Think. Learn. Succeed.
2007-2008 University Catalog
The 2007–2008 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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http://catalog.gmu.edu
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, MA
Astronomy BA, BS
Aerobic Training BS
Biology BA, BS
Chemistry BA, BS
Civil and Infrastructure Engineering BS
Communication BA
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
Finance BS
Foreign Languages BA
Geography BA, BS
Geology BA, BS
Global Affairs BA
Government and International Politics BA
Health and Physical Education BSEd
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
Physics BS
Psychology BA, BS
Public Administration BS
Religious Studies BA
Russian Studies BA
Social Work BS
Sociology BA
Systems Engineering BS
Theater BA

Undergraduate Certificate Programs
Accounting
Applied Statistics
Environmental Chemistry
Environmental Management
Gerontology
Information Technology
Islamic Studies

Interdisciplinary Minors
African American Studies
Ancient Mediterranean Art and Archaeology
Art and Visual Technology
Asia-Pacific Studies
Film and Media Studies
Folklore and Mythology
Global Affairs
Global Systems
Islamic Studies
Latin American Studies
Linguistics
Multimedia
New Europe
Nonprofit Studies
Political Philosophy
Urban and Suburban Studies

Nutrition
Operations Research and Engineering
Outdoor Adventure
Professional Development in Piano Pedagogy
Post Bachelor Computer Science

Undergraduate Certificate Programs
Accounting
Applied Statistics
Environmental Chemistry
Environmental Management
Gerontology
Information Technology
Islamic Studies
Women’s Studies
World Music

**Minors**
- Administration of Justice
- American Government
- Anthropology
- Art and Visual Technology
- Art History
- Arts Administration
- Assistive Technology
- Astronomy
- Bioinformatics
- Biology
- Business
- Chemistry
- Chinese
- Classical Studies
- Communication
- Computer Science
- Conflict Analysis and Resolution
- Dance
- Data Analysis
- Early Childhood Special Education
- Earth Science
- Economics
- Economic Systems Design
- Electronic Journalism
- Emotional Disturbance/Learning Disabilities
- English
- Exercise Science
- French
- Geographic Information Systems
- Geography
- Geology
- German
- Health Promotion
- History
- Information Technology
- International/Comparative Studies
- Jazz Studies
- Judaic Studies
- Latin
- Leadership
- Legal Studies
- Mathematics
- Mathematics for School of Management Students
- Mental Retardation
- Music
- Nutrition
- Ocean and Estuarine Sciences
- Parks, Recreation, and Leisure Studies
- Philosophy
- Physics
- Psychology
- Public Policy and Management
- Religious Studies

**Graduate and Professional Degrees**
- Accounting MS
- Art History MA
- Arts Management MA
- Applied and Engineering Physics MS
- Art and Visual Technology MA, MFA
- Art Education MAT
- Biodefense MS, PhD
- Bioinformatics MS, PhD
- Bioinformatics Management MS
- Biology MS
- Bioscience Management MS
- Biosciences PhD
- Business Administration MBA
- Chemistry MS
- Civil and Infrastructure Engineering BS/Accelerated MS, MS
- Climate Dynamics PhD
- Communication MA, PhD
- Community College Education DA
- Computational Science MS
- Computational Sciences and Informatics PhD
- Computational Social Science PhD
- Computer Engineering Accelerated MS, MS
- Computer Science Accelerated MS, MS, PhD
- Conflict Analysis and Resolution MS, PhD
- Counseling and Development MEd
  - Community Agency Counseling
  - School Counseling PK-12
- Creative Writing MFA
- Cultural Studies PhD
- Curriculum and Instruction MEd
  - Adult Education
  - Advanced Studies in Teaching and Learning
  - Alternative Education
  - Advanced Studies in Teaching and Learning
  - Early Childhood Education
  - Advanced Studies in Teaching and Learning
  - Foreign Language
  - Advanced Studies in Teaching and Learning
  - Gifted Child Education
  - Advanced Studies in Teaching and Learning
  - History
  - Advanced Studies in Teaching and Learning
  - Instructional Technology
  - Advanced Studies in Teaching and Learning
  - Literacy
  - Advanced Studies in Teaching and Learning
  - Mathematics
  - 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
- FAST TRAIN
  - Elementary PK-6
- FAST TRAIN English as a Second Language
- Foreign Language or Latin PK-12
- Instructional Technology: Assistive and Special Education
- Instructional Technology: Immersion
- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Part-Time
- Instructional Design and Development
- Instructional Design and Development
- Instructional Technology: Assistive and Special Education
- Instructional Technology: Part-Time
- Instructional Design and Development
- Instructional Design and Development
- Instructional Technology: Immersion
- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Part-Time
- Instructional Design and Development
- Instructional Design and Development
- Instructional Technology: Immersion
- Instructional Technology: Integration of Technology in Schools
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- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Part-Time
- Instructional Design and Development
- Instructional Design and Development
- Instructional Technology: Immersion
- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Part-Time
- Instructional Design and Development
- Instructional Design and Development
- Instructional Technology: Immersion
- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Part-Time
Programs of Study

Environmental Science and Public Policy PhD
Epidemiology and Biostatistics MS
Executive MBA
Exercise, Fitness, and Health Promotion MS
Foreign Languages MA (Spanish, French)
Geographic and Cartographic Sciences MS
Health Science MS
Health Systems Management MS
History MA, PhD
Information Security and Assurance Accelerated MS, MS
Information Systems Accelerated MS, MS
Information Technology, Engineer Degree
Information Technology PhD

Concