awareness, vocabulary development, and comprehension.

411 Characteristics of Students with Visual Impairments (1:1:0) Provides an overview of the characteristics of and services to persons with visual impairments, including the impact of visual impairment on infants’ and children’s growth and development, child and adolescent emotional and social development, and family interaction patterns. Considers the educational, conceptual, psychosocial, and physical implications of a visual impairment. Course delivered online.

412 Braille Code (3:3:0) Prerequisite: EDSE 411 (may be taken concurrently). Provides understanding of the literary code of Braille and its implications for educational/literacy programs for students with a visual disability. Practice experiences will enable students to better understand the Braille code and how to teach it to students with a visual disability. Delivered online.

414 Orientation and Mobility (2:2:0) Prerequisite: EDSE 511 (may be taken concurrently). Provides the foundation for understanding the components and essence of orientation and mobility (O&M). Establishes how the need for independent travel in the blind population created the field of O&M. Explores the philosophy and history of orientation and mobility, including cane instruction, dog guides, and methods of travel. Addresses techniques in developing orientation skills and basic mobility instruction. Motor and concept skill development are emphasized. Delivered online.

415 Early Intervention for Infants and Toddlers with Disabilities (3:3:0) Explores current public policy initiatives for coordinating services for infants and toddlers. Covers models of services delivery and approaches to family-centered service.

418 Curriculum and Assessment of Students with Visual Impairments (3:3:0) Prerequisite: EDSE 511 (may be taken concurrently). Provides students with knowledge and understanding of the educational assessment of students with visual impairments and additional disabilities including deaf-blindness. Students practice assessing and planning educational programs for students with visual impairments. Addresses assessment of technology for students with visual impairments. Examines determination of learning needs and appropriate learning media, relationship of assessment, IEP development, and placement. Delivered online.

422 Augmentative Communication (3:3:0) Focuses on alternative language, literacy, and communication techniques for children with severe language and speech impairments.

428 Elementary Reading, Curriculum, and Strategies for Mild Disabilities (3:3:0) Applies research on teacher effectiveness, teacher accountability, instructional approaches, and advances in technology at the elementary level for individuals with emotional disturbance, learning disabilities, and mental retardation. Includes curriculum and instructional strategies in reading, language arts, mathematics, science, social studies, and social skills; cognitive strategies in self-regulation, study skills, attention, memory, and motivation; and peer-mediated instruction including cooperative learning and peer tutoring.

429 Secondary Curriculum and Strategies for Mild Disabilities (3:3:0) Applies research on teacher effectiveness, teacher accountability, instructional approaches, and technological advances at the secondary level for individuals with emotional disturbance, learning disabilities, and mental retardation. Includes curriculum and instructional strategies in reading, language arts, math, science, social studies, and social skills; cognitive strategies in self-regulation, study skills, attention, memory, and motivation; peer-mediated instruction including cooperative learning and peer tutoring; and self-advocacy and strategies for facilitating transition to community, workplace, and post-secondary environments.

431 Transition and Community-Based Instruction (3:3:0) Addresses issues in transition for youth with severe disabilities. Covers self-determination, development and implementation of a transition plan, post-secondary opportunities including education and community-based instruction, and vocational environments.

432 Positive Behavior Supports (3:3:0) Focuses on concepts and skills to design, implement, and evaluate behavior support programs derived from functional assessment; use effective teaching strategies; address relevant replacement skills; facilitate generalization and maintenance of skills and incorporate individually designed crisis intervention procedures.

434 Communication and Severe Disabilities (3:3:0) Introduces professionals to augmentative and alternative communication (AAC) for individuals with severe speech and language impairments. Addresses knowledge and skills needed to assess the potential AAC user, make team decisions, develop and implement instruction, and evaluate the effects of instruction, aimed at motivating, building, and expanding communication, choice-making, and social interaction.

440 Characteristics of Students with Disabilities Who Access the General Curriculum (3:3:0) Covers theories and specific conditions in learning disabilities and emotional disorders. Includes the impact of these learning and behavioral differences on academic and social and emotional performances. Addresses diversity within student populations. Experiential, observational, and interactive strategies, including use of technological advances, are used to facilitate fulfillment of the outcomes established for the course. May require field experience.

442 Characteristics of Students with Mental Retardation (3:3:0) Covers theories and specific conditions in mental retardation, and provides advanced study of persons with mental retardation, ranging in age from preschool to adult. Topics include historical development of the field of mental retardation; theoretical models of mental retardation; etiological factors; characteristics; models of assessment and intervention, including technological advances; and issues and trends, including legislation and litigation. Includes the study of the impact of mental retardation on academic and social and emotional performances. Field experience required.

447 Medical and Developmental Risk Factors for Children with Disabilities (3:3:0) Examines nature and causes of disabling or special health conditions. Examines screening and evaluation techniques, characteristics, and educational implications.
456 Language Development and Communication for Diverse Infants and Toddlers (3:3:0) Provides understanding of early language development in terms of each of the five major components of language. Speech, language, and communication are discussed, particularly in terms of their interrelatedness with cognitive and sociocultural development. Explores importance of adult-child interaction, and impact of bilingualism, cultural diversity, cognitive ability, and language disorder.

457 Language Development and Emergent Literacy for Diverse Learners (3:3:0) Addresses first and second language acquisition and its application in the various contexts in which children develop. Explores the impact of disability and second language acquisition, and the inter-relationship of speaking, listening, and writing. Includes review of characteristics and etiology of children with language disabilities. Also addresses the diversity of communication styles in families, communities, and cultures. Field experience required.

458 Physical and Sensory Disabilities: Developmental, Education, and Medical Aspects (3:3:0) Focuses on physical, sensory, medical, and health aspects of child development, including etiology and symptomatology of developmental disabilities affecting physical development. Emphasizes positioning, handling, adaptive strategies, and understanding of assistive technology devices. Focuses on the understanding of roles of related disciplines in collaborative planning and service delivery. Field experience required.

459 Curriculum and Methods: Early Childhood Special Education (3:3:0) Emphasizes planning, organizing, implementing, and evaluating programs for young children with special needs.

500 In-Service Educational Development (1–6:1–6:0) Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at request of school division or other educational agency. Content varies; may be repeated for credit.

501 Introduction to Special Education (3:3:0) Survey of current knowledge on individuals with disabilities within the context of human growth and development across the life span. Includes historical factors, legislation, etiology, characteristics, needs, educational strategies, assessment, and support services for individuals with disabilities ranging from mild and moderate to severe. Includes the impact of disabilities on academic, social, and emotional performances. Field experience required.

502 Classroom Management and Applied Behavior Analysis (3:3:0) Explores how to identify, record, evaluate, and change social and academic behaviors of special and diverse populations. Explores theories of classroom management and various approaches to management including use of technological advances. Emphasizes developing classroom and individual behavior-management plans.

503 Language Development and Reading (3:3:0) In-depth coverage of reading instruction for students with special needs. Topics include language development and emergent literacy skills; reading subskills including auditory discrimination, phonemic awareness, decoding and word reading; reading comprehension; and use of technological advances in the teaching of reading.

510/EDIT 510 Introduction to Assistive Technology (3:3:0) Provides an understanding of assistive technology and application in instructional programs, career tasks, and life skills for persons with disabilities. Presentation and demonstration experiences enable students to better use assistive technology in education, work, community, and home environments. Knowledge and awareness components may be delivered via distance education.

511 Characteristics of Students with Visual Impairments (1:1:0) Provides an overview of the characteristics of and services to persons with visual impairments, including the impact of visual impairment on infants’ and children’s growth and development, child and adolescent emotional and social development, and family interaction patterns. Considers the educational, conceptual, psychosocial, and physical implications of a visual impairment. Course delivered online.

512 Braille Code (3:3:0) Prerequisite: EDSE 511 (may be taken concurrently). Provides understanding of the literary code of Braille and its implications for educational/literacy programs for students with a visual disability. Practice experiences enable students to better understand the Braille code and how to teach it to students with a visual disability. Delivered online.

513 Medical and Educational Implications of Visual Impairments (3:3:0) Prerequisite: EDSE 511 (may be taken concurrently). Provides an introduction to anatomy and physiology of the visual system and the educational implications of visual pathology. Topics include anatomy of the human eye, normal visual development, pathology of the eye, examination procedures for the identification of visual pathology, and the effects of pathology on visual learning and development. Delivered online.

514 Orientation and Mobility for Students with Visual Impairments (2:2:0) Prerequisite: EDSE 511 (may be taken concurrently). Provides the foundation for understanding the components and essence of orientation and mobility (O&M). Establishes how the need for independent travel in the blind population created the field of O&M. Explores the philosophy and history of orientation and mobility, including cane instruction, dog guides, and methods of travel. Addresses techniques in developing orientation skills and basic mobility instruction. Motor and concept skill development are emphasized. Delivered online.

517 Computer Applications for Special Populations (3:3:0) Prerequisite: graduate standing, or permission of instructor. Lecture and laboratory course for teachers of special populations in applications of computer technology for instructional programs and computer skills. Students learn to use computer technology designed for special populations.

518 Curriculum and Assessment of Students with Visual Impairments (3:3:0) Prerequisite: EDSE 511 (may be taken concurrently). Provides students with knowledge and understanding of the educational assessment of students with visual impairments and additional disabilities including deaf-blindness. Students practice assessing and planning educational programs for students with visual impairments. Addresses assessment of technology for students with visual impairments. Examines determination of learning needs and appropriate learning media, relationship of assessment, IEP development, and placement. Delivered online.
522 Assistive Technology for Individuals with Sensory Impairments (2-3:2–3:0) Focuses on professionals or students interested in serving visually impaired/blind or hearing-impaired/deaf populations. Heights awareness of participants to specific technology and resources available to enhance and improve ability of individuals with disabilities.

523 Accessibility/Input Modification (1–3:1–3:0) Provides overview of accessibility/input modifications and strategies. Students explore various input devices and their application and use by individuals with disabilities.

524 Assistive Technology for Individuals with Learning Disabilities (2:2:0) Focuses on strategies and techniques for implementing software and other technologies in lives of individuals age three to adult with learning disabilities. Students develop and implement plans for assistive technology. Requires practicum.

525 Software for Individuals with Special Needs (1-2:1–2:0) Focuses on software evaluation and design for individuals with disabilities. Explores existing software resources, and identifies design features to meet individual’s special needs. Students create software program for person with disabilities (credit 2).

526 Web Accessibility and Design (3:3:0) Develops understanding of principles of universal web design. Students apply understanding by designing and developing accessible web site using web-authoring tools.

527 Adapted Sports, Recreation, and Leisure (1:1:0) Introduces tools for adapting sports, recreation, and leisure activities to promote the benefits of active participation, relaxation, health, and well-being for individuals with differing abilities. Students participate in simulations, research, and design. Knowledge and awareness components may be delivered via distance education.

528 Low-Tech Assistive Technology Solutions (1:1:0) Focuses on functional applications of low-technology solutions within the areas of self-care; mobility and transfer communication; stability and support; sports, recreation, and leisure; and academic and work environments. Includes explorations, design, and create low-tech devices for children and adults. Knowledge and awareness components may be delivered via distance education.

529 Internet as an Assistive Technology Tool (2:2:0) Prerequisite: HTML experience. Provides overview of the web and Internet as an educational tool for students with disabilities. Focuses on presentation of strategies, accommodations, assistive technology, and Internet resources for educators. Students review and evaluate web sites, and develop an accessible Internet lesson plan or web site.

530 Policy Perspectives Affecting Diverse Young Learners and Their Families (3:3:0) Provides understanding of historical and current trends and issues involving legislation and policy in early childhood education, bilingual education, early childhood special education, and multicultural education. Focuses on historical role of social advocacy, development of advocacy skills, and collaboration and consultation with other professionals and staff in the field of early childhood education.

531 Transition and Community-Based Instruction (3:3:0) Addresses issues in transition for youth with severe disabilities. Covers self-determination, development, and implementation of a transition plan, post-secondary opportunities including education and community-based instruction, and vocational environments. Course is equivalent to EDSE 544 for students in the severe disabilities program.

532 Positive Behavior Supports (3:3:0) Designed for professionals working with individuals with severe disabilities. Focuses on concepts and skills needed to design, implement, and evaluate behavior support programs derived from functional assessment. Covers effective teaching strategies; addresses relevant replacement skills; facilitates generalization and maintenance of skills; and incorporates individually designed crisis intervention procedures. Course is equivalent to EDSE 620 for students in the severe disabilities program.

533 Curriculum and Assessment in Severe Disabilities (3:3:0) Addresses best practices in curriculum and assessment for individuals with severe disabilities. Covers the design of assessment and evaluation techniques and procedures for the severe-needs population, including adaptations and accommodations. Covers IEP formulation and implementation with linkage to assessment. Course is equivalent to EDSE 649 for students in the severe disabilities program.

534 Communication and Severe Disabilities (3:3:0) Introduces professionals to augmentative and alternative communication (AAC) for individuals with severe speech and language impairments. Addresses the knowledge and skills needed to assess the potential AAC user, make team decisions, develop and implement instruction, and evaluate the effects of instruction, aimed at motivating, building, and expanding communication, choice-making, and social interaction.

540 Characteristics of Students with Disabilities who Access the General Curriculum (3:3:0) Examines the characteristics of students with mild disabilities. Emphasis on etiology, contributing factors, conditions that affect learning, the challenges of identifying students with disabilities, and the need for academic, social, and emotional accommodations and support.

542 Characteristics of Students with Mental Retardation (3:3:0) Covers theories and specific conditions in mental retardation, and provides advanced study of persons with mental retardation, ranging from preschool to adult. Topics include historical development of the field of mental retardation; theoretical models; etiological factors; characteristics; models of assessment and intervention, including technological advances; and issues and trends, including legislation and litigation. Includes the study of impact of mental retardation on academic and social and emotional performances. Requires field experience.

544 Adapted Instructional Methods and Transition for Secondary Learners (3:3:0) Provides strategies for teaching functional academics and social/life skills, facilitating the transition to postsecondary environments. Focuses on all aspects of transition and alternative assessments for secondary learners with disabilities.

547 Medical and Developmental Risk Factors for Children with Disabilities (3:3:0) Examines nature and causes of disabling or special health conditions. Covers screening and evaluation techniques, characteristics, and educational implications.
551 Classroom Management: Theory and Practice (3:3:0)
Focuses on identifying, recording, evaluating, and changing social and academic behaviors of diverse student populations. Explores theories of classroom management, and presents various approaches to instructional, behavioral, and environmental management. Addresses the development of Individualized Education Programs and their impact on management issues. May require field experience in public schools.

553 Teaching Mathematics to Students with Special Needs (3:3:0)
Covers techniques for assessing and remediating difficulties in mathematics.

555 Language Development and Emerging Literacy (3:3:0)

556 Language Development and Communication for Diverse Infants and Toddlers (3:3:0)
Provides understanding of early language development in terms of each of the five major components of language. Discusses speech, language, and communication, particularly in terms of their interrelatedness with cognitive and sociocultural development. Explores the importance of adult-child interaction and the impact of bilingualism, cultural diversity, cognitive ability, and language disorders.

557 Language Development and Emergent Literacy for Diverse Learners Ages 3–5 (3:3:0) Prerequisite: admission to a Mason graduate program.
Addresses first and second language acquisition and its application in the various contexts in which children develop. Explores the impact of disability and second language acquisition, and the interrelationship of speaking, listening, and writing. Includes review of characteristics and etiology of children with language disabilities. Also addresses the diversity of communication styles in families, communities, and cultures. Requires field experience.

558 Physical and Sensory Disabilities: Developmental, Educational, and Medical Aspects (3:3:0) Prerequisite: admission to a Mason graduate program.
Focuses on physical, sensory, and medical and health aspects of child development, including etiology and symptomatology of developmental disabilities affecting physical development. Emphasizes positioning, handling, adaptive strategies and understanding of assistive technology devices. Focuses on the understanding of roles of related disciplines in collaborative planning and service delivery. Requires field experience.

560 Workshop in Education (1–6:1–6:0)
Offers full-time workshops and weekend seminars on selected topics in education and education tour seminars. May be repeated for credit.

561 Designing Adaptive Environments (2:2:0) Prerequisite: EDSE/EDIT 510. Overview of environmental adaptations for people with disabilities to increase their access to community, workplace, and school activities. Covers legal issues within the ADA for adapting environments, and addresses programmatic and physical access issues. Knowledge and awareness components may be delivered via distance education.

562 Special Needs Students in International Schools (3:3:0) Prerequisite or corequisite: admission to FAST TRAIN program for graduate course work, and EDSE 501.
Focuses on students with special learning needs at international schools in the regular classroom environment. Enhances understanding of current issues within the field of special education in the international schools in an increasingly global community.

563 Teaching Methods for Students with Visual Impairments (3:3:0) Prerequisite: EDSE 511 (may be taken concurrently).
Explores methods of teaching compensatory skills, the core curriculum, and technology for use by students who are blind and visually impaired. Addresses curriculum development, adaptations, and teaching methodology for individuals with visual impairments. Provides information on adaptations within various educational programs and adaptation of general education classroom materials and procedures for use with blind and low vision children and youth. Delivered online.

565 Early Intervention for Infants and Toddlers with Disabilities (3:3:0)
Explores current public policy initiatives for coordinating services for infants and toddlers. Covers models of services delivery and approaches to family-centered service.

566 Braille Reading and Writing (3:3:0) Prerequisite: EDSE 512; EDSE 511 (may be taken concurrently).
Provides basic instruction on transcription of advanced Braille codes, including music, foreign language, chemistry, computer Braille, and Nemeth code (Braille math code). Introduces techniques for teaching skills in each code. Explores technology tools used to create Braille and tactile materials in addition to other assistive technologies used for instruction in math and science. Delivered online.

569 Applied Behavior Analysis: Principles, Procedures, and Philosophy (3:3:0) Prerequisite: Admission to applied behavior analysis graduate certificate program.
Focuses on basic principles and procedures of applied behavior analysis; identification of factors that contribute to behavioral problems and improved performance; and procedures that can be used to minimize behavioral problems, improve performance, teach new behaviors, and increase probability of behaviors occurring under appropriate circumstances.

570 Managing Severely Challenging Behaviors and Applied Behavior Analysis (3:3:0) Prerequisites: graduate standing and permission of advisor.
Focuses on applying behavior analysis principles and social learning theory to increase learning by students with special needs. Emphasizes single subject research designs.
621 Applied Behavior Analysis: Empirical Bases (3:3:0)  
Prerequisite or corequisite: EDSE 619. Focuses on basic content of applied behavior analysis. Teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs.

623 Applied Behavior Analysis: Assessments and Interventions (3:3:0)  
Prerequisites: EDSE 619. Further expands on basic content of applied behavior analysis and teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs.

624 Applied Behavior Analysis: Applications (3:3:0)  
Prerequisite or corequisite: EDSE 623. Expands capability to deal with more complex behavioral situations and enables students to relate to more sophisticated professional issues and environments.

625 Applied Behavior Analysis: Verbal Behavior (3:3:0)  
Prerequisite: EDSE 623. Further expands capability to deal with more complex behavioral situations, and enables students to relate to more sophisticated professional issues and environments.

626 The Inclusive Classroom (3:3:0)  
Introduces instructional procedures for facilitating inclusive instruction for students with disabilities in general education classes. Includes characteristics of students with disabilities and with effective strategies for adapting curriculum materials, designing instructional procedures, and evaluation methods to accommodate students with disabilities within general education inclusive environments.

627 Psychoeducational Assessment (3:3:0)  
Offers knowledge and experiential learning activities related to psychoeducational assessment of students with mild disabilities. Includes statistical and psychometric concepts in assessment. Addresses norm-referenced, criterion-referenced, and curriculum-based measurement, as well as informal testing. Provides experiences in administering, scoring, and interpreting academic and behavior assessment instruments commonly used in special education, with emphasis on writing reports and developing the Individualized Education Program using existing and emerging technologies. Considers use of assessment results for instructional and placement decisions.

628 Elementary Reading, Curriculum, and Strategies for Students with Mild Disabilities (3:3:0)  
Applies research on teacher effectiveness, teacher accountability, instructional approaches, and advances in technology at the elementary level for individuals with emotional disturbance, learning disabilities, and mental retardation. Includes curriculum and instructional strategies in reading, language arts, mathematics, science, social studies, and social skills; cognitive strategies in self-regulation, study skills, attention, memory, and motivation; and peer-mediated instruction including cooperative learning and peer tutoring.

629 Secondary Curriculum and Strategies for Students with Disabilities who Access the General Curriculum (3:3:0)  
Applies research on teacher effectiveness, accountability, and instructional approaches at the secondary level for individuals with mild disabilities. Includes instructional methods necessary for teaching reading, writing, math, and other content areas across the curriculum.

631 Policy Perspectives Affecting Diverse Young Learners (3:3:0)  
Prerequisite: admission to a Mason graduate program. Provides understanding of historical and current trends and issues involving legislation and policy in early childhood education, bilingual education, early childhood special education, and multicultural education. Focuses on historical role of social advocacy, development of advocacy skills, and collaboration and consultation with other professionals and staff. Addresses continuum of services and the context of service delivery. Requires field experience.

632 Characteristics of Students with Autism (3:3:0)  
Describes varying characteristics of students labeled with a type of autism who receive special education services. Examines definitions, eligibility criteria, incidence rates, and etiology. Perspectives from students, families, educational, community, and career personnel are described.

633 Interventions for Students with Autism (3:3:0)  
Research-based interventions that promote progress in the areas of communication, social, academic, behavior, and sensory motor skills for students with autism are described. Methods for monitoring the impact of interventions are identified and a variety of service delivery models are described.

634 Characteristics of Students with Autism (3:3:0)  
Describes varying characteristics of students labeled with a type of autism who receive special education services. Examines definitions, eligibility criteria, incidence rates, and etiology. Perspectives from students, families, educational, community, and career personnel are described.

635 Interventions for Students with Autism (3:3:0)  
Research-based interventions that promote progress in the areas of communication, social, academic, behavior, and sensory motor skills for students with autism are described. Methods for monitoring the impact of interventions are identified and a variety of service delivery models are described.

636 Introduction to Psycho-Educational Assessment (3:3:0)  
Prerequisite: EDSE 540. Introduces basic statistical procedures and test characteristics. Appropriate terminology and practices related to formal and informal assessment applied throughout the course. Students practice administering, scoring, and interpreting tests, including the impact of multicultural diversity on assessment.

637 Advanced Clinical Psycho-Educational Assessment in Special Education (3:3:0)  
Prerequisite: EDSE 648 is required for ED/LD students. Focuses on advanced issues in administering, scoring, and interpreting education evaluation instruments with emphasis on writing reports and developing the Individualized Education Program. Considers using assessment results for instructional and placement decisions.

638 Curriculum Methods: Elementary ED/LD (3:3:0)  
Applies research on teaching effectiveness, teaching accountability, and instructional approaches with specific attention to reading, language arts, social skills, and cooperative learning. May require field experience in public schools.

639 Assessment of Diverse Young Learners, Ages 3–5 (3:3:0)  
Provides understanding of the forms, functions, methods, and roles of assessment for planning and implementing effective early childhood programs for children ages 3 to 5 from diverse cultures and with varied learning needs. Students learn to use qualitative and quantitative approaches to evaluation and assessment. They also learn about technological adaptations, and gain an understanding of appropriate strategies for conducting, reporting, and decision-making related to specific functions of assessment. Course also covers assessment strategies necessary for second-language learners, and adaptations for children with disabilities.

640 Curriculum and Methods: Early Childhood Special Education (3:3:0)  
Prerequisite: permission of advisor. Emphasizes planning, organizing, implementing, and evaluating programs for young children with special needs.
661 Curriculum and Methods: Severe Disabilities (3:3:0)
Focuses on current best practices in curriculum, and methods for students with severe disabilities, including specific strategies for teaching students with severe disabilities, general strategies for working with heterogeneous groups of students in inclusive settings, and methods for adapting the general education curriculum to include students with severe disabilities.

662 Consultation and Collaboration (3:3:0)
Prerequisite: admission to Mason graduate program.
Provides advanced graduate students with opportunities for in-depth study, analysis, and discussion of original intervention research in special education practice and policy. Familiarizes students with current issues in special education and the group experimental, single subject, and qualitative research designs used to address these current issues. Students evaluate research studies in terms of their methodological strengths and weaknesses and their part in providing convergent bodies of evidence that can be used for defining practice and policy.

663 Consultation and Collaboration (3:3:0)
Prerequisite: admission to PhD in education program, or permission of instructor.
Prerequisite and corequisite for doctoral studies or who have been admitted to the PhD program in education.
Provides advanced graduate students with opportunities for in-depth study, analysis, and discussion of original intervention research in special education practice and policy. Familiarizes students with current issues in special education and the group experimental, single subject, and qualitative research designs used to address these current issues. Students evaluate research studies in terms of their methodological strengths and weaknesses and their part in providing convergent bodies of evidence that can be used for defining practice and policy.

664 Consultation and Collaboration (3:3:0)
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Prerequisite and corequisite for doctoral studies or who have been admitted to the PhD program in education.
Provides advanced graduate students with opportunities for in-depth study, analysis, and discussion of original intervention research in special education practice and policy. Familiarizes students with current issues in special education and the group experimental, single subject, and qualitative research designs used to address these current issues. Students evaluate research studies in terms of their methodological strengths and weaknesses and their part in providing convergent bodies of evidence that can be used for defining practice and policy.

665 Collaboration with Families of Children with Special Needs (3:3:0)
Focuses on strategies for developing culturally appropriate family-professional partnerships to benefit children with special needs. Explores theories and research that support a family-centered approach. Includes a focus on family and professional rights and responsibilities in the special education process.

666 Collaboration and Consultation (3:3:0)
Prerequisite: admission to Mason graduate program.
Provides advanced graduate students with opportunities for in-depth study, analysis, and discussion of original intervention research in special education practice and policy. Familiarizes students with current issues in special education and the group experimental, single subject, and qualitative research designs used to address these current issues. Students evaluate research studies in terms of their methodological strengths and weaknesses and their part in providing convergent bodies of evidence that can be used for defining practice and policy.

667 Cognitive Development of Diverse Young Children (3:3:0)
Prerequisite: admission to Mason graduate program.
Explores conflicting views about how young children think and learn. Addresses cognitive theoretical approaches of leading researchers, and emphasizes their relevance to educational practice. Addresses characteristics of children with cognitive disabilities, children from multilingual and multicultural backgrounds, and those living in poverty, along with the educational implications of those characteristics. Requires field experience.

668 Sensory and Motor Disabilities (3:3:0)
Focuses on understanding the roles of related disciplines in collaborative planning and service delivery.

669 Interdisciplinary Approach for Children with Sensory and Motor Disabilities (3:3:0)
Emphasizes positioning, handling, and adaptive strategies. Focuses on understanding the roles of related disciplines in collaborative planning and service delivery.

701 Legal Issues and Special Populations (3:3:0)
Offers a study of the impact of legislation and litigation on the education of special populations emphasizing IDEA and Section 504. Topics of study include emerging trends in special education based on interpretation of landmark court cases related to disability, legal updates on policies and procedures for exceptional learners, and discussion of the guiding principles of special education law when addressing the needs of special populations.

702 Managing Resources for Special Education Programs (3:3:0)
Examines the specialized skills necessary to develop and deliver programs for exceptional learners. Topics of study include use of Individualized Education Plans (IEPs) to support curriculum access and service delivery via Universal Design, financial planning and budget issues, acquisition of external funding, utilization of technological resources, recruitment and retention of staff human resource development, effective supervision, and evaluation and documentation of student outcomes.

703 Creating a Collaborative Culture (3:3:0)
Provides leaders in school settings with an opportunity to gain the skills needed to facilitate collaborative environments supportive of all learners. Topics of study include the impact of diversity on educational settings, developing a vision of educationally engaging and coteaching techniques, family professional partnerships, implementing schoolwide change initiatives, alternative dispute resolution, and maintaining a positive school climate.

743 Leadership in Special Education Administration (3:3:0)
Examines leadership issues and applies them to the administration of special education programs. Explores current challenges in the delivery of services for exceptional children through case studies and projects.

744 Current Issues in Special Education (3:3:0)
Helps students develop an understanding of the role of convergent research evidence in addressing current issues in special education policy and practice. Familiarizes students with current issues in special education and the group experimental, single subject, and qualitative research designs used to address these current issues. Students evaluate research studies in terms of their methodological strengths and weaknesses and their part in providing convergent bodies of evidence that can be used for defining practice and policy.

782 Comprehensive Topics in Special Education: Trends and Issues (3:3:0)
Prerequisite: majority of course work.
Focuses on current trends and issues in special education based on interpretation of landmark court cases related to disability, legal updates on policies and procedures for exceptional learners, and discussion of the guiding principles of special education law when addressing the needs of special populations.

790 Internship in Special Education (1–6:1–6:0)
Prerequisite: passing scores on Praxis I prior to final internship, and permission of advisor.
Supervised internships that apply university course work to instruction of children and their families in school and community settings. Students enroll in two separate internships appropriate to the area of study for a total of 6 credits. Applications for field internships are due on February 15 for fall; September 15 for spring; and March 1 for summer.

791 Midpoint Portfolio (1:1:0)
Prerequisite and corequisite: must be taken concurrently with fourth EDSE prefix course or concurrently with fourth or fifth EDSE prefix course in program. Opportunity for students to develop their portfolio. Serves as the vehicle to assess whether they are meeting the standards of their professional organization, the Council for Exceptional Children.

792 Final Portfolio (1:1:0)
Corequisite: must be taken concurrently with last EDSE 790 internship or the last EDSE course in the program. Opportunity for students to develop their portfolio. Serves as the vehicle to assess whether they are meeting the standards of their professional organization, the Council for Exceptional Children.

794 Special Topics (1–6:1–6:0)
Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education.

797 Advanced Topics in Education (1–6:1–6:0)
Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with CEHD approval.

841 Intervention Research in Special Education (3:3:0)
Prerequisite: admission to PhD in education program, or permission of instructor.
Provides advanced graduate students with opportunities for in-depth study, analysis, and discussion of original intervention research in special education.
tion. Emphasizes analyzing research methodology, coding original intervention research, analyzing results, synthesizing findings, formulating future research questions relevant to individuals with disabilities, and gaining an understanding of the submission process for conferences and publications.

842 Application of Research Methodology in Special Education (3:3:0) Prerequisite: admission to PhD in education program, or permission of instructor. Provides knowledge and skills in the application of research methodology in special education. Topics include methods for conducting survey research, experimental and quasi-experimental research, research involving correlation and regression, and qualitative research. Emphasizes application to specific issues in special education research.

843 Leadership in Special Education Administration (3:3:0) Prerequisite: admission to PhD in education program, or permission of instructor. Examines leadership issues and applies them to the administration of special education programs. Explores current challenges in the delivery of services for exceptional children through case studies and projects.

844 Current Issues in Special Education (3:3:0) Prerequisite: admission to PhD in education program, or permission of instructor. Develops understanding of the role of convergent research evidence in addressing current issues in special education practice and policy. Describes current issues in special education and the group experimental, single subject, and qualitative research designs used to address these current issues. Students evaluate research studies in terms of methodological strengths and weaknesses, and their part in providing convergent bodies of evidence that can be used for defining practice and policy.

Sport Management (SPMT)

School of Recreation, Health, and Tourism

201 Introduction to Sport Management (3:3:0) Open to nonmajors. Introduces sport management profession. Primary focus is on sport industry, including professional sport entertainment, amateur sport entertainment, for-profit sport participation, nonprofit sport participation, sporting goods, and sport services.

241 Practicum (3:0:3) Open to majors and minors only. Prerequisite: SPMT 201. Paid or voluntary experience in sport industry setting. Work sites chosen by students after receiving approval of faculty supervisors.

302 Sport and Ethics (3:3:0) Prerequisites: SPMT 201 and 60 hours or permission of instructor. Investigates moral issues in sport and judgments about right and wrong behavior among athletes, coaches, spectators, and others.

304 Sport, Culture, and Society (3:3:0) Prerequisite: PHED 200 or permission of instructor. Analyzes sport from educational, political, economic, and cultural perspectives.

318 Gender and Racial Issues in Sport (3:3:0) Investigates dominant gender and racial ideologies, and their influence on sport.

320 Psychology of Sport (3:3:0) Psychological theories of personality, motivation, and anxiety explored in sport environment. Examines social-psychological research on audience effects, team cohesion, leadership, and fan behavior.

405 Sport Operation and Planning (3:3:0) Principles and techniques of planning and operating sport facilities. Emphasizes principles and concepts of organization and administration including communication, personnel management, management of physical resources, and risk management. Examines variety of sport operations such as indoor stadiums, athletic field complexes, and managing recreation and intramural activities.

412 Sport Marketing and Finance (3:3:0) Prerequisites: SPMT 201 and PRLS 411, or permission of instructor. Investigates principles and processes in sport marketing and finance. Focuses on research and development, sport promotion, sport sponsorships, advertising, merchandising, and distribution of sporting goods.

420 Economics and Finance in the Sport Industry (3:3:0) Prerequisites: Completion of 60 hours, including SPMT 201, or permission of instructor. Examines the principles of economics, budgeting, and finance as it applies to the sport industry.

430 Sport Communication (3:3:0) Prerequisites: 60 hours, including SPMT 201, PHED 200, and the general education communication requirement, or permission of instructor. Provides a senior-level exploration of the role of sport communication in contemporary cultures. Readings and discussions address questions about how communication about/in sports highlights the importance of sports, the cultural identities of those who engage in sport communication, and the pervasiveness of sport communication practices in industry.

440 Global Perspectives in Sport (3:3:0) Prerequisites: 60 hours, including SPMT 304, or permission of instructor. This course is an interdisciplinary examination of sport as a global phenomenon. Historical, cultural, economic, and governance perspectives are considered.

455 Governance and Policy in Sport Organizations (3:3:0) Prerequisite: 60 hours, including SPMT 201, or permission of instructor. Examines sport organizations focused on both professional and amateur governance structures and processes. The study of policy in educational, nonprofit, and professional sport venues is also addressed.

475 Sport Management Professional Development Seminar (3:3:0) Prerequisites: 90 hours, including SPMT 241 and PHED 200, and a minimum of 40 hours in SRHT. This is a seminar format in which students synthesize and apply theories, concepts, and practices in the leadership and management of sport organizations.

480 Special Topics in Sport Management (3:3:0) Prerequisite: 60 credits. See course description in the Schedule of Classes. Selected topics reflecting interest in specialized areas of sport management. Announced in advance.

490 Internship (12:0:12) Prerequisites: 90 hours (pass/fail), HEAL 323, PHED 200, PRLS 410, SPMT 304, and SPMT 403. Paid or voluntary work experience in sport industry settings. Requires minimum period of 10 to 12 weeks of full-time employment. Applies course work, theories, and research to work settings. Work sites chosen by students after approval of faculty supervisors. Includes meetings and assignments before and during the internship.

499 Independent Study (1–3:1–3:0) Faculty-directed independent study of approved topics in sport management.
Statistics (STAT)

Statistics

250 Introductory Statistics I (3:3:0) Prerequisite: high school algebra. Elementary introduction to statistics. Topics include descriptive statistics, probability, and estimation and hypothesis testing for means and proportions. Statistical software used for assignments. f, s, sum

344 Probability and Statistics for Engineers and Scientists I (3:3:0) Prerequisite: MATH 213. Introduction to probability and statistics with applications to computer science, engineering, operations research, and information technology. Basic concepts of probability, random variables and expectation, Poisson process, bivariate distributions, sums of independent random variables, correlation and least squares estimation, central limit theorem, sampling distributions, maximum likelihood and unbiased estimators, confidence interval construction, and hypothesis testing. f,s,sum

346 Probability for Engineers (3:3:0) Prerequisite: MATH 213. Introduction to probability with applications to electrical and computer engineering, operations research, information technology, and economics. Basic concepts of probability, conditional probability, random variables and moments, specific probability distributions, multivariate distributions, moment generating functions, limit theorems, and sampling distributions. f,s

350 Introductory Statistics II (3:3:0) Prerequisite: STAT 250. Emphasis on applications. Topics include analysis of variance, multiple regression, and nonparametric inference. A statistical computer package is used for data analysis. f,s

354 Probability and Statistics for Engineers and Scientists II (3:3:0) Prerequisite: STAT 344. Continuation of STAT 344. Multivariate probability distributions, variable transformations, regression, analysis of variance, contingency tables, and nonparametric methods. Applications to quality control, acceptance sampling, and reliability. s

362/IT 362 Introduction to Computer Statistical Packages (3:3:0) Prerequisite: STAT 250 or equivalent. Use of computer packages in statistical analysis of data. Topics include data entry, checking, and manipulation; and use of computer statistical packages for regression and analysis of variance. s

435 Analysis of Experimental Data Using SPSS (3:3:0) Prerequisite: STAT 250 or equivalent. Statistical methods for analysis of experimental data, including ANOVA and regression. Parametric and nonparametric inference methods appropriate for a variety of experimental designs are presented along with data analysis using SPSS. Intended primarily for researchers in the natural, social, and life sciences. f

455 Experimental Design (3:3:0) Prerequisites: STAT 350 or 354, and STAT 362 or 501. Principles of analysis of variance and experimental design. Topics include computation and interpretation of analysis of variance; multiple comparisons; orthogonal contrasts; and design of experiments, including factorial, hierarchical, and split plot designs. Optional topics may include analysis of covariance; partial hierarchical designs; incomplete block designs; principles of blocking and confounding in 2**n experiments; or estimation of variance components. Computer statistical packages are used to perform computations. ir

457 Applied Nonparametric Statistics (3:3:0) Prerequisites: STAT 350 or 354, or equivalent. Introduction to nonparametric methods with applications to the decision and information sciences and operations analysis. Topics covered are testing and estimation for one- and two-sample problems, independent and paired samples, location and dispersion problems, one- and two-way layouts, tests for independence, regression, and discussion of efficiency. ir

463 Introduction to Exploratory Data Analysis (3:3:0) Prerequisite: STAT 350 or 354, or equivalent. Introduction to modern exploratory data analysis techniques. Topics include graphical techniques, such as box plots, parallel coordinate plots, and other graphical devices, re-expression and transformation of data, order statistics, influence and leverage, and dimensionality reduction methods such as projection pursuit. ir

474 Introduction to Survey Sampling (3:3:0) Prerequisite: STAT 350 or 354 and STAT 362 or permission of instructor. Introduction to design and analysis of sample surveys. Sample designs include simple random sampling; systematic sampling; stratified, cluster, and multistage sampling. Analytical methods include sample size determination, ratio and regression estimation, imputation for missing data, and nonsampling error adjustment. Practical problems encountered in conducting a survey are discussed. Methods applied to case studies of actual surveys. Class project may be required. Recommended for students of decision, information, social sciences, and mathematics. f

498 Independent Study in Statistics (1–3:0:0) Prerequisites: 60 undergraduate credits; must be arranged with instructor and approved by the department chair before registering. Directed self-study of special topics of current interest in statistics. May be repeated for maximum 6 credits if topics are substantially different.

499 Special Topics in Statistics (3:3:0) Prerequisites: 60 undergraduate credits and permission of instructor; specific prerequisites vary with nature of topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics substantially differ.

501 SAS Language and Basic Procedures (1:1:0) Prerequisite: course in statistics and experience with Microsoft OS. Introduction to the SAS Data Step and Base SAS Procedures. Preparation for graduate students in use of SAS for other graduate courses offered by department. Topics include observation and variable structures, data interfaces, formats, functions, and procedures for summarizing and displaying data. At most, one of STAT 501–503 can be applied to certificate programs in statistics. s

502 Introduction to SAS/GRAPH (1:1:0) Prerequisite: STAT 501. Introduction to SAS/GRAPH. Continued preparation beyond STAT 501 for graduate students in the use of SAS for other graduate courses offered by department. Topics include SAS/GRAPH and SAS/GRAPH procedures, SAS/GRAPH output options and in-depth coverage of the GOPTIONS, GDEVICE, GCHART, GPLOT, and GSLIDE procedures. At most, one of STAT 501–503 can be applied to certificate programs in statistics. s

503 SAS Macro Language (1:1:0) Prerequisite: STAT 501. Introduction to SAS Macro Language. Continued preparation beyond STAT 501 for graduate students in use of SAS for other graduate courses offered by department. Topics include macro language processing, macro variables, defining and
calling macro variables, macro quoting, macro facility error messages, and examples of efficient code using macros. At most, one of STAT 501–503 can be applied to certificate programs in statistics.

535 Analysis of Experimental Data Using SPSS (3:3:0)
Prerequisite: STAT 250 or equivalent. Statistical methods for analysis of experimental data, including ANOVA and regression. Parametric and nonparametric inference methods appropriate for a variety of experimental designs are presented along with data analysis using SPSS. Intended primarily for researchers in the natural, social, and life sciences. Can be used to satisfy requirements for certificates in federal statistics and biostatistics, but not MS in statistical science. Certificate program students granted credit for only one of STAT 535 or 554.

544 Applied Probability (3:3:0)
Prerequisite: Math 213 and STAT 344, or permission of instructor. Course in probability with applications in computer science, engineering, operations research, and statistics. Random variables and expectation, multivariate and conditional distributions, conditional expectation, order statistics, transformations, moment generating functions, special distributions, limit theorems.

554 Applied Statistics (3:3:0)
Prerequisite: STAT 344 or equivalent, or permission of instructor. Application of basic statistical techniques. Focus is on the problem (data analysis) rather than on the theory. Topics include one and two sample tests and confidence intervals for means and medians, descriptive statistics, goodness-of-fit tests, one- and two-way ANOVA, simultaneous inference, testing variances, regression analysis, and categorical data analysis. Normal theory is introduced first with discussion of what happens when assumptions break down. Alternative robust and nonparametric techniques are presented. Certificate program students granted credit for only one of STAT 535 or 554.

574 Survey Sampling I (3:3:0)
Prerequisite: STAT 354 or 554; corequisite: STAT 362 or permission of instructor. Design and implementation of sample surveys. Covers components of a survey; probability sampling designs to include simple random, systematic, Bernoulli, proportional to size, stratified, cluster and two-stage sampling; and ratios and regression estimators. Discusses practical problems in conducting a survey. Methods applied to case studies of actual surveys. Class project required.

634 Case Studies in Data Analysis (3:3:0)
Prerequisite: STAT 534 and 501, or permission of instructor. Examination of a wide variety of case studies illustrating data-driven model building and statistical analysis. With each case study, various methods of data management, data presentation, statistical analysis, and report writing are compared.

645/OR 645 Stochastic Processes (3:3:0)
Prerequisite: OR 542 or STAT 544, or permission of instructor. Selected applied probability models, including Poisson processes, discrete- and continuous-time Markov chains, renewal and regenerative processes, semi-Markov processes, queuing and inventory systems, reliability theory, and stochastic networks. Emphasis on applications in practice, as well as analytical models.

652/CSI 672 Statistical Inference (3:3:0)
Prerequisite: STAT 544, ECE 528, or equivalent. Fundamental principles of estimation and hypothesis testing. Topics include limiting distributions and stochastic convergence, sufficient statistics, exponential families, statistical decision theory and optimality for point estimation, Bayesian methods, maximum likelihood, asymptotic results, interval estimation, optimal tests of statistical hypotheses, and likelihood ratio tests.

655 Analysis of Variance (3:3:0)
Prerequisite: STAT 554 and 501, or permission of instructor. Single and multivariate analysis of variance, planning sample sizes, introduction to the design of experiments, random block and Latin square designs, and analysis of covariance.

656 Regression Analysis (3:3:0)
Prerequisites: STAT 554, STAT 501, and matrix algebra; or permission of instructor. Simple and multiple linear regression, polynomial regression, general linear models, subset selection, step-wise regression, and model selection. Also covered are multicollinearity, diagnostics, and model building. Both the theory and practice of regression analysis are covered.

657 Nonparametric Statistics (3:3:0)
Prerequisite: STAT 544 and 554. Distribution-free procedures for making inferences about one or more samples. Tests for lack of independence, association or trend, and monotone alternatives are included. Measures of association in bivariate samples and multiple classifications are discussed. Both theory and applications are covered. Students are introduced to appropriate statistical software.

658/CSI 678 Time Series Analysis and Forecasting (3:3:0)
Prerequisite: STAT 544 or equivalent. Modeling stationary and nonstationary processes, autoregressive, moving average and mixed model processes, autocovariance functions, autoregression functions, partial autocorrelation functions, spectral density functions, identification of models, estimation of model parameters, and forecasting techniques.

660 Biostatistical Methods (3:3:0)
Prerequisites: STAT 554 or STAT 535 and a working knowledge of a statistical software package, such as SAS or SPSS. Focuses on biostatistical aspects of design and analysis of biomedical studies, including epidemiologic observational studies and randomized clinical trials. Topics include randomization principle, confounding, ethics in human experimentation, methods of randomization, stratification, primary outcome analyses, covariate-adjusted analyses, epidemiologic measures, and sample size and power computation.

662 Multivariate Statistical Methods (3:3:0)
Prerequisites: STAT 554 or STAT 535 and 501; or permission of instructor. Standard techniques of applied multivariate analysis. Topics include review of matrices, T square tests, principle components, multiple regression and general linear models, analysis of variance and covariance, multivariate ANOVA, canonical correlation, discriminant analysis, classification, factor analysis, clustering, and multidimensional scaling. Computer implementation via a statistical package is an integral part of the course.

663/CSI 773 Statistical Graphics and Data Exploration (3:3:0)
Prerequisite: A 300-level course in statistics. (STAT 554 is strongly recommended.) Exploratory data analysis provides a reliable alternative to classical statistical techniques that are designed to be the best possible when stringent assumptions apply. Topics include graphical techniques such as scatter plots, box plots, parallel coordinate plots and other graphical devices, re-expression and transformation of data, influence and leverage, and dimensionality reduction methods such as projection pursuit.
664/SYST 664 Bayesian Inference and Decision Theory (3:3:0) Prerequisite: STAT 544, 554, or equivalent. Introduces decision theory and relationship to Bayesian statistical inference. Teaches commonalities, differences between Bayesian and frequentist approaches to statistical inference, how to approach a statistics problem from the Bayesian perspective and how to combine data with informed expert judgment in a sound way to derive useful and policy-relevant conclusions. Teaches necessary theory to develop firm understanding of when and how to apply Bayesian and frequentist methods, and practical procedures for inference, hypothesis testing, and developing statistical models for phenomena. Teaches fundamentals of Bayesian theory of inference, including probability as a representation for degrees of belief, likelihood principle, use of Bayes Rule to revise beliefs based on evidence, conjugate prior distributions for common statistical models, and methods for approximating the posterior distribution. Introduces graphical models for constructing complex probability and decision models from modular components. af

665 Categorical Data Analysis (3:3:0) Prerequisites: STAT 554 or equivalent, STAT 656, and STAT 501. Analyzes cross-classified categorical data in two and higher dimensions. Familiarity with the basic test for two-way contingency tables and elementary regression and analysis of variance as presented in STAT 554 is presumed. Topics include association tests and measures of association in two- and three-dimensional contingency tables, logistic regression, and loglinear models. Computer statistical package used extensively for data analysis. as

668 Survival Analysis (3:3:0) Prerequisites: STAT 544, 554 or 555, and STAT 501, or a working knowledge of SAS. Survival Analysis is a class of statistical methods for studying the occurrence and timing of events. In medical research, the events may be deaths, and the objective is to determine factors affecting survival times of patients following treatment, usually in the setting of clinical trials. Methods can also be applied to the social and natural sciences and engineering where they are known by other names (reliability, event history analysis). Concepts of censored data, time-dependent variables, and survivor and hazard functions are central. Nonparametric methods for constructing computational models for survival data in the Cox regression model (proportional hazards model), Weibull model, and the accelerated failure time model are studied in detail. Concepts are applied to analysis of raw data from major medical studies using SAS software. af

673 Statistical Methods for Longitudinal Data Analysis (3:3:0) Prerequisites: STAT 544, STAT 656, and working knowledge of a statistical software package. Presents modern statistical approaches to the analysis of longitudinal data, i.e., data collected repeatedly on experimental units over time (or other conditions). Topics include linear mixed effects models, generalized linear models for correlated data (including generalized estimating equations), and computational issues and methods for fitting models. as

674 Survey Sampling II (3:3:0) Prerequisites: STAT 501, 554, and 574. Continuation of STAT 574. Regression estimators for complex sampling designs, domain estimation, two-phase sampling, weighting adjustments for nonresponse, imputation, nonresponse models, measurement error models, introduction to variance estimation. Applications to case studies of actual surveys. as

677/OR 677/SYST 677 Statistical Process Control (3:3:0) Prerequisite: STAT 544 or 554, or permission of instructor. Introduces concepts of quality control and reliability. Acceptance sampling, control charts, and economic design of quality control systems are discussed, as are system reliability, fault-tree analysis, life testing, repairable systems, and the role of reliability, quality control, and maintainability in life-cycle costing. Role of MIL and ANSI standards in reliability and quality programs also considered. ir

700 Advanced Quantitative Data Analysis for Health Care Research II (3:3:0) Prerequisite: STAT 535 or HSCI 799. Multivariate analysis of variance (MANOVA, MANCOVA), multiple regression, and logistic regression. Students apply multivariate statistical methods using statistical software to analyze and interpret data in health care research. Cannot be used to satisfy requirements for MS in statistical science. ir

701 Advanced Multivariate Statistics and Data Analysis in Health Care Research (3:3:0) Prerequisites: STAT 700, HSCI 800, or equivalent. Coverage of discriminate analysis, canonical correlation analysis, structural analysis (LSREL and path analysis), and factor analysis. Cannot be used to satisfy requirements for MS in statistical science. ir

719/OR 719/CSI 775 Computational Models of Probabilistic Reasoning (3:3:0) Prerequisites: STAT 652 or SYST/STAT 664, or permission of instructor. Introduces theory and methods for building computationally efficient software agents that reason, act, and learn environments characterized by noisy and uncertain information. Covers methods based on graphical probability and decision models. Students study approaches to representing knowledge about uncertain phenomena, and planning and acting under uncertainty. Topics include knowledge engineering, exact and approximate inference in graphical models, learning in graphical models, temporal reasoning, planning, and decision-making. Practical model building experience is provided. Students apply what they learn to semester-long project of their own choosing. ir

751/CSI 771 Computational Statistics (3:3:0) Prerequisites: STAT 544, STAT 554, and STAT 652. Covers basic computationally intensive statistical methods and related methods, which would not be feasible without modern computational resources. Covers nonparametric density estimation including kernel methods, orthogonal series methods and multivariate methods, recursive methods, cross-validation, nonparametric regression, penalized smoothing splines, the jackknife and bootstrapping, computational aspects of exploratory methods including the grand tour, projection pursuit, alternating conditional expectations, and inverse regression methods. af

753 Computer Intrusion Detection (3:3:0) Prerequisite: STAT 554 or 663, or permission of instructor. Statistical approach to computer intrusion detection. Networking basics, TCP/IP networking, network statistics, evaluation, intrusion
758 Advanced Time Series Analysis (3:3:0) Prerequisite: STAT 658. Mathematical modeling and methods for model identification and forecasting of nonstationary and seasonal time series data (ARIMA models), multivariate time series, and state-space models.

760 Advanced Biostatistical Methods (3:3:0) Prerequisites: STAT 544, STAT 652, working knowledge of statistical programming language. Advanced statistical methods in the drug development process. Provides the theoretical statistical basis for the design and analysis of pharmaceutical clinical trials. Topics include the theory of randomization, randomization-based inference, restricted, response-adaptive, and covariate-adaptive randomization, the modern theory of group sequential monitoring, statistical aspects of determination of dose-response relationships.

779 Topics in Survey Design and Analysis (1–3;1–3:0) Prerequisite: STAT 674 or permission of instructor. Specialized advanced topics in survey sampling building on foundations in STAT 574 and 674. Topics vary according to interest and availability of instructors, but may include administrative records in analysis of data, adaptive sampling, calibration estimators, capture-recapture models, data security, establishment surveys, model-based inference, measurement error models, nonresponse models, imputation, multivariate analysis of survey data, record linkage, small area estimation, spatial sampling, survey errors and costs, telephone survey methods, variance estimation, web-based survey methods. Topics may be offered in form of modules from 1 to 3 credits, with 1-credit module offered over five weeks. Up to three modules may be offered in single semester for maximum 3 credits. Students may earn up to 6 credits under different topics.

781/SYST 781 Data Mining and Knowledge Discovery (3:3:0) Prerequisite: One of the following courses: CS 687, CS 650, INFS 614, STAT 663, STAT 664, or permission of instructor. Statistical and computational methods and systems for deriving user-oriented knowledge from large databases and other information sources, and applying knowledge to support decision making. Information sources can be in numerical, textual, visual, or multimedia forms. Covers theoretical and practical aspects of current methods and selected systems for data mining, knowledge discovery, and knowledge management, including those for text mining, multimedia mining and web mining. Content may vary from semester to semester.

789 Advanced Topics in Statistics (1–6;1–6:0) Prerequisite: permission of instructor. Topics in statistics not covered in regular statistics sequence. May be repeated for credit.

796, 797 Directed Reading and Research (1-3:0:0) Prerequisite: admission to PhD program in Statistical Science. Reading and research on specific topic in statistics under direction of faculty member.

798 Master’s Essay (3:0:0) Prerequisites: 9 graduate credits, and permission of instructor. Project chosen and completed under guidance of graduate faculty member that results in acceptable technical report.

799 Master’s Thesis (1–6;0:0) Prerequisites: 9 graduate credits, and permission of instructor. Project chosen and completed under guidance of graduate faculty member that results in acceptable technical report and oral defense.

871/IT 871 Statistical Data Mining (3:3:0) Prerequisite: STAT 554 or 663, or permission of instructor. Covers basic concepts, computational complexity, data preparation and compression, databases and SQL, rule-based machine learning and probability, density estimation, exploratory data analysis, cluster analysis and pattern recognition, artificial neural networks, classification and regression trees, correlation and nonparametric regression, time series, and visual data mining.

875/IT 875/CSI 703 Scientific and Statistical Visualization (3:3:0) Prerequisite: CS 652, STAT 554, STAT 663, or STAT 751; or permission of instructor. Covers visualization methods used to provide new insights and intuition concerning measurements of natural phenomena, and scientific and mathematical models. Presents case studies from myriad disciplines. Topics include human perception and cognition, introduction to graphics laboratory, elements of graphing data, representation of space-time and vector variables, representation of three-dimensional and higher dimensional data, dynamic graphical methods, and virtual reality. Work on a visualization project required. Emphasizes software tools on Silicon Graphics workstation, but other workstations and software may be used.

876/IT 876/CSI 876 Measure and Linear Spaces (3:3:0) Prerequisites: STAT 544 and MATH 315. Measure theory and integration; convergence theorems; theory of linear spaces and functional analysis; and probability theory. The theory of linear spaces includes normed linear spaces, inner product spaces, Banach and Hilbert spaces, Sobolev spaces, and reproducing kernels. Topics include wavelets, applications to stochastic processes, and nonparametric functional inference.

877/IT 877/CSI 877 Geometric Methods in Statistics (3:3:0) Prerequisite: STAT 751 or permission of instructor. Develops foundations of geometric methods for statistics. Topics include n-dimensional Euclidian geometry; projective geometry; differential geometry, including curves, surfaces, and n-dimensional differentiable manifolds; and computational geometry, including computation of convex hulls, tessellations of two-, three-, and n-dimensional spaces, and finite element grid generation. Examples include applications to scientific visualization.

971/IT 971 Probability Theory (3:3:0) Prerequisite: STAT 544 and MATH 315. A rigorous measure-theoretic treatment of probability. Includes expectation, distributions, laws of large numbers and central limit theorems for independent random variables, characteristic function methods, conditional expectations, martingales, strong and weak convergence, and Markov chains.

972/IT 972/CSI 972 Mathematical Statistics I (3:3:0) Prerequisites: STAT 652/CSI 672 or equivalent, and either STAT 876/IT 876/CSI 876 or STAT 971/IT 971. Focuses on theory of estimation. Includes method of moments, least squares, maximum likelihood, and maximum entropy methods. Details methods of minimum variance unbiased estimation. Topics include sufficiency and completeness of statistics, Fisher information, Cramer-Rao bounds, Bhattacharyya bounds, asymptotic consistency and distributions, statistical decision theory, minimax and Bayesian decision rules, and applications to engineering and scientific problems.
973/IT 973/CSI 973 Mathematical Statistics II (3:3:0)
Prerequisite: STAT 972/IT 972/CSI 972. Continuation of STAT 972/IT 972/CSI 972. Concentrates on theory of hypothesis testing. Topics include characterization of decision process, simple versus simple hypothesis tests, Neyman-Pearson Lemma, uniformly most powerful tests, unbiasedness and invariance of tests, and randomized and sequential tests. Applications of testing principles made to situations in normal distribution family and other families of distributions. s

998 Doctoral Dissertation Proposal (1–12:0:0) Work on research proposal that forms basis for doctoral dissertation. May be repeated. No more than 24 credits of STAT 998 and 999 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: Admission to candidacy. Formal record of commitment to doctoral dissertation research under direction of faculty member in statistics. May be repeated as needed; no more than 24 credits of STAT 998 and 999 may be applied to doctoral degree requirements.

Systems Engineering (SYST)

Systems Engineering and Operations Research

101 Understanding Systems Engineering (3:3:0) Introduces systems engineering and curriculum for BS in field. Introduces large and small systems, and explains them through some hands-on experiences. Key concepts include understanding requirements for system and translation of system-level requirements to component-level requirements. Several different kinds of example systems presented and discussed: objectives, major components, how system works, and major design issues. Each student gives similar presentation on system of choice. Students working in groups design, develop and test system, and give oral presentation. Students responsible for writing several short papers on curriculum and presentations they have heard. s

198 Independent Study in Systems Engineering (1–3:0:0) Must be arranged with instructor and approved by department chair before registering. Directed self-study of special topics of current interest in systems engineering. May be repeated for maximum 6 credits if topics are substantially different. f,s,summer

210 Systems Design (3:3:0) Prerequisite: SYST 101, or permission of instructor. Systems engineering design and integration process, development of functional, physical, and operational architectures. Emphasizes requirements engineering, functional modeling for design, and formulation and analysis of physical design alternatives. Introduces methods, software tools for systems engineering design. f

220 Dynamical Systems I (3:3:0) Prerequisite: MATH 114; corequisite: Math 214, 203; PHYS 260, 261. Introduces modeling of dynamical systems. Formulation of mathematical models from system descriptions, including computer, biological, economic, transportation, and mechanical systems. Analytical and numerical methods for solving models and studying their behavior. Discrete-time and continuous-time systems. Linear and nonlinear systems. Introduction to computer modeling using MATLAB. s

221 Systems Modeling Laboratory (1:0:3) Corequisite: SYST 220. Companion laboratory to SYST 220. Emphasizes system design and analysis using computer modeling environment MATLAB. Simulation and numerical solutions of continuous dynamic systems. Use of built-in functions and construction of macros. Graphical presentation of results. s

320 Dynamical Systems II (3:3:0) Prerequisite: SYST 220, MATH 203, 214; PHYS 260, 261. Continuation of SYST 220 with emphasis in continuous-time systems. Translational, rotational, and electrical systems. Block diagrams and state-variable models. Systems analysis in time domain and frequency domain. Analysis of control systems. f

330 Systems Methods (3:3:0) Prerequisite: MATH 114; corequisites: CS 112, STAT 346, and SYST 320. Analysis methods of system engineering design and management. Decision analysis, economic models and evaluation, optimization in design and operations, probability and statistical methods, queuing theory and analysis, management control techniques, reliability and maintainability analysis, and economic and life-cycle cost analysis. Laboratory exercise with different software programs included. s

335/OR 335 Discrete Systems Modeling and Simulation (3:3:0) Corequisites: CS 112, STAT 346, SYST 320 or CS 310, or permission of instructor. Introduces basic concepts of modeling complex discrete systems by computer simulation. Topics include Monte-Carlo methods, discrete-event modeling, specialized simulation software, and statistics of input and output analysis. s

371 Systems Engineering Management (3:3:0) Prerequisite: SYST 210; corequisite: SYST 330. Study of basics of systems engineering management. Includes engineering economics, planning, organizing, staffing, monitoring, and controlling process of designing, developing, and producing system to meet stated need in effective and efficient manner. Discusses management tools, processes, and procedures, including various engineering documentation templates, managerial processes, and dealing with personnel issues. f

420 Network Analysis (3:3:0) Prerequisite: OR 441 and MATH 213. Network nomenclature. Elementary graph theory. Linear and nonlinear network models: multicommodity flow, mathematical games and equilibria on networks, network design and control; dynamic network models; applications to transportation, telecommunications, data communications, and water resource systems. f

421/ECE 421 Classical Systems and Control Theory (3:3:0) Prerequisite: grade of C or better in ECE 220. Introduction to analysis and synthesis of feedback systems. Functional description of linear and nonlinear systems. Block diagrams and signal flow graphs. State-space representation of dynamical systems. Frequency response methods: Root Locus, Nyquist, and other stability criteria. Application to mechanical and electromechanical control systems. f,s,summer

460 Introduction to Air Traffic Control (3:3:0) Prerequisites: SYST 210, 335; STAT 346. This course is intended as an introduction to Air Traffic Control (ATC) for those who plan professions in the air transportation industry. It is a necessary introduction for students who will later specialize and take more in-depth courses. The course will survey the entire field, presenting the history of ATC and how it came to be as it is, the technology on which the system is based, the procedures used by controllers to meet the safety and efficiency goals of the system, the organizational structure of the FAA, challenges facing the system, and means under investigation to meet these challenges. Some fieldwork
will be required to acquire and analyze airport operational data. A brief introduction to airport design will be discussed.

461 Air Transportation System Engineering (3:3:0) Prerequisite: SYST 460 or permission of instructor. This is a course on the theory and practice of system engineering a national air transportation system. The course will stress the application of mathematical techniques to analyze and design complex network transportation systems, airports, airspace, airline schedules, and traffic flow.

465/ECON 496/Math 493 Pricing in Optimization and Game Theory (3:3:0) Prerequisites: Math 203 or 216, and OR 441, or permission of instructor. Allocation of limited resources among competing activities to maximize the outcome or minimization of expenses required to produce a given assortment of goods and services are two typical problems faced by any economic institution. Mathematical modeling of such problems and finding efficient mathematical tools for solving them are two main goals of modern optimization theory. Pricing limited resources, goods, and services is the key instrument for theoretical analysis of complex economical systems. Pricing theory can also give rise to numerical methods for finding optimal solutions and economic equilibrium. Fundamental tools in pricing theory are the classical Lagrangian and Lagrange multipliers for constrained optimization. In this course we will cover the basic ideas and methods of linear programming and matrix games. Particular emphasis to pricing for both theoretical analysis and numerical methods.

469 Human Computer Interaction (3:3:0) Prerequisites: IT/STAT 250, IT 108. Covers principles of human-computer interaction, including information processing design, cognitive models, ergonomics, and design metaphors. Students learn to evaluate interface design in terms of effectiveness, efficiency, and cost. Students who receive credit for SYST 470 may not receive credit for this course.

470 Human Factors Engineering (3:3:0) Prerequisites: SYST 210, STAT 346, and STAT 354. Human information processing, inferential analysis, biases and heuristics in human information processing, support systems to aid in human information processing, human-system interaction, and software systems engineering considerations.

473 Decision and Risk Analysis (3:3:0) Prerequisite: STAT 346. Studies analytic techniques for rational decision making that address uncertainty, conflicting objectives, and risk attitudes. Covers modeling uncertainty; rational decision-making principles; representing decision problems with value trees, decision trees, and influence diagrams; solving value hierarchies, decision trees and influence diagrams; defining and calculating the value of information; incorporating risk attitudes into the analysis; and conducting sensitivity analyses.

480/ECON 440 Economic Systems Design I: Principles and Experiments (3:3:0) Prerequisite: OR 441; corequisite: SYST 465. Introduces design principles used in developing systems used to allocate resources. Students required to participate in experiment demonstrations of different allocation mechanisms. In addition, students exposed to experimental methods in economics and market design.

481/ECON 441 Economic Systems Design II: Case Studies and Analysis (3:3:0) Prerequisite: SYST 480. Students required to design and develop mechanism to a specific allocation problem. Analytical and working engineering models of mechanism must be developed.

490 Senior Design Project I (3:2:1) Prerequisite: SYST 335, 371, and 90 satisfactory credits toward BS in systems engineering; corequisites: SYST 470, 473, and OR 441. First part of capstone course in systems engineering program. Students apply knowledge they have gained to group project. During first semester, students perform concept definition and requirements analysis. Plan for carrying out project is developed, culminating in proposal presented to faculty at end of semester.

491 Industrial Project (1–3:0:3–9) Prerequisites: 75 credits toward BS in systems engineering; SYST 330; GPA of at least 3.00; must be arranged with instructor and approved by department faculty chair before registering. Semester-long work experience in systems engineering in industrial or governmental organization. Work supervised jointly by systems engineer from sponsoring organization and department faculty member. Project and arrangements for supervision must be approved by student’s faculty advisor. Periodic reports, written final report, and presentation are required.

495 Senior Design Project II (3:1:2) Prerequisite: SYST 490. Second part of capstone course. Design project plans formulated in SYST 490 are reviewed and modified. Additional instruction on documentation and project management is given. Design project completed; formal report prepared, presented, and evaluated.

498 Independent Study in Systems Engineering (13:0:0) Prerequisites: 60 credits toward BS in systems engineering and GPA of at least 3.00; must be arranged with instructor and approved by department chair before registering. Directed self-study of special topics of current interest in systems engineering. May be repeated for maximum 6 credits if topics are substantially different.

499 Special Topics in Systems Engineering (3:3:0) Prerequisites: 60 credits toward BS in systems engineering; specific prerequisites vary with topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics are substantially different.

500/CSI 600 Quantitative Foundations for Systems Engineering (3:3:0) Prerequisite: MATH 203, 213. Provides quantitative foundations necessary for core courses in systems engineering and operations research master’s program, and certificate program in C4I. Topics include vectors and
matrices, infinite series, partial differentiation, multiple integrals, differential and difference equations; linear systems; Laplace and Z-transforms, and probability theory. Students receive graduate credit for this course which, when used on plan of study, extends minimum credit requirements for degree. f

510 Systems Definition and Cost Modeling (3:3:0) Prerequisite: graduate standing. Comprehensive examination of methods and processes for the identification and representation of system requirements. Investigation of the system's acquisition life cycle with emphasis on requirements definition, including functional problem analysis. Examination of the systems engineering definition phase including requirements, problem analysis, definition, and functional economics. Specification of functional and nonfunctional requirements, and associated requirements proto-typing. Functional economic analysis, including the use of prevailing cost estimation models and planning and control of common operating environments. Lecture and group project including creation of requirements and use of cost estimation model. f, s

513 Total Systems Engineering, Reengineering and Enterprise Integration (3:3:0) Prerequisite: SYST 510 or 520. Principles of strategic quality, including TQM. Quality standards including ISO9000 and 14000. Organizational leadership, cultures, and process maturity, reengineering. Quality, organization learning and reengineering approaches to enable information integration and management and environment and framework integration in the systems engineering of knowledge intensive systems. Emphasis is placed on the role of integrated product and process design teams, standard and commercial off-the-shelf products in enterprise integration. Architecture driven system characteristics are studied, as is transition management of legacy systems.

520 System Engineering Design (3:3:0) Prerequisite: Graduate standing. System design and integration methods are studied and practiced, including structured analysis and object-oriented based techniques. Life cycle of systems is addressed, including definition and analysis of life cycle requirements. Software tools are introduced and used for the systems engineering cycle. Identification of preliminary architectures. Students are expected to develop a system design for a system of their choice using both the structured analysis and object-oriented techniques presented in class and they will make presentations on these designs. f, s

521/OR 643 Network Analysis (3:3:0) Prerequisites: MATH 213 and 203 or equivalent; OR 441 or 541. Network nomenclature. Elementary graph theory. Linear and nonlinear network models: multi-commodity flow, mathematical games and equilibria on networks, network design and control. Dynamic network models. Applications to transportation, telecommunications, data communications, and water resource systems. f

530 System Management and Evaluation (3:3:0) Prerequisite: graduate standing. Provides techniques for evaluating cost and operational effectiveness of system designs and systems management strategies. Discusses performance measurement, work breakdown structures, cost estimating, quality management, configuration management, standards, and case studies of systems from different application areas. f, s

540/OR 540 Analysis for Systems Management (3:3:0) Prerequisites: MATH 108 and STAT 250 or DESC 210; or equivalent. Operations research techniques and their application to managerial decision making. Mathematical programming, Markov processes, queuing theory, inventory models, PERT, CPM, and computer simulation are covered, as well as use of contemporary computer software for problem solving. Case-study approach to problem solving is used. OR/MS and SE/MS majors do not receive credit. f, s

542/EEP 602 Decision Support Systems Engineering (3:3:0) Prerequisite: SYST 301 or graduate standing. Studies design of computerized systems to support individual or organizational decisions. Teaches systems engineering approach to decision support system (DSS) development. DSS is end product of development process, and process is key to successfully integrating DSS into organization. Any DSS is built on a theory (usually implicit) of what makes for successful decision support in given context. Empirical evaluation of specific DSS and the underlying theory should be carried on throughout development process. Course examines prevailing theories of decision support, considers issues in obtaining empirical validation for theory, and discusses empirical support that exists for theories considered. Students design decision support system for semester project. f

560 Introduction to Air Traffic Control (3:3:0) Prerequisite: graduate standing. Introduction for those who plan careers in aviation industry. Survey of entire field, presenting history of ATC and how it came to be, technology on which system is based, procedures used by controllers to meet safety and efficiency goals, organizational structure of the FAA, challenges facing system, and means under investigation to meet these challenges. Involves some field work for data collection and analysis. Class project requiring system simulation required. f

563 Research Methods in Systems Engineering and Information Technology (3:3:0) Prerequisites: STAT 346 and 354, or equivalent. Provides foundation for one of the most important activities in systems engineering: information gathering to support drawing conclusions and making decisions about design options and process improvements. Develops understanding of scientific process, use of empirical evidence to support and refute scientific hypotheses, and use of scientific information in decision-making. Covers different sources of scientific evidence: designed experiments, quasi-experiments, field studies, surveys, and case studies. Discusses process of formulating testable hypotheses, and methods of measurement including approaches to measuring soft, hard-to-quantify factors. Presentation of results is discussed. Students do project involving empirical research. f

571 Systems Engineering Management (3:3:0) Prerequisite: SYST 471 or 530. Study of more advanced topics in systems engineering management. Seminar style; students expected to read selections from current literature as well as make presentations and produce papers on engineering management topics. Examines issues such as multiproject management, quality programs, and the impacts of process change on the organization. Focuses strongly on the practical impacts of various systems engineering management techniques and practices on projects, organizations, and personnel. f
573 Decision and Risk Analysis (3:3:0) Prerequisite: STAT 346 or equivalent. Study of analytic techniques for rational decision making that address uncertainty, conflicting objectives, and risk attitudes. Covers modeling uncertainty; rational decision-making principles; representing decision problems with value trees, decision trees, and influence diagrams; solving value hierarchies, decision trees, and influence diagrams; defining and calculating the value of information; incorporating risk attitudes into the analysis; and conducting sensitivity analysis. (Offered concurrently with SYST 473. Students may not receive credit for both SYST 473 and 573. f,s)

611 System Methodology and Modeling (3:3:0) Prerequisite: SYST 500 or equivalent. Provides broad yet rigorous introduction to methodologies. Emphasizes systems modeling and performance. Topics include system model and behavior analysis linear and nonlinear systems, discretization and linearization, optimization, dynamic programming and optimal control. Methodologies address system performance issues, and assist in the evaluation of alternative system designs. Resource allocation for planning and control introduced. f,s

619/ECE 672 Introduction to Architecture Based Systems Engineering. (3:3:0) Prerequisites: SYST 510 or 520, or permission of instructor. Lifecycles in systems engineering and the role of systems integration and architecting in these. Conceptual frameworks for systems architecting. Structure, function, and purpose of systems architecting and integration. Risk management and systems architecting and integration. User requirements and functional specifications in systems architecting. f

620/ECE 673 Discrete Event Systems (3:3:0) Prerequisites: SYST 611 or ECE 521, or equivalent. Introduces modeling and analysis of discrete event dynamical systems. Course covers elements of discrete mathematics and then focuses on Petri Net models and their basic properties. Relation to other discrete event models of dynamical systems. f

621/ECE 674 Systems Architecture Design (3:3:0) Prerequisites: SYST 520 and SYST 620/ECE 673. Intensive study of relationships between different types of architecture representations and methodologies used to obtain them. Approaches based on systems engineering constructs, such as structured analysis and software engineering constructs, including object orientation, are used to develop architecture representations or views and to derive an executable model of the information architecture. Executable model is then used for behavior analysis and performance evaluation. Roles of systems architect and systems engineer are discussed. Examples from current practice including the C4ISR architectures are used. s


631/ECE 678 Systems Engineering of Information Architectures (3:3:0) Prerequisites: SYST 520 and SYST 619 / ECE 672. An intensive study of the relationships between different types of architecture representations and the methodologies used to obtain them. Approaches based on systems and software engineering constructs, such as object orientation and structured analysis are used to develop architecture representations or views. The roles of the systems architect and the systems engineer are discussed. The function of executable model of the information architecture in deriving requirements is presented. Examples from current practice including C4ISR architectures are included. This course does not meet the requirements for the MS/SE degree.

632/ECE 679 System Integration and Architecture Evaluation (3:3:0) Prerequisites: SYST 631/ECE 678. Examines the system integration problem and its human, organizational, societal cultural, and technological aspects. The role of architectures in systems integration. Integration in a system of systems and a federation of systems. Measures of performance and effectiveness. Analysis of alternatives. This course does not meet the requirements for the MS SE degree.

659 Topics in Systems Engineering (3:3:0) Prerequisite: permission of instructor. Topics not covered in department’s regular systems engineering offerings. Course content may vary each semester depending on instructor and the perception of students’ needs. Course may be repeated once for credit. f,s

660/OR 660 Air Transportation Systems Modeling (3:3:0) Prerequisite: SYST 460/560 or permission of instructor. Introduces wide range of current issues in air transportation. Issues include public policy toward industry, industry economics, system capacity, current system modeling capability, human factors considerations, safety analysis and surveillance systems, and new technological developments. Develops broad understanding of contemporary and future issues. Knowledge evaluated through class discussions, take-home midterm exam, and term project to be completed by end of semester. s

664/STAT 664 Bayesian Inference and Decision Theory (3:3:0) Prerequisite: STAT 544 or 554, or equivalent. Introduces decision theory and relationship to Bayesian statistical inference. Teaches commonalities, differences between Bayesian and frequentist approaches to statistical inference, how to approach statistics problem from Bayesian perspective, and how to combine data with informed expert judgment in a sound way to derive useful and policy relevant conclusions. Teaches necessary theory to develop firm understanding of when and how to apply Bayesian and frequentist methods; and practical procedures for inference, hypothesis testing, and developing statistical models for phenomena. Teaches fundamentals of Bayesian theory of inference, including probability as a representation for degrees of belief, likelihood principle, use of Bayes Rule to revise beliefs based on evidence, conjugate prior distributions for common statistical models, and methods for approximating the posterior distribution. Introduces graphical models for constructing complex probability and decision models from modular components. s

671/OR 671 Judgment and Choice Processing and Decision Making (3:3:0) Prerequisite: STAT 510 or equivalent, or permission of instructor. How do people make judgments and decisions? Course presents initial review of scientific literature directed toward answering this question, and emphasizes importance when performing decision analysis.
674/OR 674 Dynamic Programming (3:3:0) Prerequisites: OR 442 or OR 542 or permission of instructor. This is a course on the theory and practice of dynamic programming, i.e., optimal sequential decision making over time in the presence of uncertainties. Stresses intuition, the mathematical foundations being for the most part elementary. It will introduce the theory, applications (finance, engineering, and biology), and computational aspects of dynamic programming for deterministic and stochastic problems.

677/OR 677/STAT 677 Statistical Process Control (3:3:0) Prerequisites: STAT 510, 554, or 544; or equivalent. Introduces concepts of quality control and reliability. Acceptance sampling, control charts, and economic design of quality control systems are discussed, as are system reliability, fault-free analysis, life testing, repairable systems, and role of reliability, quality control, and maintainability in life-cycle costing. Role of MIL and ANSI standards in reliability and quality programs considered.

680/ECE 670/OR 683 Principles of Command, Control, Communications, Computing, and Intelligence (C4I) (3:3:0) Prerequisite: ECE 528, SYST 611, or OR 542; or equivalent. Broad introduction to fundamental principles of command, control, communications, computers, and intelligence (C4I). Principles and techniques applicable to wide range of civilian and military situations. Discusses modeling and simulation of combat operations. Studies in detail sensing, fusion, and situation assessment processes. Derives optimal decision-making rules; discusses concepts of C4 architectures; and develops tools to evaluate and design C4 systems such as queuing theory.

683 Modeling, Simulation, and Gaming (3:3:0) Prerequisites: MATH 213, SYST 500 or equivalent, and graduate standing. Developing methods for designing combat models and games. Existing combat models critical to the C4I process. Exercises and games demonstrate value of properly developed C4I modules in a combat simulation.


685 Estimation and Tracking: Principles and Techniques (3:3:0) Prerequisite: ECE 528, OR 542, STAT 544, or equivalent. Principles and estimation techniques for static and dynamic systems, linear and nonlinear, discrete and continuous time. Estimation for kinematic models, track initiation, bearing-only tracking, tracking maneuvering targets with adaptive filtering, MM (Multiple Model) and interactive MM algorithms. Tracking single target in clutter, nearest neighbor algorithm, tracking and data association, Multiple hypothesis tracking. Tracking performance evaluation.

691/PUBP 777 Introduction to Enterprise Engineering: Engineering and Policy (4:3:1) Prerequisite: INF5 614, or equivalent. Provides overview of Extended Enterprise Integration. Lectures focus on the SAP architecture and the R/3 standard software solution. Laboratory requires students to complete an end-to-end implementation project with the Great Plains Software midrange ERP solution, Dynamics C/S+. For modeling, students must demonstrate complete proficiency in the Architecture of Information Systems (ARIS) methodology, and the supporting ARIS Toolset.

692/PUBP 772 Decision Support for Enterprise Integration (3:3:0) Prerequisite: SYST 542 and 691. Focuses on use of “business intelligence” to enhance competitive advantage; developing an information driven set of controls to improve profitability; and emphasizing the creation of a balanced business with aligned corporate direction and strategic intent. Solutions provided within ERP systems examined.

693/PUBP 773 Supply Chain Integration and Management (Business-to-Business Electronic Commerce) (3:3:0) Prerequisite: SYST 691. Lectures focus on two issues: Supply chain integration from an information technology perspective, and supply chain management from a decision support perspective. The motivation for the course is the merging of enterprise computing with operations research, primarily through customer/supply chain management systems. Topics include ERP/web integration, advanced planning, and customer relationship management.

694/PUBP 774 E-Commerce Architectures (Business-to-Consumer Electronic Commerce) (3:3:0) Prerequisite: ECE 670, OR 674, or ECE 528, SYST 611, or OR 542; or permission of instructor. Design and developing C4I modules in a combat simulation.

695/PUBP 775 Economics of Electronic Commerce (3:3:0) Prerequisite: SYST 691. Focuses on gaining competitive advantage through electronic commerce implementation; the identification and growing of new market opportunities, as well as the electronic enabling of existing business relationships; business-to-consumer relationships, as well as the economics of strategic procurement, ERP hosting, customer relationship management, catalog hosting, portal operations, and supplier management.

696/PUBP 776 Customer Relationship Management (3:3:0) Prerequisite: SYST 691. Focuses on the “front office” and its integration with the “back office.” The modern world of e-commerce extends intra-enterprise integration as implemented in Enterprise Resource Planning (ERP) systems to include external constituents, such as customers, partners, and suppliers. This course is focused on modern system support for the demand chain and the value creation process that results from integrating the front office systems with the back office systems.

697/PUBP 777 Critical Information Technology Infrastructures (3:3:0) Prerequisite: SYST 694. Design and implementation of high-speed network and application services in support of modern enterprise resource planning (ERP) systems. Critical technologies include high-speed data communication, switched versus routed data flow, workflow engines, business rule and web application servers, and load-balancing technologies. A large-scale web-enabled ERP system architecture examined in detail.

698 Independent Study and Research (3:3:0) Prerequisites: graduate standing, completion of at least two core courses, permission of instructor. Study of a selected area
in systems engineering or C3I under the supervision of a faculty member. Written report required. f,s,summer

735/OR 735 Topics in Stochastic System Simulation (3:3:0) Prerequisite: OR 635 or permission of instructor. Special topics and recent developments in Monte Carlo simulation methodology for discrete-event stochastic systems. Contents vary; possible topics include statistical analysis of simulation output data, random number and random variate generation, variance reduction techniques, sensitivity analysis and optimization of simulation models, distributed and parallel simulation, object-oriented simulation, and specialized applications. May be repeated for credit when topics are distinctly different.

760 Special Topics in Command, Control, Communications, Computing, and Intelligence Systems Engineering (3:3:0) Prerequisite: SYST 680. Special topics in the C4I area, with different content in different terms. Representative areas include quantitative evaluation of C4 systems, applications of artificial intelligence in C4 systems, and military communications systems.

763/OR 763 Empirical Methods in Information Technology (3:3:0) Prerequisite: STAT 554. Examines alternative paradigms of scientific research and their applicability to research in information technology. Topics include fundamental elements of scientific investigation, basic principles of experimental design and statistical induction, philosophy of science and its relation to the information technology sciences, and case studies of information technology research.

774/IT 774 Advanced Dynamic Programming (3:3:0) Prerequisite: OR674/SYST674 or permission of instructor. Covers advanced topics on the theory and practice of dynamic programming, i.e., optimal sequential decision making over time in the presence of uncertainties. Stresses the mathematical foundations, and introduces the theory, computational aspect, and applications of dynamic programming for deterministic and stochastic problems.

781/INFS 781/STAT 781: Data Mining and Knowledge Discovery (3:3:0) Prerequisite: SYST/STAT644, or CS 650 or INFS 623, or equivalent. Methods and systems for deriving user-oriented knowledge from large databases and other information sources, and applying knowledge to support decision making. Information sources can be in numerical, textual, visual, or multimedia forms. Covers theoretical and practical aspects of current methods and selected systems for data mining, knowledge discovery, and knowledge management, including those for text mining, multimedia mining, and web mining.

798 Systems Engineering Project (3:0:0) Prerequisite: 21 graduate credits, including SYST 611. Capstone project course for MS/SE program. Key activity is completion of major applied team project resulting in an acceptable technical report, and oral briefing. Students should plan to take course in last semester of studies.

799 Master’s Thesis (1–6:0:0) Prerequisites: 21 graduate credits and permission of instructor. Research project chosen and completed under the guidance of a graduate faculty member, which results in a technical report acceptable to a three-member faculty committee, and an oral defense.

842/IT 842/OR 842 Models of Probabilistic Reasoning (3:3:0) Prerequisites: STAT 544 and OR 681. Survey of alternative views about how incomplete, inconclusive, and possibly unreliable evidence might be evaluated and combined. Discusses Bayesian, Baconian, Shafer-Dempster, and Fuzzy systems for probabilistic reasoning.

850/IT 850 Systems Integration Engineering (3:3:0) Prerequisite SIST 510 or 520. Covers lifecycles; large systems comprising heterogeneous components; human, organizational, and technological basis for integration; societal and cultural basis; conceptual frameworks; structure, function, and purpose of industry; risk management; user requirements and functional specifications; bid and proposal process; systems integration and federal government; standards; integration of systems and federations of systems; integrated process and product development; architectures; systems management and cost estimation; reengineering; quality management; increasing returns to scale, network effects, and path dependency issues; and systems integration ecology and evolutionary systems integration.

888/ECE 753/IT 888/OR 888 Distributed Estimation and Multisensor Tracking and Fusion (3:3:0) Prerequisite: ECE 734 or SYST 611. Centralized and distributed estimation theory, hierarchical estimation, tracking and data association, multisensor multitarget tracking and fusion, distributed tracking in distributed sensor networks, track-to-track association and fusion, and Bayesian networks for fusion.

944/IT 944 The Process of Discovery and Its Enhancement in Engineering Applications (3:3:0) Prerequisite: SIST 842 or permission of instructor. Studies ingredients of imaginative reasoning as they concern efficient discovery of new ideas and valid evidential test of them. Topics include different interpretations of Peirce’s theory of abductive reasoning and other forms of reasoning, Hintikka’s analysis of process of inquiry, and current attempts to design systems that provide assistance in discovery-related or investigative activities.

Systems Engineering and Operations Research (SEOR)

Systems Engineering and Operations Research

998 Doctoral Dissertation Proposal (1–12:0:0) Work on research proposal that forms basis for doctoral dissertation. May be repeated. No more than 24 credits of SEOR 998 and 999 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1–12) Prerequisite: admission to doctoral candidacy. Formal record of commitment to doctoral dissertation research under direction of faculty member approved by SEOR Department. May be repeated as needed.

Technology Management (TECM)

School of Management

610 Communications and Leadership (2:2:0) Prerequisite: admission to the Technology Management Program. Distinguishes between leadership and management, and focuses on the critical roles and functions of leadership, including communication ability, use of power and influence, providing direction, aligning an organization’s systems, motivating a workforce, and creating a culture for effectiveness. It also focuses on strategies for developing oneself as an effective leader.
Courses

615 Decision Making Using Accounting and Financial Data (3:3:0) Prerequisite: admission to Technology Management Program. Provides managers with an overview of the purpose and importance of accounting within the organization and the financial valuation of information technology companies, projects, and product lines. Students focus on the economics and analysis of business transactions and their related financial reporting issues from internal and external stakeholder perspectives. Students improve their skills in analyzing financial issues and presenting results in a case analysis framework.

620 Economics of Technology Management (2:2:0) Prerequisite: admission to Technology Management Program. Enables students to build and evaluate economic and business models that can be used to analyze real managerial questions that affect all types of institutions, especially firms in the information technology industry. Students develop a better understanding of the operation of markets in general and the use of various quantitative and qualitative methods when making decisions within the firm. The use of economic analysis allows students to identify and evaluate decision alternatives, the competitive environments of firms, and the factors that influence firm performance, especially in the information technology industry.

635 Metrics and Statistics for Quality and Project Management (2:2:0) Prerequisite: admission to Technology Management Program. Explores current metrics and metric development for quality, intangible assets, and project management as required within information technology companies. Applies statistical tools of best use with these metrics.

640 Management of Consulting and Technical Professionals (3:3:0) Prerequisite: admission to Technology Management Program. Students gain insight into conflict resolution, teamwork, communication, power and influence, career development, and ethics. This course also helps students understand themselves and those they manage, as they work to be as effective as possible in modern organizations.

660 Negotiation, Conflict Resolution and Group Decision Making (2:2:0) Prerequisite: admission to Technology Management Program. Techniques for making group decisions and resolving internal team conflicts, as well as negotiating effectively with outside parties. Applications include technology assessments, outsourcing decisions, project bidding, and contract negotiations.

700 Business Engineering and Change Management (2:2:0) Prerequisite: admission to Technology Management Program. Visualizing, planning, and implementing transitions in an organization or business unit is fast becoming a key source of competitive advantage. Course provides theory and practice of change management and strategic planning including organizational development and organizational transformation.

702 Interpersonal Dynamics and Teamwork (3:3:0) Prerequisite: admission to Technology Management Program. Develops behavioral skills integral to effective teamwork and interpersonal relationships in work environments. Covers techniques for making group decisions and resolving internal team conflicts, as well as negotiating effectively with outside parties.

703 Technology Assessment, Evaluation, and Investment (3:3:0) Prerequisite: admission to Technology Management Program. Prepares students to be educated consumers of information technology to maximize strategic advantage of IT to an organization. Information technologies, architectures, and products are categorized and analyzed with a view to develop and maintain the most favorable IT asset portfolio to successfully carry out business goals and strategies. Techniques for making group technology assessments, outsourcing decisions, project bidding, and contract negotiations.

704 Planning and Control of Projects (3:3:0) Prerequisite: admission to Technology Management Program. Examines advanced topics in project and program management, with specific attention to the issues that managers face to effectively manage programs. This involves managing resources (both internal and external to the organization) and managing within an existing organizational structure. Specific program management topics include advanced topics for project management, program alignment with strategic objective, management of stakeholders, and development and organization of the program office. Strategic and operational tools and metrics also are discussed.

720 Analysis of IT Industries (2:2:0) Prerequisite: admission to Technology Management Program. Provides students with an understanding of the impact of information technology on firms and industries and equips them to develop and execute appropriate strategies. Although the emphasis is on information technology firms and industries, a key goal of the course is to better prepare students to respond to a diverse array of information technology challenges. Course work covers the demand and the supply side of information technology, as well as the development of frameworks and analytical tools to help put events, behaviors, and processes into understandable contexts.

735 Technology Management Capstone Project (2:2:0) Prerequisite: admission to Technology Management Program. Teams undertake a strategic evaluation and plan for IT-driven business initiatives. Presentation includes analysis of competitive forces and the value chain; recommendations, including changes in goals and organizational design; plan of action integrating marketing, human resource development, organizational design, finance, and information technology; and implementation plan using theories of communication and change management, to include business case and business plan.

740 Management of Client Relationships (3:3:0) Prerequisite: admission to Technology Management Program. Prepares students to be educated consumers of information technology to maximize strategic advantage of IT to an organization. Information technologies, architectures, and products are categorized and analyzed with a view to develop and maintain the most favorable IT asset portfolio to successfully carry out business goals and strategies. Techniques for making group technology assessments, outsourcing decisions, project bidding, and contract negotiations.

745 Business Functions and Operations: Client Industries (2:2:0) Prerequisite: admission to Technology Management Program. Explores best practices in the IT industry. Students analyze practices in terms of gaining competitive advantage in an industry where the scarcity economic model for products no longer applies. Course work focuses on leading an organization with the IT function.

750 Global IT Management (3:3:0) Prerequisite: admission to Technology Management Program. Students spend a week in an international residency. Emphasizes dealing with
technological changes across international markets and amid global developments, virtual organizations, and project management across cultures. Corporate site visits combined with presentations by professors from universities outside the United States and relevant practitioners.

Telecommunications (TELE)
School of Public Policy

694 Telecommunications Internship (3–6:1–2:0) Prerequisite: graduate standing, and permission of MA in telecommunications program director. Students work in approved professional-level telecommunications position, meeting regularly with agency and university internship supervisors. Paper and journal are required, as well as minimum 60 hours work for each credit of enrollment. Usually, students enroll in internships at end of program of study.

730 Telecommunications Management (3:3:0) Prerequisite: graduate standing. Surveys strategic and organizational issues in field of telecommunications management. Focuses on strategic management; oriented toward executive management level of telecommunications firms.

750 Coordinating Seminar (3:3:0) Prerequisite: open only to students in MA or MS in telecommunications programs with at least 18 credits of course work. Topics include specific telecommunications problems in management, law, engineering, education, and communication. Focuses on ways a problem in one area can create or solve a problem in other areas.

798 Directed Readings and Research (3:3:0) Prerequisite: graduate standing in telecommunications, 15 graduate credits completed, and permission of department. Specialized course designed for students who seek to explore telecommunications topic in greater depth than through current course work provided in curriculum. Written report required; oral or written exam may also be required.

799 Thesis (1–6:0:0) Prerequisite: degree candidacy in MA in telecommunications, completion of 24 credits of graduate course work, and approval of thesis proposal by faculty advisor and telecommunications director. Individualized section form required. Original research related to student’s concentration in telecommunications. Research must result in document meeting university standards. Graded S/NC.

Telecommunications (TCOM)
The Volgenau School of Information Technology and Engineering

500/ECE 540 Modern Telecommunications (3:3:0) Prerequisite: TCOM 575, or equivalent. Comprehensive overview of telecommunications, including current status and future directions. Topics include review of evolution of telecommunications; voice and data services; basics of signals and noise, digital transmission, network architecture and protocols; local area, metropolitan and wide area networks and narrow band ISDN; asynchronous transfer mode and broadband ISDN; and satellite systems, optical communications, cellular radio, personal communication systems, and multimedia services. Examples of real-life networks illustrate basic concepts and offer further insight.

501 Data Communications and Local Area Networks (1.5:1.5:0) Prerequisite: graduate standing. Network concepts; Open Systems Interconnection (OSI) reference model and layering; data coding; analog/digital communications review; Physical layer and data link control; switching and multiplexing; commercial digital link standards; Data Link Layer Control (DLC) functions. DLC protocols; flow control; error control; link management; common link protocols. Local Area Networks (LANs); basics, definitions, media access control; LAN performance; LAN standards, rings and buses; bridging and frame relay.

502 Wide Area Networks and Internet (1.5:1.5:0) Prerequisite: graduate standing. OSI reference model review; packet network layer functions; connection-oriented and connectionless packet switching; X.25 and X.75 standards; SONET and Packet-over SONET; circuit-switched networks and control signaling; congestion control and traffic management; virtual private networks; introduction to network management; routing methods; internetworking; introduction to Internet Protocol concepts; OSI transport layer client-server model; domain name systems; and telnet.

503 Fiber Optic Communications (1.5:1.5:0) Prerequisite: TCOM 500. Introduction and overview of optical fiber communications systems. Course covers basic elements of fiber optic networks: semiconductor light sources (light emitting diodes and laser diodes), fiber optic waveguides, network system design issues, link budget analysis, and component requirements. Additional topics may include wavelength-division multiplexed and Time-Division Multiplexed networks and optical switching systems.

504 Asynchronous Transfer Mode Networks (1.5:1.5:0) Prerequisites: TCOM 500, 501, 502, or equivalent. Asynchronous Transfer Mode (ATM) concept, protocols, services, and applications. The emphasis is on the standards and technology of ATM for local and wide area networks. Relations to broadband ISDN; ATM switching, multiplexing and transport; user-network and network-network interface aspects; ATM Adaptation layer; Access switching; ATM Wide Area Network switches; design and practice of networks based on ATM technology.

505 Networked Multicomputer Systems (1.5:1.5:0) Prerequisites: TCOM 500, 501, or equivalent. Introduces systems engineering of a networked multicomputer system. Studies distributed multicomputer architectures, architecture of a network operating system, and key system components. The focus of this course is on the development of a thin-client/server system, requirements analysis of a client/server web computing, system planning and implementation. Includes a study of example multi-computer systems and a discussion of future directions.

506 Personal Communication Systems (PCS) (1.5:1.5:0) Prerequisites: TCOM 500, 501, 551, and 552 or equivalent. Introduces Personal Communication Systems (PCS). Topics include multiple technical layers of the PCS systems; data link level and network layer protocols, including implementation; mobile station operation and base station operation; and how voice and data services work. Also discusses vital issues of user authentication, privacy, and data or voice encryption.

509 Internet Protocols (1.5:1.5:0) Prerequisites: TCOM 501 and 502. The Internet Protocol (IP) Suite: principles, protocols, and architecture; Internetworking; Internet
addressing; IP; routing protocols (RIP, OSPF, BGP); Internet Control Message Protocol; Internet Group Management Protocol; User Datagram Protocol; Transmission Control Protocol; Client-Server Model; Domain Name System; Socket Interface; Internet applications (TELNET, FTP, SNMP, HTTP); Internet security; Internet multicasting; quality-of-service in the Internet (RSVP, DiffServ, MPLS); Mobile IP; Next Generation Internet (IPv6)

510 Client-Server Architectures and Applications (1.5:1.5:0) Prerequisite: TCOM 500. Fundamentals of application engineering for Client/Server (C/S) Internet environments. Review of C/S application architectures and system perspective on C/S middleware. Study of web-based middleware, distributed data managers and SQL middleware, distributed transaction processing middleware, and C/S object technology.

513 Optical Communications Networks (1.5:1.5:0) Prerequisite: TCOM 503. Introduction and overview of current developments in Optical Communication Networks. Emphasizes underlying technologies that make all-optical networks possible. Specific topics include components needed for Wavelength Division Multiplexed Systems and Dense Wavelength Division Multiplexed Systems; tunable wavelength lasers, wavelength add/drop multiplexers, space division switching, and wavelength-routing networks; optical LAN, MAN, and WAN concepts; passive and active wavelength filters, switches and routers; free-space optical networks.

514 Basic Switching: Lecture and Laboratory Course (3:1.5:1.5) Prerequisites: TCOM 501 and 502. Basic switching techniques and protocols for low and high speed digital packet networks (Ethernet, Frame Relay, ATM, X.25) are taught within a half semester lecture series, followed by hands-on laboratory for remainder of semester. Real-life scenarios taught in the laboratory element through exercises that involve configuring switches and routers.

515 Internet Protocol Routing: Lecture and Laboratory Course (3:1.5:1.5) Prerequisites: TCOM 501, 502, and 509. Internet Protocol (IP) routing overview; static routing; dynamic routing; default routing; access lists; route redistribution; RIP, IGRP, EIGRP, IS-IS, and BGP protocols submitted for comment. Real-life scenarios taught in the laboratory element through exercises that involve configuring routers as network elements.

516 Global Positioning System (GPS) (1.5:1.5:0) Prerequisite: TCOM 500. Background in long-range navigation developments; early global systems; space based systems; GPS and GLONASS systems; system architecture; spacecraft and earth station characteristics; design concepts of the CA and P GPS signal modes; frequencies, modulation, and other design aspects; clock issues; range and accuracy calculations and limitations; advanced concepts.

517 Introduction to Propagation Effects (1.5:1.5:0) Prerequisite: TCOM 500. Introduction to radiowave propagation effects in wireless communications systems. Propagation effects on terrestrial point-to-point (line of sight), satellite (fixed service, mobile, and direct broadcast), and cellular services are evaluated. Clear air, multipath atmospheric and terrestrial), diffraction, refraction, tropospheric and ionospheric scintillation, rain attenuation, ice crystal and rain depolarization, and low angle fading effects are covered. Impact of climate and path geometries on fade margin assessed, and mechanisms for reducing potentially adverse effect of propagation conditions discussed.

518 Third Generation Cellular Telephony (1.5:1.5:0) Prerequisites: TCOM 506, 531, and 552. Introduction to post-second generation cellular systems; benefits and features of third generation (3G) systems; review of air interface standards currently approved for 3G; review of 3G technologies; analysis of competing multiple access methods; transition plans and backward compatibility between G, 21/2G, and 3G systems; possible fallback plans.

519 Voice over IP (1.5:1.5:0) Prerequisites: TCOM 501, 502, and 509. Concept of transporting voice over Packet Switched Network; typical VoIP network scenarios (campus, multi-site private network, calling nationwide and international); communications protocols for VoIP (RTP, RTCP, RFC 1889, H.323); conferencing and security issues; quality issues (delay, mean opinion scores); VoIP network design.

520 Economics of Telecommunications (3:3:0) Prerequisite: TCOM 500. Management of telecommunications networks; economic concepts in changing climate of telecommunications ownership, deregulation, and privatization; resource allocation fundamentals based on internal rate-of-return, net present value, opportunity costs; valuation of potential acquisitions in broad telecommunications market; financial modeling techniques.

521 Systems Engineering for Telecommunications Management (3:3:0) Prerequisite: TCOM 500. Advanced software principles, techniques, and processes for designing and implementing complex telecommunication systems. Planning and implementation of telecommunications systems from strategic planning through requirements, initial analysis, general feasibility study, structured analysis, detailed analysis, logical design, and implementation. Current system documentation through use of classical and structured tools and techniques for describing flows, data flows, data structures, file designs, input and output designs, and program specifications. Practical experience gained through project.

526 Advanced Global Positioning System (GPS) (1.5:1.5:0) Prerequisite: TCOM 516. Advanced concepts in global navigation satellite systems (GNSS) such as the American GPS (global positioning system), the European’s Galileo and the Russian’s GLONASS (GLOBAL Navigation Satellite System) System level description, architecture and design of a wide area augmentation system (WAAS) comprising geostationary satellites overlaying GPS satellites and its vast network of monitoring and control ground stations. The equivalent EGNOS (European Geostationary Navigation Overlay Service), a precursor to Galileo and the Japanese MSAS (Multi-transport Satellite-based Augmentation System) Updates on evolving GNSS technology and GNSS backup alternatives.

529 Advanced Internet Protocols (1.5:1.5:0) Prerequisite: TCOM 509 or a strong background in networking protocols. Presents Link-State Routing Protocols (OSPF, IS-IS); functionality, features, design criteria; TCP Performance Tuning; Routing Architectures: routing vs. forwarding tables, shortest path routing algorithms, Internet architecture; Routing Between Peers: BGP/IGP interactions; Internet Security: IPsec, SSL protocols; Internet Multicasting: Layer 2 and 3 Multicast, functionality and features, IGMP and multicast routing protocols; Mobile IP: mobility, routing and address-
ing; Next Generation Internet (IPv6): functionality and features, pros and cons; Internet Applications: DNS, TELNET, FTP, SNMP, HTTP, etc.)

539 Advanced Voice Over IP (1.5:1.5:0) Prerequisite TCOM 519. Presents VoIP Applications using Softswitches: The Softswitch paradigm, advanced functionality and features. Different use of the Softswitch architecture; VoIP QoS: QoS components, protocols, trade-offs. VoIP Security: Aspects of VoIP vulnerabilities, industry-standard remedies; VoIP network design considerations, traffic forecasting, product and vendor selection criteria; case studies: Enterprise and service provider implementations. Vonage example; Advanced Topics: e.g., vendor interoperability issues, business case analysis, and future of VoIP.

540 Telecommunications Network Optimization: Routing, Flow Management, and Capacity Modeling (1.5:1.5:0) Prerequisite: TCOM 500. Provides state-of-the-art knowledge and techniques to apply operations research knowledge to optimal dimensioning, design and use of telecommunication networks. Includes review of traffic models in telecommunication networks including models for particular streams and multiplexing, as well as multirate and multishort models. Theory, algorithms and computational aspects of linear, network, and integer programming; formulation of telecommunication problems as optimization models, and review of solution strategies. Topics include maximum flow, shortest paths, minimum cost flows; data structure for trees and graphs; applications, modeling, theory and algorithms for optimal location of service facilities (concentrators, multiplexers) in telecommunication networks.

541 Network Design and Pricing (1.5:1.5:0) Prerequisite: TCOM 500. Capacity planning, capital budgeting and reliability modeling for determining optimal design. Economic models of pricing alternative telecommunications systems, project selection evaluation, and mechanisms for determining reliability of complex networks. Concentrates on modeling and evaluation. Software tools provided and tested throughout course.

542 Stochastic Models in Telecommunications (1.5:1.5:0) Prerequisite: TCOM 500. Review of teletraffic theory: Erlang’s loss formula, equivalent random method, delay and delay-loss systems; complex simulation modeling and statistical analysis of outputs. Parameter estimation, evaluation of quality.

545 Reliability and Maintainability of Networks (3:3:0) Prerequisite: TCOM 500. Stochastic modeling of network reliability, simulation modeling, modeling replacement strategies. Introduces quality control, sampling for accep- tance, economic design of quality control systems, and system reliability. Also covers faulty tree analysis, life testing, repairable systems and role of reliability, quality, and maintainability in life-cycle costing.


547 Project Management in Telecommunications (3:3:0) Prerequisite: graduate standing. Develops integrated approach to managing major telecommunications projects; evaluates and uses tools and software for project management, with specific goals of containing costs and time overruns; introduces elements for resolving conflict resolution and applying motivation within project team, and gaining the ability to monitor and control projects in changing environment; develops understanding of unique attributes of major telecommunications systems such as interoperability requirements and international technical standards.

548 Security and Privacy Issues in Telecommunications (1.5:1.5:0) Prerequisite: graduate standing. Introduces philosophy of secure data and voice communications. Topics include cryptography, cipher systems, practical security schemes, confidentiality, authentication, integrity, access control, nonrepudiation, and their integration across telecommunications network. Reviews threats and vulnerabilities in distributed systems.

549 Advanced Topics: e.g., vendor interoperability issues, business case analysis, and future of VoIP.

550 Digital Communication Systems (3:3:0) Prerequisite: TCOM 500. Digital transmission of data, voice, and video. Covers signal digitization; modulation and demodulation; error correction coding; multiple access methods; multiplexing; synchronization; channel equalization; frequency spreading; encryption; transmission codes; digital transmission using bandwidth compression techniques; elements of information theory; and development of link budget evaluation such as system noise temperature, Nyquist filter concepts, antenna gain, and filter bandwidth.

551 Introduction to Mobile Communications Systems (3:3:0) Prerequisites: TCOM 500 and 551. Introduces mobile communication system design and analysis. Topics include mobile communication channel, access and mobility control, mobile network architectures, connection to fixed network, and signaling protocols for mobile communication systems. Offers examples of mobile communication systems including pan-European GSM system, North American DAMPS system, and Personal Communication Systems.

552 Carrier Telecommunications (1.5:1.5:0) Prerequisite: TCOM 500. Sampled signals; delta modulation; adaptive delta modulation; pulse amplitude modulation; pulse code modulation. Sampling theorem; quantization; quantization noise; aliasing; time division multiplexing; North America / Japan T carriers; European Ecarriers. Introduction to digital communications: data codes; baseband line codes; noise and its effects; modulation and demodulation methods Amplitude shift keying; frequency shift keying; phase shift keying; differential phase shift keying; multilevel signaling; hybrid signaling; comparative performance.

553 Network Management Foundations and Applications (3.0:3.0:0) Prerequisites: TCOM 500, 501, and 502. Defines and explains techniques that network managers utilize to maintain and improve performance of telecommunications network; network management system; five tasks tradition-
ally involved with network management (fault management, configuration management, performance management, security management, and accounting management); theoretical background in transmission systems sufficient to understand network parameters such as capacity and response times; and specific network management products. Also explores how network performance data should be used for management and when considering upgrades in network architecture.

556 Applied Cryptography (1.5, 3.0: 0) Prerequisites: TCOM 500 and 548. Broad overview of cryptographic algorithms and mechanisms, and application in today's communication networks. Discusses modern cryptographic techniques such as public key cryptography, digital signatures, secret key management, key escrow, public key certificates, and public key infrastructure. Covers cryptography on Internet including secure electronic mail, secure WWW, and electronic commerce. Compares, analyzes software implementations of cryptographic algorithms.

562 Network Security Fundamentals (3, 3: 0) Prerequisite: TCOM 500. Introduces full spectrum of network security. Topics include taxonomy such as language commonality in incident handling, national strategy to secure cyberspace and cybersecurity organizations; organizational structure for network defense; best practices, security policy, and threats; actors and tools, countermeasures, vulnerability identification/correction, intrusion detection, and impact assessment; firewalls and intrusion detection systems; antivirus software; active defense; disaster recovery; and law enforcement and privacy issues. Reviews threats and vulnerabilities in network systems based on reports, case studies available in the literature, and actual experience.

575 Quantitative Foundations for Telecommunications (3, 3: 0) Prerequisite: graduate standing. Provides quantitative foundations in mathematical and electrical concepts to permit registration for courses in telecommunications MS degree and certificate programs. Topics include polynomials, exponentials, linear and quadratic equations, graphs and functions, trigonometric functions, radial measure and sine/cosine functions, exponentials and logarithms, basic probability and statistics, fundamentals of matrix algebra and vectors, basic Boolean logic; circuit elements (resistor, capacitor, inductor), basic electrical circuits, units, ohm's law, kirchhoff's law, decibel notation. Note: Course cannot be used for credit in any IT&E graduate degree program.

590 Selected Topics in Telecommunications (1, 3, 3: 0) 1, 5, 3.0: 0) Prerequisite: permission of instructor; specific prerequisites vary with the subject of the topic. Selected topics from recent developments and applications in various engineering disciplines within specialty modules 1, 2, and 3 of the TCOM program. The course is designed to help the professional engineering community keep abreast of current developments. The 1.5-credit course lasts for one-half semester (approximately seven weeks); the 3-credit course lasts for full semester.

598 Independent Study in Telecommunications (1, 5, 3.0: 0) 1, 5, 3.0: 0) Prerequisites: graduate standing; approval of program director. Directed self-study of special topics in telecommunications that relate to specialty modules 1, 2, and 3. Topics must be arranged with instructor and approved by program director before registering. May be taken for either 1.5 credits, or 3.0 credits in fall and spring semesters. NOTE: No more than total 6 credits may be taken from combination of TCOM 598, 599, 696, and 697 courses for credit in TCOM program.

599 Independent Study in Telecommunications (1, 5, 3.0: 0) 1, 5, 3.0: 0) Prerequisites: graduate standing; approval of program director. Directed self-study of special topics in telecommunications that relate to specialty modules 4 and 5. Topics must be arranged with instructor and approved by program director before registering. May be taken for either 1.5 credits, or 3 credits in fall and spring semesters. Note: No more than total 6 credits may be taken from combination of TCOM 598, 599, 696, and 697 for credit in TCOM program.

603 Standards for Advanced Optical Networks (3, 3: 0) Prerequisites: TCOM 503 and 513. Introduces current and upcoming global optical networking standards. Introduces currently deployed optical networking standards, primarily SONET, and proceeds with evolution of next generation optical networks as envisioned by various standards bodies. Covers standard work on Automatic Switched Optical Networks being worked on at ITU, and Generalized Multi-Protocol Label Switching being worked on at IETF. Also covers evolution of Ethernet from local area networking to wide area networking, specifically the G.Etna standard that is being developed by ITU, and T1.X1 committee and 802.xxx developed by IEEE.

606 Advanced Mobile Communications Systems (3, 3: 0) Prerequisite: TCOM 532. Introduction to post-second generation cellular systems; benefits and features of third generation (3G) systems and personal communications services (PCS); review of air interface standards and transmission technologies for mobile and quasi-stationary wireless systems, including cellular networks, satellite networks, indoor systems (Wi-Fi, Personal Local Area Networks, Orthogonal Frequency Multiplexing, Ultra Wide Band technologies); review of network control strategies; investigation of user authentication, privacy, and data and voice encryption aspects. Evolving technology, analysis of competing multiple access methods, transition plans, and backward compatibility between 2G, 21/2 G, 3G, and future systems, with possible fallback plans.

607 Satellite Communications (3, 3: 0: 0) Prerequisite: TCOM 551. Topics include introduction to satellite communications systems; historical aspects; orbital mechanics and launchers; satellite components such as payload, orbital maneuvering systems, cooling systems, and antennas; look angle predictions; link budget; overall link design; multiple access such as TDMA, CDMA, ALOHA, TDMA, and MF-TDMA; error control for digital satellite links; propagation effects on satellite links; elements of VSAT systems and nongeostationary satellite systems; and direct broadcast satellite services.
609 Interior Gateway Protocol (IGP) Routing (3:3:0)
Prerequisites: TCOM 509 and 515, or equivalent. Discusses development of Interior Gateway Protocols, including standards documents; interaction between various interior and exterior gateway protocols; design procedures and implementation aspects; field trial issues; and analysis of latest RFC information posted on IETF web site.

610 Border Gateway Protocol (BGP) Routing (3:3:0)
Prerequisites: TCOM 509 and 515, or equivalent. Discusses development of Border Gateway Protocol and its application in today’s Internet routing architecture. Covers evolution of Internet, BGP routing standard specifications (RFCs), interaction between various routing protocols, network BGP routing design principals and procedures for enterprise and ISP networks, BGP’s real-world implementation and configuration syntax, network scalability and convergence issues, and the latest extension and proposals for new standards.

611 Multi-Protocol Label Switching (MPLS) (3:3:0)
Prerequisites: TCOM 609 or 610. Develops full understanding of MPLS theory, technology, and implementation aspects through detailed analysis of MPLS routing concepts and protocol stacks, and completion of major project to reinforce understanding of MPLS.

660 Network Forensics (3:3:0)
Prerequisites: TCOM 509, and working knowledge of computer programming. Deals with collection, preservation, and analysis of network-generated digital evidence so it can be successfully presented in civil or criminal court of law. Examines relevant federal laws and private sector applications. Examines capture/intercept of digital evidence, analysis of audit trails, recordation of running processes, and reporting of such information.

661 Digital Media Forensics (3:3:0)
Prerequisites: TCOM 548 and 556, or TCOM 562, and working knowledge of computer operating systems; or permission of instructor. Deals with collection, preservation, and analysis of digital media so this evidence can be successfully presented in civil or criminal court of law. Examines relevant federal laws and private sector applications. Examines seizure, preservation, and analysis of digital media.

662 Advanced Secure Networking (3:3:0)
Prerequisites: TCOM 509 and 562, and a working knowledge of network routing protocols. Advanced technologies in network security that can be applied to enhance enterprise and ISP’s network security. Covers network perimeter defense concept and various components for complete layered defense system. Examines each component and its technologies, including TCP/IP protocol vulnerabilities, router access control list (ACL), dynamic ACL, firewall, network address translation (NAT), virtual private network (VPN), IPSec tunnels, intrusion detection system (IDS), routing protocol security, denial-of-service (DOS) attack, DOS detection and mitigation techniques.

663 Operations of Intrusion Detection and Forensics (3:3:0)
Prerequisites: TCOM 509 and 529 and a working knowledge of computer programming. Introduces students to network and computer intrusion detection and its relation to forensics. It addresses intrusion detection architecture, system types, packet analysis, and products. It also presents advanced intrusion detection topics such as intrusion prevention and active response, decoy systems, alert correlation, data mining, and proactive forensics.

690 Advanced Topics in Telecommunications (3:3:0)
Prerequisite: permission of instructor; specific prerequisites vary. Advanced topics from recent developments and applications in various engineering disciplines in specialty modules 1, 2, and 3 of TCOM program. Advanced topics chosen so that they do not duplicate existing TCOM courses. Active participation of students encouraged in form of writing and presenting papers in various research areas of advanced topic. Enhances professional engineering community’s understanding of breakthrough developments in specific areas.

691 Advanced Topics in Telecommunications (3:3:0)
Prerequisite: permission of instructor; specific prerequisites vary. Advanced topics from recent developments and applications in various engineering disciplines in specialty modules 4 and 5 of TCOM program. Advanced topics are chosen in such a way that they do not duplicate existing TCOM courses. Active participation of students encouraged in form of writing and presenting papers in various research areas of advanced topic. Enhances professional engineering community’s understanding of breakthrough developments in specific areas.

696 Independent Reading and Research (1.5, 3.0: 1.5, 3.0:0)
Prerequisites: graduate standing; approval of program director. Study of selected area in specialty modules 1, 2, or 3 under supervision of faculty member. Written report required. Note: No more than total 6 credits may be taken from combination TCOM 598, 599, 696, and 697 for credit in TCOM program.

697 Independent Reading and Research (1.5, 3.0: 1.5, 3.0:0)
Prerequisites: graduate standing; approval of program director. Studies selected area in specialty modules 4 or 5 under supervision of faculty member. Written report required. Note: No more than total 6 credits may be taken from combination TCOM 598, 599, 696, and 697 for credit in TCOM program.

698 Telecommunications Projects Course (3:3:0)
Prerequisite: graduate standing. To be taken toward end of degree program within any of modules 1, 2, or 3. Primary activity is completing major applied project, preferably with group of two to three people. Secondary goal is consolidating training before graduation so that, in some cases, it may act as capstone course. Students and outside telecommunication industry managers present ideas for projects and, through grouping of students, new skills and approaches may be learned. Some class time used for discussion of projects, either to monitor progress or explore alternative approaches. Readings, class-time discussion of current trends, difficulties, and new opportunities for industry most relevant to module. Concludes with presentations of projects to department faculty.

699 Telecommunications Project Course (3:3:0)
Prerequisite: graduate standing. Capstone of degree program under the specialty modules 4 or 5. To be taken toward end of degree program. Primary activity is completion of major applied project, preferably as two- to three-person group. Secondary goal is consolidation of training before graduation. Students, outside telecommunication industry managers present ideas for projects. From these ideas, group projects selected. Some classroom time used to discuss projects, either to monitor progress, or explore alternative approaches. Readings, class-time discussion of current trends, difficulties, and new
opportunities for the industry. Projects presented to department faculty at end of semester.

707 Advanced Link Design (3:3:0) Prerequisite: TCOM 551. Topics include advanced satellite link design such as VSAT optimization, intersatellite systems, and propagation mitigation trade-offs; radar link design such as primary and secondary radars, range ambiguities, false alarms, Doppler radar, FM radar, radar tracking, radar transmitters and receivers, and phased array radars; terrestrial wireless link design including line of sight, LMDS, and nonlinear of sight; optical link design including laser options, diffraction limits, lidar and communications links, tracking limitations, and GEO and LEO intersatellite link design; Wi-Fi link design; and directed energy systems.

750 Coordinating Seminar (3:3:0) Open only to students in MA or MS in telecommunications programs with at least 18 credits of course work prior to registration. Topics include specific telecommunications problems in management, law, engineering, education, and communications. Focuses on ways a problem in one area can create or solve a problem in other areas.

Theater (THR)

College of Visual and Performing Arts

101 Theatrical Medium (3:3:0) Introduces medium of theatrical performance and its role in contemporary society, and investigates components of production from conception through performance to ensuing criticism. Lectures, demonstrations by theater professionals. Students required to attend theatrical performances on and off-campus, and submit a written report on each.

150, 151 Drama, Stage, and Society I and II (3:3:0), (3:3:0) First semester covers development of Western drama and theater from its beginnings through Shakespeare. Second semester brings study to present day. Considers readings in dramatic literature and history of theater in social context.

190 Special Topics (1–3:1–3:0) Rotating topic. Introductory seminar in areas of special interest. May be repeated for maximum 12 credits.

200 Play Production Practicum (1:0:0) Academic credit awarded for satisfactory participation in departmental (GMU Players) or Theater of the First Amendment productions. One credit is awarded for each assignment up to total 4 credits; fulfills theater BA requirement. See departmental listing for more information. May be repeated for total 4 credits. Graded S/NC.

201 Stage Management (1:1:0) Theory and technique of stage management for theater. Special emphasis on problem-solving skills.

202 Literary Management (1:1:0) Principles of literary management and dramaturgy for regional/resident theater. Directed primarily toward developing new work.

203 Production/Company Management (1:1:0) Techniques of production and company management applied to university and professional theater productions.

210 Acting I (3:3:0) Introduces contemporary acting techniques through individual and group exercises, incorporating tools such as observation, sense and emotion memory, improvisation, given circumstances, and actions and objectives. Considers history and development of acting theory, selected examples of various cultural contexts, and basic types of stage configurations. Students develop appreciation of theater and its basic elements through attendance of live performances on- or off-campus, in-class critical evaluation, and oral and written reflection.

230 Introduction to Technical Theater (3:3:0) Theory, practice, and historical context of physical production component of theater. Studies current trends in technical theater, and explains how they developed from earlier technology. Lectures and hands-on experience.

235 Fundamentals of Costume Construction (3:3:0) Basic flat pattern development, theatrical sewing techniques, and organization of the costume construction process. Includes lab study and practical experience in garment construction and related costume crafts as used in theater costume design.

300 Voice and Speech Fundamentals (3:3:0) Prerequisite: THR 210 or permission of instructor. Basic techniques in breathing, vocal production, and articulation for the actor.

301 Voice and Speech for the Performer (3:3:0) Prerequisite: THR 300 or permission of instructor. Integration of text and performance problems with voice and speech fundamentals begun in THR 300. Advanced work in vocal production and character-specific sounds.

303 Movement for the Actor I (3:3:0) Develops physical side of actor’s instrument emphasizing free and responsive expression of impulse and intention.

304 Movement for the Actor II (3:3:0) Advanced work in techniques established in THR 303.

305 Stage Combat (3:3:0) Prerequisites: THR 210 and 310, or permission of instructor. Studies safe, effective techniques for performing unarmed stage fights, falls, and rolls. Emphasizes acting the fight, safety, and storytelling.

310 Acting II (3:3:0) Prerequisite: THR 210 or permission of instructor. Extends principles begun in THR 210 through scene study, audition technique, and work in analysis, characterization, and relationships.

314 Lighting Stagecraft (3:3:0) Prerequisites: THR 230 or permission of instructor; must be concurrently enrolled in THR 200. Practical and theoretical instruction on becoming theatrical electrician. Includes ideas on workplace safety, basic electrical procedures, theatrical electrical production, integrating with other theater professionals, and professionalism.

320 Beginning Modern Acting (3:3:0) Prerequisites: THR 210 and 310, or permission of instructor. Builds on existing skills in observation, sense memory, relaxation, and improvisation. Students learn variety of methods for scene preparation to apply to their own acting process.

321 Acting Shakespeare (3:3:0) Prerequisites: THR 210 and 310, or permission of instructor. Develops understanding of challenges of performing Shakespeare by building on body of acting skills and knowledge. Focuses on how structure of language in plays reflects, reveals, and expresses character’s emotional life. Students use detailed script analysis, expansion of vocal range, and use of actions and objectives to achieve experience of transforming Shakespeare’s language into powerful theatrical expressions.
329 Directing I (3:3:0) Prerequisite: THR 150–151, 210, or 350; or permission of instructor. Introduces text analysis, rehearsal procedure, staging techniques, and development of production idea. Students direct exercises and short scenes, and prepare written production notes.

330 Seminar in Technical Theater (3:3:0) Prerequisite: THR 230 or permission of instructor. Rotating topic. Offered periodically; addresses selected topic in design or technical theater on advanced level. May be repeated for total 24 credits.

331 Drafting and Model Making (3:3:0) Prerequisite: THR 230 or permission of instructor. Studies conventions and techniques of drafting and model making as methods of communication in the theatrical production process.

332 Seminar in Costume History (3:3:0) Explores evolution of fashion and styles of dress. Students study silhouette, color, fabric, accessories, and make-up appropriate to development of clothing during specific historical era. Offers broader understanding of context relating to sociological and psychological factors influencing Western dress. Historical era studied will rotate. May be repeated for total 9 credits if specific course content differs.

333 Stage Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Fundamentals of creating, developing, and communicating design idea through sketches, plans, rendering, or models. Analysis of text from designer’s perspective.

334 Lighting Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Study of lighting design as art that defines space and reveals form. Introduces tools, equipment, and process of lighting design. Analyzes text from designer’s perspective.

335 Costume Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Project-oriented class emphasizing process of designing and building. Costume design studied in relation to historical periods and artistic demands of script. Includes lecture, lab in fundamentals of costume design for stage.

336 Advanced Theater Technology (3:3:0) Prerequisite: THR 230 or permission of instructor. Continuation of work begun in THR 230, stressing contributions of costumes, sound, and props to theatrical production. Intensive work in drafting for theater. Participation in theater division productions required.

340 Directing II (3:3:0) Prerequisite: THR 329 or permission of instructor. With techniques developed in THR 329, students analyze and stage extended scenes or one-act plays. Emphasizes collaborative process and production organization.

342 Makeup Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Project-oriented class emphasizing makeup for different performance spaces, character age analysis, facial anatomy, and specialized application for theater, opera, dance, film, and television.

343 Costume Draping and Drafting (3:3:0) Pattern development through draping and drafting. Laboratory study and practical experience in construction of stage costumes.

345 Puppetry: History and Technique (4:2:4) In context of comprehensive and intensive exploration of world puppetry, course experiments with building and performance styles. Emphasizes hand and rod puppets, shadow work, toy theater, and bunraku-style figures. Students develop, build, and present original work.

350 Script Analysis (3:3:0) Critical analysis of dramatic literature as preparation for production and performance. Examination of plot, character, theme, audience impact, and cultural context, and the transformation of intellectual ideas into physical theatrical production elements. Writing-intensive course.

351 Dramatic Theory and Criticism (3:3:0) Chronological study of development of dramatic theory and criticism from Plato and Aristotle through modern movements. Students read plays, theoretical works, and critical responses, and write original criticism of performances or texts.

352 Dramatic Literature Seminar (3:3:0) Rotating topic. Intensive study of particular topic, period, or genre in dramatic literature. May be repeated for a total of 9 credits if specific course content differs.

355 Moral Vision in American Theater (3:3:0) Prerequisite: THR 101, theater major, or permission of instructor. Examines vision of American society created and presented in contemporary American theater. Subject defined as “moral” vision because focus is on how we perceive ourselves in relation to others and society’s value standards. Perspectives include sociology, theory of culture, practical theater craft, and literary criticism. Features plays by range of American playwrights.

359 World Stages (3:3:0) Introduces variety of theatrical traditions and performance theories from around the world, with special emphasis on those not covered in introductory Western drama survey courses, 150 and 151. Students read and discuss dramatic texts, performance theory, and video clips to understand variety of theatrical traditions in cultural and historical contexts. Requirements include two team presentations (taking turns as writer and presenter), one midterm paper, and one solo presentation with accompanying paper.

365 Characterization (3:3:0) Prerequisite: THR 210. Explores method and approach of understanding and creating characters for theater modeled on people from personal experience and observation, imagination, dreams, and other media. Transforms that information into detailed, specific, and vivid physical manifestations. Through presentations of characters drawn from personal experience, students shift understanding of characterization from “outward directed” physical adjustments to physical characteristics and personality character traits that are immediate, familiar, and completely realized from “inner driven” connections to their own lives.

380 Playwriting I (3:3:0) Explores to principles of dramatic writing, including character, plot, dramatic structure, dialogue, exposition, setting, and creating theatrical images using examples from plays, screenplays, and students’ own work.

381 Playwriting II (3:3:0) Prerequisite: THR 380 or permission of instructor. Intensive continuation of work begun in THR 380.

382 Screenplay Workshop (3:3:0) Studies screenwriting as dramatic form of 20th, 21st centuries. Explores story, plot structure, three act-structures, mythic structures, fundamental story patterns, character, thinking, and writing visually.
395 Theater as the Life of the Mind (3:3:0) Traces four subjects (battle of the sexes, good gifts, cyclical tragedy, and eschatology) from ancient theater to contemporary plays, television, and movies, using literary criticism, history, political theory, comparative religion, sociology, and anthropology.

420 Advanced Modern Acting (3:3:0) Prerequisite: THR 210 and 310, or permission of instructor. Advanced scene study to build on skills from previous acting courses. Students assigned actor’s approach, midterm sonnet presentation, and final scene.

421 One-Person Show (3:3:0) Prerequisites: THR 210 and THR 310 or permission of instructor. Students work with designated faculty in creative writing, staging, and performance culminating in the successful writing, rehearsing, and performing of a one-person show.

423 Audition Techniques: Stage and Camera (3:3:0) Prerequisite: THR 310 or equivalent, or permission of instructor. Professional directors, coaches, and casting directors offer perspectives on what makes an effective and honest audition. Students prepare a repertoire of pieces for stage and camera auditions.

424 Contemporary Women Playwrights (3:3:0) Prerequisite: junior standing, or permission of instructor. Explores identity and culture, sexuality and gender, work, relationships, and power through the eyes of female dramatists and performance artists. Analyzes texts and issues through readings, videos, and live performances.

425 Verse Speaking (3:3:0) Prerequisite: THR 210 and 310, or permission of instructor. Explores verse literature and mechanics of verse structure through reading, discussing, and reciting major verse plays of Western drama from the Middle Ages through the 20th century. Focuses on various verse forms, paying particular attention to vocal clues within verse structure, the meaning of rhythm, and practicing vocal techniques used in speaking texts in class. Students also prepare weekly presentations of playwrights, and historical backgrounds of plays and their periods.

434 Advanced Lighting Design (3:3:0) Prerequisite: THR 230 and 334, or permission of instructor. In-depth study of lighting design. Work with lighting distribution, composition, and color to create compelling visual pictures and moods. Extensive work with script analysis as related to lighting, drafting of light plots, and the generating associated paper work used by lighting designer.

440 Advanced Studies in Directing/Dramaturgy (3:3:0) Prerequisites: junior or senior standing; completion of or concurrent enrollment in all general education courses; THR 150 or THR 151, and THR 329; or permission of instructor. Examines theory and practice of collaborative development of production ideas by director and dramaturg teams. Students draw from extensive study in field to support production ideas from classical and modern repertoire to be presented as written and oral projects before faculty panel. Meets university general education synthesis requirement.

480 Advanced Playwriting (3:3:0) Prerequisite: THR 381, or permission of instructor. Advanced playwriting workshop in which students explore their own voice in theatrical writing.

482 Advanced Screenplay Workshop (3:3:0) Prerequisite: THR 382 or permission of the instructor. Screenwriting workshop emphasizing student development in screenplay form, structure, and storytelling with emphasis on craft, character, and story culminating in a screenplay.

490 Special Topics in Drama (1–6:1–6:0) Rotating topic. Advanced seminar in topics of special interest, including dramatic writing or other media, and feminism in contemporary theater. May be repeated for a total of 24 credits provided specific course content differs.

491 Major’s Seminar on the Profession (3:3:0) Prerequisite: junior standing or higher. Explores professional issues with students of all stages. Course content varies from year to year and is designed to help students prepare for the demands of the profession. May be repeated for a total of 4 credits.

494 Field Experience (1–6:0:0) Experience in a theatrical organization to provide opportunity to apply classroom training, knowledge, skills, and theory in a professional situation. Activity must be approved by department chair. May be repeated for a total of 12 credits. Graded S/NC.

495 Senior Synthesis Project (3:3:0) Prerequisite: junior standing or higher. Students design advanced-level project, with supervision of faculty advisor, representing culmination of studies in major. May reflect work in one or more specialized areas, such as acting, directing, playwriting, dramaturgy, design, puppetry, or technical production. Synthesis project must include intellectual component and public presentation, with discussion of work with faculty panel. Students encouraged to incorporate work in one or more disciplines and collaborate. Projects assessed on demonstrated ability to communicate effectively in oral and written forms.

496 Text in Production (3:3:0) Prerequisites: completion or concurrent enrollment in all theater core courses and all other required general education courses, and junior standing; or permission of instructor. In-depth investigation of collaborative nature of theatrical arts. Examines discrete creative disciplines; acting, directing, dramaturgy, and design as discussed by distinguished professionals and scholars. In-depth exploration of one selected playscript for the entire semester. Students will work collaboratively in small groups to research, design, direct, and perform scenes from selected text.

497 Independent Study (1–6:0:0) Open only to theater majors with 90 credits and special permission of department chair. Individual research and creative project in close consultation with instructor. Selection from projects in performance, directing, technical theater and design, playwriting, or theater history and criticism. May be repeated for a total of 24 credits, provided suffix citing specific course content is different.

571 Advanced Playwriting Workshop (3:3:0) Prerequisite: undergraduate degree or equivalent, or permission of instructor. Advanced playwriting workshop in which students explore their own voice in theatrical writing.

599 Independent Study (1–6:1–6:0) Prerequisite: undergraduate degree or equivalent, or permission of instructor. Independent reading, performance, or research on a specific project under direction of selected faculty member. May include attendance in a parallel undergraduate course. May be repeated for a total of 6 credits.
Tourism and Events Management (TOUR)
School of Recreation, Health, and Tourism

190 Wedding Planning (3:3:0) Introduction to the planning and management of weddings. Explores social, political, economic, cultural, religious, and historical influences on wedding planning decision-making and business strategies. Reviews practices relevant to successful wedding planning, and consultancy for diverse clients and settings.

200 Introduction to Travel and Tourism (3:3:0) Open to nonmajors. Introduction to travel and tourism from local to international levels. Overview of the scale, scope, and organization of the industry, with emphasis on the development of natural, cultural, heritage, and recreational resources of tourism. Identifies issues related to the economic, technological, legal, and political aspects of tourism.

210 Global Understanding through Travel and Tourism (3:3:0) Open to nonmajors. Approved general education requirement. Examines tourism as a global industry and human activity that promotes and facilitates understanding of historical and cultural values, and of international institutions that characterize the broader global system.

220 Introduction to Event Management (3:3:0) Explores principles and practices of managing medium- and large-scale events including festivals, conventions, concerts, shows, sporting events, and ceremonies. Emphasizes organization, site preparation, communications, personnel, and security as well as evaluation and innovation.

221 Event Implementation and Evaluation (3:3:0) Prerequisite: TOUR 220, or permission of instructor. Introduction to event implementation and evaluation through involvement in on-site event delivery and analysis. Studies participant motivation and economic, social, environmental, and cultural impacts in relation to an event’s products and services.

241 Practicum (3:0:3) Prerequisites: TOUR 200. Open to majors and minors only. Pass/fail. Provides practical experience in the travel and tourism environment through selective fieldwork, job placement, and seminar or conference attendance.

311 Women and Tourism (3:3:0) Open to nonmajors. Approved general education requirement. Focuses on women as hosts and guests. Using social theory, explores issues regarding the history and evolution of tourism as a gendered system. Addresses family, solo and business travel, and employment, taking into consideration issues related to more and lesser developed countries as they relate to the roles of women in international tourism.

312 Ecotourism (3:3:0) Prerequisite: TOUR 200, or permission of instructor. Analyzes tourism that is nature-based and entails a learning component while striving for environmental and sociocultural sustainability within the context of financial viability. Considers markets, role of protected areas, impacts, business aspects, external environments, organizations and policies, and research trends and needs.

330 Resort Management (3:3:0) Prerequisite: TOUR 200, or permission of instructor. Surveys effective practices in the management of resort recreation enterprises. Examines basic resort operations, including front desk, food and beverage, amenities, and housekeeping. Covers management of a variety of resort types, such as ski resorts, beach resorts, dude ranches, business retreats, adventure camps, health spas, and golf resorts.

340 Sustainable Tourism (3:3:0) Prerequisite: TOUR 200, or permission of instructor. Considers the characteristics of environmentally, economically and socioculturally sustainable tourism, and assesses the possibilities and limitations for its implementation in a variety of destination and product settings. Emphasizes conventional “mass” tourism as well as small-scale “alternative” tourism.

352 Heritage and Cultural Tourism (3:3:0) Prerequisite: TOUR 200, or permission of instructor. Examines historical and cultural attractions, including museums, canals, monuments, pilgrimage sites, military sites, and cultural and heritage landscapes. Covers presentation and interpretation, African-American and Native American heritage, management and operational considerations, and marketing.

362 Cultural and Environmental Interpretation (3:3:0) Prerequisite: PRLS 300, PRLS 328, or TOUR 352; or permission of instructor. Focuses on communication processes and practices used by professionals to explain and interpret special characteristics of cultural and environmental resource sites for visitors. Discusses conceptual principles for planning interpretive programs, as well as techniques for analyzing and disseminating information and entertainment through various media. Examines delivery of interpretive messages across a variety of audiences, strategies for programming interpretive services, and the administration and evaluation of interpretive services at tourism, event, and recreation sites.

400 Meetings and Conventions (3:3:0) Prerequisites: TOUR 200 and at least 9 hours of TOUR credits. Principles of planning and policy that apply to integrated and sustainable tourism development at the international, national, state, regional, local, and site scale. Considers government, industry, and community perspectives.

412 Tourism and Events Marketing (3:3:0) Prerequisite: TOUR 200 and PRLS 410, or permission of instructor. Provides understanding and tools for marketing and management of financial resources in entrepreneurial tourism enterprises. Includes market planning, business planning, feasibility assessment, investment analysis, basic accounting, and operational control.

414 Tourism and Events Finance (3:3:0) Prerequisite: TOUR 200, or permission of instructor. Develops skills and competencies for the management of financial resources in tourism and events management enterprises. Students learn about business planning, feasibility assessment, investment analysis, and basic accounting and operational control, with special emphasis on application to this unique industry.

420 Tourism Planning/Policy (3:3:0) Prerequisite: at least 9 hours of TOUR credits. Principles of planning and policy that apply to integrated and sustainable tourism development at the international, national, state, regional, local, and site scale. Considers government, industry, and community perspectives.

430 Tourism on Public Lands (3:3:0) Prerequisite: at least 9 hours of TOUR credits. Evolution, status, and management of tourism on federal, state, and municipal lands, including USDA Forest Service, Bureau of Land Management, National Park Service, and state forest jurisdictions. Emphasizes supply and demand, multiple-use issues, policy and management, funding, tourism impacts, jurisdictional coordination, and the role of adjacent private lands.

440 Meetings and Conventions (3:3:0) Prerequisites: TOUR 200 and at least 9 hours of TOUR credits, or permission of instructor. Analyzes meetings, incentives, conventions, and exhibitions with respect to business environment...
and structure, industry suppliers, site and facility selection, human resource management, legal and financial issues, marketing and promotion, and event organization.

470 Senior Seminar (1:1:0) Only for TOUR majors with senior status. Capstone educational experience focuses on current issues in tourism and event management, and career development strategies.

480 Special Topics (1–3:1–3:0) Selected topics reflect interest in specialized area of tourism and events management. Announced in advance.

490 Internship (12:0:12) Prerequisites: 90 hours, of which at least 12 credits must be in TOUR, including TOUR 241. Open only to majors. Supervised professional experience provides a continuous and structured opportunity to apply principles and skills developed in the classroom to the solution of practical problems in the tourism and events management industry. Provides a paid or voluntary full-time work experience in an approved tourism or event management setting for a minimum of 10 to 12 weeks. Includes meetings and assignments before and during the internship. Graded Pass/Fail.

499 Independent Study (1–3:1–3:0) TOUR majors only. Prerequisites: TOUR 200 and 220, and 90 credits. Faculty-directed independent study of approved topics in tourism and events management.

540 Sustainable Tourism Management (3:3:0) Examines components and interrelationships within tourism systems and assesses the potential economic, sociocultural, and environmental impacts associated with this sector. Considers managerial strategies that minimize the negative impacts and maximize the positive impacts, thereby attaining sustainable tourism.

University/Interdisciplinary Studies (UNIV)

Student Academic Affairs

190 Freshman Seminar (3:3:0) Prerequisite: Freshman standing; enrollment is by minimum 3.30 cumulative high school GPA and invitation. Broad interdisciplinary subjects taught by Robinson Professors; topics vary. Courses may be repeated for up to 12 credits.

301 Great Ideas in Science (3:3:0) Nontechnical introduction to ideas that have shaped the growth of science, from the building of Stonehenge to modern theories of the Big Bang. The idea behind each major advance is treated in its historical context, with special attention to its importance in mankind’s understanding of the nature of the universe. Intended for nonscience majors; uses little mathematics.

342 The George Mason Debates in Current Affairs (3:3:0) In-depth investigation of one or more contemporary public policy issues. Examines the selected topics as discussed by scholars, public interest groups and think tanks, government officials, and the news media. Texts and guest lecturers presenting a wide range of perspectives are an important feature.

342 The George Mason Debates in Current Affairs (3:3:0) Interdisciplinary seminar offering a window on the latest advances and research related to cognitive science, an interdisciplinary field of inquiry that seeks to understand the nature, basis, and origins of human consciousness, thinking, and cognition.

University Transition (UNIV)

Student Academic Affairs

100 University: Freshman Transition (1–2:1–2:0) Helps freshmen transition to college life, focusing on adjusting academically, developing decision-making skills, and learning about services and opportunities for involvement. Although all classes have a core body of knowledge, each class specializes in a particular aspect of college life. Team development at Hemlock Overlook is a component of most sections.

200 University: Sophomore Transition (2:2:0) Focuses on transition issues for students at second-semester freshman standing or higher. Main focus is career exploration and choosing a major. Section topics include self-assessment, values clarification, skill development, career and major research, and options for experiential learning.

300 University: Junior Transition (1:1:0) Focuses on transition issues for students at second-semester sophomore standing or higher. Features three tracks: assisting new transfer students with first-semester academic and transition issues, career readiness for internships and research assistantships, and peer leadership.

400 University: Senior Transition (1:1:0) Transition issues for students at second-semester junior standing or higher. Focuses on development for the professional workplace, skills for graduate school preparation, and readiness for life responsibilities. Includes skill preparation for work, development of field-of-study expertise, resume and portfolio development, job-search strategies, money management, career and alumni networks, interview strategies, and final-year planning.

Urban and Suburban Studies (USST)

Public and International Affairs

301 Urban Growth in a Shrinking World (3:3:0) Examines process of urbanization historically and comparatively. For major world regions, attention is given to the political economy of urbanization and its impact on social and economic relations. Examines growing globalization of the world economy, implications for urban life, and urban political economy of the future.

390 Special Topics in Urban and Suburban Studies (3:3:0) Subject varies according to specialization of instructor.

401 Seminar: The Future of Metropolitan America (3:3:0) Prerequisite: 12 credits of USST-approved courses, including USST 301. Examines trends in the development of American metropolis, including impact of information economy and technological developments on metropolitan form and life, continuing outward growth and increasing decentralization of metropolitan areas, changing functional organization of urban space, and continued social segregation in metropolitan areas. Analyzes contemporary predictions about future of metropolitan life in America, and explores how alternative public policies can shape that future. Students work on research projects in metro area.

490 Internship (3:0:0) Prerequisite: open only to students with 12 credits of USST; see USST coordinator. Approved work-study programs that focus on urban and suburban issues with an approved agency or firm. Placement depends on
student qualifications and availability of positions. Students work with onsite supervisor and coordinator of Urban and Suburban Studies.

Women and Gender Studies (WMST)

Women and Gender Studies Program

100 Representations of Women (3:3:0) Explores ways women are portrayed in advertising, television, film, photographs, cartoons, performance arts, literature, religious texts, and news media from various worldwide sources. Through interdisciplinary study students will evaluate the powerful effects these representations have on the political, economic, and social lives of women throughout the world.

200 Introduction to Women’s Studies (3:3:0) Prerequisites: 30 credits. Interdisciplinary introduction to women’s studies, encompassing key concepts in the field, history of women’s movements and women’s studies in America, cross-cultural constructions of gender, and a thematic emphasis on the diversity of women’s experience across class, race, and cultural lines.

300 Current Issues in Women’s Studies (3:3:0) Study of selected topics central to contemporary women’s studies. Topics vary but include subjects such as women and violence, women and international development, women’s myth and ritual, the history and politics of sexuality, psychoanalysis, and religion.

301 Sex and Gender in Contemporary Society (3:3:0) Prerequisite: 6 credits, or permission of instructor. Changing conceptions of sex roles, both female and male, in contemporary society. Using historical and comparative data, course considers the differential socialization of males and females in relation to the changing social structure in which it takes place.

302 Cultural Constructions of Sexualities (3:3:0) Prerequisite: 6 credits of 200-level English courses. Introductory survey of cultural, literary, and theoretical constructions of sexuality that seeks to complicate traditionally fixed categories of identity. Examination of various representatives of human sexuality, with particular attention to its intersections with gender, race, ethnicity, nationality, and class.

303 Psychology of Women (3:3:0) Prerequisites: PSYC 100, and BIOL 103 and 104; or permission of instructor. Behavior and attitudes of women, influence of sex chromosomes and sex hormones on behavior, influence of culture on sex role differentiation, and theories of sex role development.

304 Women and Media (3:3:0) Prerequisite: COMM 302 or permission of instructor. Introduction to the concepts of the power and influence of the mass media. Allows students to see themselves as products of media influence and gives them a sense of women’s roles as media professionals, as well as consumers.

305 Women and Literature (3:3:0) Prerequisite: 6 credits of 200-level English courses. An exploration of the experience of women as both authors of and subjects in imaginative literature. May be repeated once for credit when subtitle is different, with permission of department.

306 Topics in Communication and Gender (3:3:0) Prerequisite: 60 credits. Exploration of selected topics involving gender and communication. Topics may include women in media, women as rhetors, male/female communication, and communication and sex roles. Specific interests are examined in a seminar setting. Course may be repeated with approval of department.

330 Feminist Theory Across the Disciplines (3:3:0) Prerequisite: WMST 200, or permission of instructor. Examination of feminist critique and transformation of the theories, methods, and methodologies of the sciences and humanities.

340 Internship in Women’s Studies (1–3:0:0) Prerequisite: completion of 60 credits, including WMST 200, or permission of instructor. Community- or campus-based service or experiential learning related to women’s or gender issues. Independent course in which students develop, in consultation with a faculty member, individual contracts defining the learning and competencies they plan to gain from the experience. May be repeated for credit up to 6 credits.

341 Experiential Learning in Women’s Studies (1–3:0:0) Prerequisite: concurrent enrollment in women’s studies course. Community- or campus-based service or experiential learning as it relates to a specific WMST course, taken at the same time. Students develop, in consultation with faculty member, individual contracts defining learning and competencies they plan to gain from the experience. May be repeated for credit up to total 6 credits, but only 3 credits of WMST 400 or 401 may be applied toward the women’s studies interdisciplinary minor.

410 Feminist Approaches to Social Research (3:3:0) Prerequisite: 60 credits, including 9 credits of WMST course work, or permission of instructor. Introduction to feminist approaches to social research for advanced undergraduate students. Students learn the techniques for collecting, analyzing, and writing-up research data as they examine many of the central methodological issues and questions raised by feminist scholars undertaking social research. Because an understanding of how to conduct social research is best gained through experience in the social world, this course emphasizes a learning-by-doing approach.

427 Feminist Political Thought (3:3:0) Prerequisite: GOVT 101, WMST 200, 3 credits of philosophy, or permission of instructor. Explores feminist political thought in historical context. Topics include feminist political movements, feminist critiques of political philosophy, and feminist contributions to political theory.

490 Independent Study in Women’s Studies (1–3:0:0) Prerequisite: 9 WMST credits including WMST 200, or permission of instructor. Reading or research on a specific topic related to women and/or gender issues, under the direction of a faculty member. May involve a combination of reading assignments, tutorials, papers, presentations, or off-campus activities. May be repeated for credit up to a total of 6 credits.

600 Special Topics (3:3:0) Study of selected topics central to contemporary women’s studies. Topics vary but include representation and images, violence, public policy, international development, transmigration of labor, myth and ritual, history and politics of sexuality, psychoanalysis, and religion.
610 Feminist Approaches to Social Research (3:3:0)  
Prerequisites: graduate standing and 3 credits of 600-level WMST course work, or permission of instructor. Provides an introduction to feminist approaches to social research. Students collect, analyze, and write-up research data as they examine many of the central methodological issues and questions raised by feminist scholars. These include feminist critiques of positivism, feminist standpoint theory, social action research models, and feminist engagements with ethical concerns in doing research with human subjects. Emphasizes a learning-by-doing approach to prepare students to conduct research.

611 Gender Research Project (3:3:0) Prerequisites: WMST 610 or SOCI 634. Students work as part of a research team and undertake a semester-long project investigating the significance of gender to the social and academic life of students at Mason. Enhances understanding of techniques for collecting, analyzing, and writing up empirical material. Involves in-depth investigation of and critical engagement with ethical, interpretive, and representational considerations relating to feminist research.

630 Feminist Theories across the Disciplines (3:3:0)  
Multidisciplinary course examines the central issues of feminist theory and explores the various strategies of feminist theorists. Analyzes the ways in which feminist theories have challenged established disciplinary boundaries and contested the traditional assumptions of the humanities, the social sciences, and the sciences.

640 Women and Global Issues (3:3:0) Prerequisites: graduate standing. Multidisciplinary course explores the complex issues women face in different regions of the world. Addresses women’s diverse and shared global concerns and provides students with the tools to analyze and understand women in a global context.

690 Directed Readings and Research in Women’s Studies (3:3:3–6) Prerequisite: graduate standing and permission of instructor. Advanced individualized study of gender through readings, discussion, research, and/or projects under the direction and supervision of a member of the women’s studies faculty. May be repeated for total 9 credits.

699 Capstone Portfolio (0:0:0) Prerequisites: students must have completed their course work for women’s studies certificate, or be in the last semester of their course work. Prior to graduation and in consultation with their advisor, students will reflect on and synthesize their work in the Women’s Studies certificate program by selecting three items taken from their work in the program and discussing these items in a 7–10 page essay. Work selected may include course papers, videos of their performances, exhibit photos, music recordings, and other items as agreed upon by student and advisor.
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John Barnet Radner, AB, BA, PhD, Associate Professor Emeritus of English
Coleman Raphael, BCE, MCE, PhD, Dean Emeritus of Business Administration
Georgine Redmond, BSN, MN, EdD, Associate Professor Emeritus of Nursing
David Rine, BS, MS, PhD, Professor Emeritus of Computer Science
Robert O. Ruhling, BS, MA, PhD, FACS, Professor Emeritus of Physical Education
Robert Rugel, BA, PhD, Associate Professor Emeritus of Psychology
Mian M. Saeed, BS, MA, PhD, Professor Emeritus of History
Andrew P. Sage, BSEE, SSEE, PhD, DENG, Founding Dean Emeritus, The Volgenau School of Information Technology and Engineering
Ben F. Sands Jr., MBA, DBA, Associate Professor Emeritus of Management
David H. Schaefer, BS, Associate Professor Emeritus of Electrical and Computer Engineering
Betty J. Schuchman, BS, MS, EdD, Associate Professor Emeritus of Education
Carol J. Sears, BS, MS, PhD, Associate Professor Emeritus of Education
Linda Seligman, AB, MA, PhD, Professor Emerita of Education
Jay Shaffer, BS, PhD, Professor Emeritus of Biology
Mary Silva, BS, MS, PhD, Professor Emeritus of Nursing
Judith Skog, BS, MS, PhD, Professor Emerita of Environmental Science and Policy
James G. Smith, BM, MM, DMA, Professor Emeritus of Music
Kitty Parker Smith, BSN, MSN, Associate Professor Emeritus of Nursing and Health Services
Vernon L. Smith, BSEE, MA, PhD, University Professor Emeritus
William P. Snavely, BA, MA, PhD, Professor Emeritus of Economics
John P. Soder, BA, MA, PhD, Associate Professor Emeritus of History
Mark Spikell, BA, MEd, EdD, Professor Emeritus of Education
Frank Spindler, Professor Emeritus of History
Melissa Stanley, BS, MA, PhD, Professor Emerita of Biology
Eileen Sypher, AB, PhD, Professor Emeritus of English
Daniel Tabak, BSEE, MS, PhD, Professor Emeritus of Electrical and Computer Engineering
Stephen R. Taub, AB, PhD, Professor Emeritus of Biology
Anita Taylor, BS, MS, PhD, Professor Emerita of Communication
Wayne Thomas, BA, MEd, PhD, Professor Emeritus of Education
Hale Tongren, MBA, DBA, Professor Emeritus of Management
Zita Tyer, PhD, Professor Emerita of Psychology

Harry Van Trees, BSc, MS, ScD, University Professor Emeritus of Electrical Engineering
Karen Vaughn, BA, MA, PhD, Professor Emerita of Economics
Irmgard Wagner, MA, PhD, Professor Emerita of German
Dorothy J. Walker, BSNE, MSNE, PhD, JD, Professor Emerita of Nursing
Gerald Wallace, BS, MEd, EdD, Professor Emeritus of Education
C. Robert Walter Jr., BA, PhD, Professor Emeritus of Chemistry
John Warfield, AB, BSEE, MSEE, PhD, Professor Emeritus of Public Policy and Integrative Studies
Keith Q. Warner, Professor Emeritus of French
Inge Wekerle, BA, AM, PhD, Assistant Professor Emerita of German
Louise White, PhD, Professor Emerita of Public and International Affairs
William Scott Willis, BA, MA, PhD, Professor Emeritus of French
Norman A. Yance, BS, BD, ThM, MPA, PhD, Associate Professor Emeritus of Religious Studies
George A. Zaphiriou, Professor Emeritus of Law

**Instructional and Administrative Faculty 2008–09**

The faculty list reflects appointments as of the end of the fall 2007 semester.

Abdalla, Wagida, Physician and Executive Director, Student Health Services. MD 1972, Alexandria University, Egypt; Diplomate of the American Board of Pediatrics, 1982.

Abramson, Alan J., Professor, Department of Public and International Affairs. BA 1977, Wesleyan University; MA 1977, M.Phil 1979, Ph.D. 1990, Yale University.

Acs, Zoltan J., University Professor of Public Policy. BA 1972, Cleveland State University; MA 1974, PhD 1980, The New School.

Addleson, Mark S., Associate Professor, School of Public Policy. BA 1972, 1973, Rhodes University; MA 1980, University of Natal, Pietermaritzburg; PhD 1992, University of Witwatersrand.


Agnarsson, Geir, Assistant Professor of Mathematical Sciences. BS 1990, University of Iceland; PhD 1996, University of California, Berkeley.

Agouris, Peggy, Professor, Earth Systems and Geoinformation Sciences. Dipl Eng 1986, National Technical University of Athens, Greece; MS 1987, PhD 1992, Ohio State University.

Aharonov, Yakir, Distinguished Professor of Theoretical Physics. BS 1956, Technion University, Haifa, Israel; PhD 1966, Bristol University.

Ahmad, Firzana J., Associate Director of Operations, Undergraduate Admissions. BA 1998, George Mason University.
Ahn, Changwoo, Assistant Professor, Environmental Science and Policy. BS 1992, MS 1996, Seoul National University; PhD 2001, Ohio State University.


Aksob, Pelin A., Assistant Professor of Applied Information Technology. BS 1994, MS 1997, Ankara University, Turkey; PhD 2005, George Mason University.

Albanese, Denise, Associate Professor of English. BA 1978, New York University; PhD 1987, Stanford University.

Albright, Daniel M., Associate Professor, Economics. MA 1988, Hunter College, City University of New York; MS 1966, PhD 1969, University of Pennsylvania.

Aldrich, Margaret, Associate Registrar for Distributed Campuses. BS 1970, University of Vermont; MEd 1996, George Mason University.

Aleem, Farrokh, Professor of Health Administration and Policy. BS 1976, MS 1978, PhD 1983, University of Wisconsin.

Allen, A. Scott, Instructor of Geography. BA 1995, Mary Washington College; MA 1996, SUNY at Stony Brook; MS 2001, George Mason University.

Allen, Melissa, Core Faculty Member, English Language Institute. BA 1975, MA 1979, San Francisco State University.

Allen, Pamela A., Assistant Dean of Academic and Career Services, School of Management. BS 1972, University of Illinois; MA 1988, Hunter College, City University of New York.

Alligood, Kathleen T., Professor of Mathematical Sciences. BA 1970, George Washington University; MS 1974, PhD 1979, University of Maryland.

Allnutt, Jeremy E., Professor, Electrical and Computer Engineering. BSc 1966, PhD 1970, Salford University.

Almond, Sonya, Term Instructor of Nursing. BSN 2001, Norfolk State University; MSN 2006, George Mason University.

Al-Ubaydli, Omar, Assistant Professor of Economics. BA 2001, MA 2003, PhD 2007, University of Chicago.


Ambeaugnkar, Jatin, Assistant Professor of Athletic Training. BS 1998, T. N. Medical College, India; MS 2003, Springfield College; PhD 2006, University of North Carolina, Greensboro.

Amireh, Amal, Associate Professor, English. BA 1983, Birzeit University, Palestine; MA 1987, PhD 1997, Boston University.

Ammann, Paul E., Associate Professor, Computer Science. AB 1983, Dartmouth College; MS 1985, PhD 1988, University of Virginia.

Anderson, Daniel M., Associate Professor of Mathematical Sciences. BA 1989, St. Olaf College; PhD 1993, Northwestern University.

Anderson, David S., Professor of Education. BS 1971, Duke University; MA 1973, Ohio State University; Virginia Polytechnic Institute and State University.

Anderson, Dawn, Associate Registrar for Operations. BBA 1994, Marymount University.


Anderson, LeKesha N., Advising Coordinator, Department of Communication. BS, University of Virginia’s College at Wise; MA, East Tennessee State University.

Anderson, Nancy M., Special Education Policies and Procedures Coordinator. BA 1982, Gallaudet University; MEd 1985, Western Maryland College/McDaniel University.


Andronikov, Sergei, Associate Professor, Information Systems and Operations Management. MSc, Moscow State University; PhD, Russian Academy of Sciences.


Apostolos, Robert J., Police Technical Advisor, Administration of Justice. BA 1974, California State University; MS 1977, San Diego State University.

Arabandi, Bhavani, Instructor, Sociology. MSW 1995, Tata Institute of Social Sciences; MA 2000, George Mason University; ABD University of Virginia.

Araujo, Robyn P., Research Associate, Center for Applied Proteomics, Molecular Medicine. BEng 1997, University of Southern Queensland; PhD 2003, Queensland University of Technology, Australia.

Arciszewski, Tomasz, Professor, Civil, Environmental, and Infrastructure Engineering. BSc 1970, MSc 1970, PhD 1975, Warsaw University of Technology.

Armor, David J., Professor, School of Public Policy. BA 1961, University of California, Berkeley; PhD 1966, Harvard University.

Arthurs, Joshua W., Postdoctoral Teaching Fellow, History and Art History. BA 1997, Wesleyan University; MA 1999, PhD 2007 University of Chicago.

Ascencio, Mario A., Reference and Liaison Librarian, University Libraries. BA 1966, CSU Northridge; MLIS 1999, UCLA.

Ascoli, Giorgio A., Professor, Department of Molecular Neuroscience. BS 1991, Scuola Normale Superiore, Italy; MS 1993, Pisa University, Italy; PhD 1996, Scuola Normale Superiore.

Ashcraft, Thomas D., Associate Chair and Associate Professor, Art and Visual Technology. BA 1978, University of South Florida; MFA 1982, Indiana University.

Atkins, David C., Director, Johnson Center and Student Union Operations. MA 1998, George Mason University.

Atkinson, Jennifer H., Associate Professor, English. BA 1978, Wesleyan University; MA 1985, MFA 1984, University of Iowa.
Auerswald, Philip E., Assistant Professor and Director, Center for Science and Technology Policy, School of Public Policy. BA 1988, Yale University; MA 1995, PhD 1999, University of Washington.

Auffret, Jean-Pierre, Assistant Professor of Information Systems and Operations Management. BS 1979, Duke University; MBA 1982, Colgate Darden School of Business University of Virginia; PhD 1999, American University.

Austin, Clayton, Chair, Department of Theater; Associate Professor of Theater. BA 1973, Brandeis University; MFA 1986, Yale School of Drama.

Avrukh, Kevin Andrew, Professor of Conflict Resolution and Anthropology. BA 1972, University of Chicago; MA 1973, PhD 1978, University of California, San Diego.

Axtell, Robert, Associate Professor, Department of Computational Social Science, Krasnow Institute for Advanced Study. BS 1983, University of Detroit; PhD 1992, Carnegie Mellon University.

Aydin, Hakan, Associate Professor, Computer Science. BSc 1991, MSc 1994, Istanbul Technical University; PhD 2001, University of Pittsburgh.

Baghi, Heibatollah, Associate Professor of Global and Community Health. BA 1974, University of Isfahan; MS 1976, PhD 1980, Iowa State University; PhD 1988, Florida State University.

Bai, Chunhong, Assistant Research Associate, Life Science. BS 1987, Peking University; MS 2004, State University of New York at Albany.

Bailey, Charles, Distinguished Professor of Biology. BS, MS, PhD, Oklahoma State University.


Bailey-Page, Jo Lynn, Public Relations and Outreach Coordinator, Music. BM 2001, George Mason University.

Baker, Ann C., Associate Professor and Director, Organizational Development and Knowledge Management. BS 1966, College of Charleston; MPA 1975, University of Tennessee; PhD 1995, Case Western Reserve University.

Baker, Max A., Executive Director of the Patriot Club. BS 1995, Virginia Polytechnic Institute and State University.

Baker, Pamela H., Assistant Professor of Special Education. BS 1984, MEd 1987, College of William and Mary; EdD 2002, Bowling Green State University.

Baker, Robert E., Associate Professor of Education. BS 1979, MS 1985, Pennsylvania State University; EdS 1986, EdD 1995, College of William and Mary.

Bakhash, Shaul, Robinson Professor of History; BA 1959, MA 1968, Harvard University; PhD 1972, Oxford University.

Balakerskaia, Anna, Term Professor of Music. MM 1969, DMA 1974, St. Petersburgh State Conservatory, Russia.

Baldwin, Carry L., Assistant Professor of Psychology. BA 1987, University of Nebraska-Lincoln; MA 1994, PhD 1997 University of South Dakota.

Balint, Peter John, Assistant Professor of Environmental Policy and Government and Politics. BA 1971, Haverford College; MA 1972, University at Albany, SUNY; MS 1998, PhD 2000, University of Maryland.

Bannan-Ritland, Brenda, Associate Professor of Education. BS 1986, Millersville University; MS 1991, Bloomsburg University; PhD 1996, Pennsylvania State University.

Banville, Dominique, Associate Professor of Physical Education. BPE 1990, MSc 1994, PhD 1998, Laval University, Canada.

Baranova, Anna, Associate Professor of Biology. MS 1995, PhD 1998, Moscow State University; DSci 2004, Vavilov Institute of General Genetics, Russian Academy of Sciences.

Barbara, Daniel, Professor, Computer Science. BS 1975, Universidad Metropolitana, Caracas, Venezuela; MSc 1981, PhD 1985, Princeton University.

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Barna, Adrienne M., Associate Director, Counseling and Psychological Services. AB 1970, Drew University; MEd 1972, Rutgers University; MA 1976, PhD 1980, University of Maryland.

Barnes, Steven, Assistant Professor, History and Art History. BA 1993, Harvard University; MA 1997, PhD 2003, Stanford University.

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Bartoli, Andrea, Drucie French Cumbie Professor of Conflict Analysis and Resolution. Laurea 1980, University of Rome; Dottorato di Ricerca 1994, University of Milan.

Bauer, Colleen, Associate Registrar. BS 1982, Indiana State University.

Bauer, Scott, Associate Professor, Education Leadership. BS 1981, MS 1983, PhD 1996, Cornell University.

Baum, Evan S., Director of Undergraduate Academic Programs, College of Humanities and Social Sciences. BA 2003, University of Richmond; MA 2005, University of Maryland, College Park.

Baylor, David M., Audience Services Manager, College of Visual and Performing Arts. BA 1989, George Mason University.

Beach, David R., Term Instructor, English. BA 1993, Marymount University; MA 1995, George Mason University.

Beach, Sheryl L., Associate Professor, Earth Systems and Geoinformation Sciences. BA 1982, California State University; MA 1984, PhD 1990, University of Minnesota.

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Behrmann, Michael Mits, Helen A. Kellar Professor of Special Education. BS 1971, MEd 1972, University of Cincinnati; EdD 1978, Teachers College, Columbia University.

Bell, Kristine L., Associate Professor, Statistics. BSEE 1985, Rice University; MSEE 1990, PhD 1995, George Mason University.

Bemak, Frederick P., Professor of Education. BA 1970, Boston University; MED 1971, EdD 1975, University of Massachusetts.

Benitez, Alexander V., Assistant Professor, Sociology and Anthropology. BA 1992, University of Arizona, Tucson; MA 1999, PhD 2006, University of Texas at Austin.

Benjamin, Lehn, Assistant Professor, Public and International Affairs. BA 1990, University of Minnesota; MRP 1998, PhD 2004, Cornell University.

Bennett, James T., William P. Snavely Professor of Economics. BS 1964, MS 1966, PhD 1970, Case Western Reserve University.

Bennington, Tammy L., Assistant Professor of Economics, and Program on Social and Organizational Learning. BA, MA 1984, Washington University; PhD 1995, SUNY at Binghamton.

Benson, Brien, Research Associate Professor of Public Policy. BA Harvard University; MBA Stanford University; PhD 1998, George Mason University.

Bentley, Callan, Instructor, Environmental Science and Policy. MS 2004, University of Maryland-College Park.

Berg, Scott, Term Assistant Professor, English. BA 1992, University of Minnesota; MA 1995, Miami University; MFA 1997, George Mason University.

Berger, Jennifer Garvey, Associate Professor of Education. BA 1991, St. Mary’s College of Maryland; MEd 1992, EdD 2002, Harvard University.

Bergman, Rachel, Assistant Professor of Music. BA 1992, Skidmore College; PhD 2001, Yale University.

Bergoffen, Debra Beth, Professor, Philosophy. AB 1962, Syracuse University; MA 1966, PhD 1974, Georgetown University.

Bernard, Elizabeth R., Director, Freshman Center. MA 1991, Ohio State University.

Bernard, Robert, Term Assistant Professor of New Century College. BA 1989, George Washington University; MA 1997, George Mason University.


Berroa, Rei, Associate Professor of Spanish. BA 1970, Catholic University of Puerto Rico; MA 1977, Middlebury College; MA 1980, PhD 1983, University of Pittsburgh.

Berry, Alok K., Associate Professor, Electrical and Computer Engineering. BS 1967, MS 1969, University of Delhi; MS 1981, PhD 1985, University of Missouri.

Best, Amy L., Associate Professor, Sociology. BA 1992, Ithaca College; MA 1995, PhD 1998, Syracuse University.

Bethea, Robert Harrison, Assistant Professor of Communication. BA 1988, JD 1991, University of Oklahoma; LLM 1999, Georgetown University.

Bever, David L., Associate Professor of Health Education. BS 1970, University of Dayton; MA 1973, Ball State University; PhD 1978, Purdue University.

Bickford, Andrew, Assistant Professor, Sociology and Anthropology. BA 1993, George Mason University; MA 1995, Columbia University; PhD 2002, Rutgers University.

Billingham, Lisa A., Associate Professor of Music. BM 1986, Indiana University; MM 1994, University of Missouri-Kansas City Conservatory; DMA 2001, University of Arizona.

Binninger, Pamela, Career Consultant, Career Services. BA 1970, Georgia State University; MED 1979, George Mason University.

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Bishop, Barney, Assistant Professor of Biochemistry. BS 1991, College of William and Mary; Ph.D 1997, University of North Carolina, Chapel Hill.

Bittler, Doris, Associate Professor, Psychology; Associate Dean for Student Academic Affairs, College of Humanities and Social Sciences and College of Science. BA 1982, Dickinson College; MA 1984, Hollins College; PhD 1991, American University.

Blackwell, Kim Avrama, Professor, Department of Molecular Neuroscience, Krasnow Institute for Advanced Study. BS 1981, Boston University; VMD 1986, MRE 1987, PhD 1988, University of Pennsylvania.

Blaisten-Barajas, Estela, Professor of Computational Sciences and Informatics, Physics and Chemistry. BS 1964, Universidad Tecnologica de Tucuman; MS 1970, PhD 1974, Universite de Paris VI.


Blasser, Christine, Term Instructor of Nursing. BSN 1993, MSN 1997, George Mason University.

Bockman, Johanna K., Assistant Professor of Global Affairs and Sociology. BA 1991, University of California, Los Angeles; MA 1995, PhD 2000, University of California, San Diego.

Boehm-Davis, Deborah A., Chair, Department of Psychology, and Professor of Psychology. AB 1975, Rutgers University; MA 1977, PhD 1980, University of California, Berkeley.

Boettke, Peter J., University Professor of Economics. BA 1983, Grove City College; PhD 1989, George Mason University.

Bohn, Debbie, Academic Advisor. BA 1998, University of Utah; MED 2002, George Mason University.

Boicu, Mihaia, Assistant Professor of Applied Information Technology. PhD 2002, George Mason University.
Boileau, Don Michael, Professor of Communication. AB 1964, Stanford University; MA 1965, PhD 1972, University of Oregon.


Boland, M. Lucille, Assistant Professor of Nursing. BSN 1968, University of Maryland; MSN 1977, Catholic University of America.

Bon, Susan C., Associate Professor. BA 1989, Toleda University; JD 1992, PhD 1996, Ohio State University.

Born, Timothy Lee, Associate Professor of Chemistry. BS 1990, Calvin College; PhD 1996, Mayo Graduate School.

Borne, Carl, Professor, Communication. BA 1972, Western Michigan University; MA 1982, PhD 1985, Wayne State University.

Bott, Leslie D., Director, Financial Education Center for Women Entrepreneurs at the Community Business Partnership. BS 2004, University of Hawaii (Laie).

Bottoms, D. Michael, Assistant Professor, History and Art History. BA 1993, University of California, Berkeley; MA 1998, PhD 2005, University of California, Los Angeles.

Boudinot, Patricia, Instructor, Geography. BS 1976, MS 1978, University of Nice.

Boudreaux, Donald J., Professor and Chair, Economics. BA 1980, Nicholls State University; MA 1982, New York University; PhD 1986, Auburn University; JD 1992, University of Virginia.

Bousel, Paul, Assistant Director, Academic Advising Center. BA 1975, Hofstra University; MA 1977, George Washington University.

Bowden, Paul C., Director of Compliance, Intercollegiate Athletics. BA 1991, Hampton University.

Boybayi, Zafer, Associate Professor, Earth Systems and Geoinformation Sciences. BS 1984, Istanbul Technical University; MS 1990, San Jose State University; PhD 1993, North Carolina State University.

Boyd, Beverly Taylor, Assistant Professor of Nursing. BSN 1966, MNEd 1969, University of Pittsburgh.

Bradshaw, Duane D., Associate Director for Career Development and Alumni Relations, School of Public Policy. BA 1996, MEd 1998, Clemson University.

Braithwaite, Michele L., Director of Student Media, University Libraries. MA 1971, University of Minnesota; MS 1975, Brooklyn College of City University of New York.

Brayley, Russell E., Professor of Tourism and Events Management. BS 1977, MA 1986, Brigham Young University; PhD 1990, Texas A&M University.

Brazier, David S., Associate Professor of Education. AB 1979, MA 1986, PhD 1988, Stanford University.

Breglia, Lisa, Assistant Director of Global Affairs Program, Assistant Professor of Global Affairs. BA 1994, MA 1996, University of Florida; PhD 2003, Rice University.

Brenkus, Rosemarie, Assistant Professor of Nursing. BSN 1964, Wilkes College; MAEd 1976, Virginia Polytechnic Institute and State University.


Brigham, Frederick J., Associate Professor of Education. BS 1978, MEd 1983, Bowling Green State University; PhD 1992, Purdue University.


Bristol, Joan C., Associate Professor, History and Art History. BA 1990, Bryn Mawr College; MA 1994, San Francisco State University; PhD 2001, University of Pennsylvania.

Britt, Thomas, Term Assistant Professor, Film and Video Studies. BA 2002, Emory & Henry College; MFA 2005, Ohio University.

Brkic, Courtney A., Assistant Professor, English. BA 1994, College of William and Mary; MFA 2001, New York University.

Brock, Elizabeth A., Associate Vice President and Controller, Fiscal Services. MA 1992, Georgetown University.

Broderick, Marc, Vice President for University Development and Alumni Affairs. BA 1993, George Washington University.

Brodsky, Alexander, Associate Professor, Computer Science. BSc 1982, MSc 1983, PhD 1991, Hebrew University.

Bronzini, Michael S., Dewberry Chair and Chair of Civil, Environmental, and Infrastructure Engineering. BS 1967, Stanford University. MS 1969, PhD 1973, Pennsylvania State University.


Brouse, Peggy S., Associate Professor, Systems Engineering and Operations Research. BS 1978, American University; MBA 1986, Marymount University; PhD 1992, George Mason University.

Brown, Lorraine Anne, Professor of English. BA 1951, MA 1961, University of Michigan; PhD 1968, University of Maryland.

Brown III, William Thomas, Instructor; Baseball Coach; and Assistant Manager, Recreation Sports Complex. BA 1980, George Mason University.

Brozo, William, Professor of Education. BA 1977, University of North Carolina; MEd 1979, PhD 1982, University of South Carolina.

Bruce, Heidi A., Director of Development, College of Humanities and Social Sciences. BA 1995, Morgan State University; CFRM 2002, Indiana University; MBA 2005, University of Phoenix.

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Bryant, Rebecca, Assistant Professor, Sociology and Anthropology. BA 1988, MA 1992, PhD 1998, University of Chicago.
Buchanan, Phillip G., Associate Professor of Accounting. BS 1970, Susquehanna University; MS 1973, Pennsylvania State University; PhD 1982, Temple University; CPA, New York and Pennsylvania.

Buehl, Michelle, Assistant Professor of Education. BA 1997, Hollins University; MA 2002, PhD 2003, University of Maryland.

Buffardi, Louis C., Associate Professor of Psychology. AB 1964, University of Rochester; MA 1966, Fordham University; PhD 1970, Kansas State University.

Bullard, Beth Alice, Assistant Professor of Music. AB 1960, Oberlin College; AM 1963, Harvard University; PhD 1987, University of Pennsylvania; PhD 1998, University of Maryland, Baltimore County.

Buot, Felix, Research Professor, Computational and Data Sciences. PhD 1970, University of Oregon.


Burke, Bridget J., Head, Special Collections and Archives. BA 1984, MSL 1986, University of Wisconsin; MA 2001, Wesleyan University.

Burns, John Barclay, Associate Professor, Religious Studies. MA 1964, St. Andrew’s University, Scotland; BD 1967, Glasgow University, Scotland; PhD 1971, St. Andrew’s University, Scotland.

Burns, M. Susan, Associate Professor of Education. BS 1974, Pennsylvania State University; MA 1980, PhD 1983, Vanderbilt University.

Burr, Zofia A., Director, Honors Program in General Education; Associate Professor, English. BA 1982, Sonoma State University; MFA 1987, MA 1990, PhD 1992, Cornell University.

Burroughs, James N., Term Assistant Professor, Department of Public and International Affairs. BS 1977, James Madison University; JD 1981, College of William and Mary; MPA 1994, George Mason University.

Bursten, Andrew, Director of Finance and Administration and Chief Financial Officer, College of Visual and Performing Arts. BA 1979, Grinnell College; MBA 1981, American University.


Busheé, Gerald R., Term Assistant Professor of Government and Politics. BA 1969, University of Maryland at College Park; MA 1979, American University; PhD 1987, University of Rochester.

Bushey, Keith R., Assistant Vice President for Special Projects, University Operations. MA 1995, Marymount University.

Butler, Ann B., Professor of Molecular Neuroscience, Krasnow Institute for Advanced Study. BA 1967, Oberlin College; PhD 1971, Case Western Reserve University.

Butler, Douthard R., Associate Athletic Director for Academics, Intercollegiate Athletics. PhD 1992, George Mason University.

Butler, Frieda R., Professor of Nursing and Global and Community Health. BSN 1956, Catholic University of America; MPH 1973, Johns Hopkins University; PhD 1980, University of Maryland, College Park.

Butler, Lawrence E., Associate Professor of Art History. BA 1978, MA 1980, Oberlin College; PhD 1989, University of Pennsylvania.


Cadenas, Hortensia B., Executive Director Early Identification Program, University Life BA 1980, MA 1993, George Mason University.


Cai, Xiaomei, Assistant Professor, Communication. BA 1993, Jilin University; MA, Peking University; MA 1998, PhD 2001, Indiana University.

Calhoun, Thomas G., Vice President, Facilities. BE 1978, Vanderbilt University; MS 1987, Stanford University.


Cambridge, Darren, Assistant Professor, New Century College. BA 1996, Wabash College; MA 1998, PhD 2003, University of Texas-Austin.

Camelli, Fernando, Assistant Professor of Computational and Data Sciences. PhD 2002, George Mason University.

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Campo, Lisa, Term Instructor of Nursing. BSN 1985, Lynchburg College; MSN 1994, Seton Hall University.

Camus, Adele C., Instructor of English as a Second Language. BA 1969, University of South Wales, Cardiff, U.K.; MA 1982, University of Texas, Austin.

Cangelosi, Pamela R., Assistant Professor, College of Health and Human Services. BSN 1989, Shenandoah University; MSN 1994, Marymount University; PhD 2002, George Mason University.

Canterbury, Shelly L., Instructor of Finance. BA 1985, George Mason University; MBA 1995, Virginia Polytechnic Institute and State University.

Cantor, Joshua, Director of Parking and Transportation. BA 1994, Cornell University; MA 1997, University of Kentucky.

Caplan, Bryan, Assistant Professor of Economics. BA 1993, University of California, Berkeley; MA 1995, PhD 1997, Princeton University.
Caraballo, Sharon, Assistant Dean for Academic Affairs, The Volgenau School of Information Technology and Engineering, Associate Professor, Applied Information Technology. BA 1994, Rutgers University; ScM 1996, PhD 2001, Brown University.

Carbonneau, Suzanne, Professor of Performance Studies. BA 1976, Bates College; MA 1978, American University; CMA 1979, Laban Institute of Movement Studies; PhD 1990, New York University.

Carle, Andrew J., Assistant Professor of Health Administration and Policy. BS 1981, SUNY at Buffalo; MHSA 1985, George Washington University.

Carr, Daniel B., Professor, Statistics. BA 1968, Whitman College; MEd 1972, Idaho State University; MS 1972, Oregon State University; PhD 1976, University of Wisconsin.

Carreño-Rodríguez, Antonio, Assistant Professor, Modern and Classical Languages. BA 1997, Trinity College; MA 1998, Middlebury College; MPhil, MA 2001, PhD 2005, Yale University.

Carretta, Patricia J., Assistant Vice President, University Life. BA 1968, MA 1974, Binghamton University; MA 1977, University of Iowa.

Carroll, James Robert, Associate Professor of Music. BM 1977, MM 1980, Indiana University.

Carton, Benedict, Associate Professor, History and Art History. BA 1987, Wesleyan University; MA 1994, PhD 1996, Yale University.

Cartwright, William, Assistant Professor of Health Administration and Policy. BA 1967, Rutgers University; MA 1972, Indiana University; PhD 1980, Indiana University.

Carver, Richard H., Associate Professor, Computer Science. BS 1982, Ohio State University; MS 1985, PhD 1989, North Carolina State University.

Casagrande, John, Visiting Associate Professor of Music. BS 1963, MS 1967, Ithaca College.

Casalini, Riccardo, Term Research Associate in Chemistry. BS 1994, Universita di Pisa, Italy; PhD 1998, University of Durham, UK.

Casey, John, Director, Fairfax Small Business Development Center, Mason Enterprise Center. BA 1979, Colgate University; MS 1985, George Washington University.

Casey, Michael J., Assistant Professor, Civil, Environmental, and Infrastructure Engineering. BS 1997, Rutgers University; MS 1999, PhD 2005, University of Maryland.

Castle, Sharon D., Associate Professor of Education. BA 1975, William Penn College; MS 1978, Iowa State University; PhD 1989, University of Maryland.

Cashon, Cara, Assistant Professor, Psychology. BS 1995, University of Iowa; MA 1999, PhD 2004, University of Texas-Austin.

Caswell, Shane Vincent, Assistant Professor of Athletic Training. BS 1999, SUNY at Brockport; MS 2000, PhD 2003, Ohio University.

Cattaneo, Lauren, Assistant Professor of Psychology. BA 1992, University of Michigan, Ann Arbor; MA 1997, PhD 2001, University of Maryland, College Park.

Cebral, Juan R., Associate Professor, Computational and Data Sciences. BS 1991, University of Buenos Aires; PhD 1996, George Mason University.

Censer, Jack Richard, Professor of History and Dean, College of Humanities and Social Sciences. AB 1968, Duke University; MA 1971, PhD 1973, Johns Hopkins University.

Censer, Jane Turner, Professor of History. BA 1973, Transylvania University; MA 1975, PhD 1980, Johns Hopkins University.

Cervone, Guido, Assistant Professor, Earth Systems and Geoinformation Sciences. BS 1998, Catholic University; MS 2000, PhD 2004, George Mason University.

Chalker, Peggy O’Hara, Associate Director, Student Academic Affairs. BS 1979, MEd 1980, University of Cincinnati; PhD, American University.

Chamberlain, Jeffrey T., Chair, Department of Modern and Classical Languages, Associate Professor of French, and University Marshall. BA 1971, Capital University; MA 1973, University of Rhode Island; PhD 1982, University of Illinois, Urbana-Champaign.

Chandhoke, Vikas, Professor of Biology and Dean, College of Science. BPharm 1986, MSc 1986, Birla Institute of Technology and Science; PhD 1991, University of Maine.

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Chang, Michael G., Associate Professor, History and Art History. AB 1992, Princeton University; PhD 2001, University of California at San Diego.

Chang, Shih-Chun, Associate Professor, Electrical and Computer Engineering. BS 1970, National Cheng Kung University; PhD 1977, University of Hawaii.

Chang, Yoonmee, Assistant Professor, English. BA 1992, Tufts University; PhD 2003, University of Pennsylvania.

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College of Health and Human Services

Certificate in Gerontology  CERG-GERO

The graduate certificate program in gerontology combines theoretical and applied course work in aging with the student’s graduate curriculum in one of several departments. Because gerontology is by definition multidisciplinary, students are required to take course work outside their major field. Two other academic units participate in the program: the Department of Psychology and the Department of Sociology and Anthropology. The program is administered by CHHS and supervised by a committee with representatives from the participating academic units.

Certificate Requirements
Applicants must have a bachelor’s degree in nursing or a related discipline. Application is made through CHHS. Completion of the certificate requires 18 graduate credits. To earn the certificate, students must complete all courses with a 3.00 GPA.

Credits

Required Core Courses.................................................6
GCH 637 Normal Aging and Health Deviations..............3
SOCI 686 Sociology of Aging ........................................3

Gerontological Electives..............................................3
Select at least one of the following:
NURS 505 Case Management .................................3
PSYC 592 Death, Dying, and Grieving ......................3

Other Electives..........................................................3
Select at least one of the following:
EDCD 525 Advanced Human Growth and Development ...3
EDCD 605 Introduction to Counseling Theory and Practice .........................................................3
EDCD 607 Advanced Counseling and Development ......3
GCH 580 Alternative Health Care Practices .................3
PHED 630 Exercise, Health, and Fitness Program
Development ...........................................................3
SOCI 651 Health Systems Delivery

Practicum Requirements.............................................6
GCH 770 Gerontology Practicum I .............................3
GCH 771 Gerontology Practicum II ............................3

Total ...........................................................................18 credits

The Volgenau School of Information Technology and Engineering

Graduate Certificate in  CERG-FRED
Foundations in Real Estate Development

The principal focus of the certificate is to provide a fundamental understanding of real estate concepts. The graduate certificate will educate the student in the following: leadership and management challenges in real estate development, fundamentals of construction management, and economic evolution and development concepts.

The Center for Real Estate Entrepreneurship, in conjunction with the Volgenau School of Information Technology and Engineering, the School of Public Policy, and the School of Management, offers this foundations in real estate development certificate. The certificate is offered in conjunction with the school’s master of science in civil engineering at Mason.

Admissions Requirements
Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or higher. Admissions decisions are based on holistic consideration of the applicant’s work experience, letters of recommendation, and application materials.

Certificate Requirements
Students must complete five courses, with an average grade of B or better, for a total of 15 credits of graduate study.

Required Courses
REAL 500 Real Estate Development Fundamentals

Any four of the following courses listed below:
REAL 502 Real Estate Client Leadership and Project Management
CEIE 610 Development and Construction Systems Management
GSOM 740 Real Estate Analysis and Valuation
PUBP 781 Entrepreneurship and Economic Development
PUBP 785 Evolution of the Washington Metropolitan Economy

Continued
Graduate Certificate in CERG-SENV
Sustainability and the Environment

The principal focus of this advanced certificate is to provide a detailed understanding of evolving real estate concepts, particularly as relating to land development, sustainability, and the impact of evolving development on the environment. The five course series will give the student a detailed understanding of land analysis and valuation, engineering concepts related to land development, the impact of the environment on development, and the key concepts of sustainable development. The degree is offered in conjunction with the school’s master of science in civil engineering at Mason.

Admissions Requirements
Applicants must hold a baccalaureate degree from an accredited institution and have earned a GPA of 3.00 or higher. In addition, this civil engineering/real estate graduate certificate requires students to have a basic understanding of real estate development, significant experience in the real estate industry, and/or completion of REAL 500 Real Estate Development Fundamentals.

Certificate Requirements
Students must complete five courses, with an average grade of B or better, for a total of 15 credits of graduate study.

Required Courses
REAL 502 Real Estate Client Leadership and Project Management
CEIE 500 Land Development Engineering
CEIE 555 Introduction to Environmental Engineering
CEIE 501 Sustainable Development
CEIE 673 Leading Engineering Innovation

Students currently enrolled in degree programs at Mason who desire to earn this certificate should contact the Civil Engineering Department in Science and Technology II, Room 109, 703-993-1675.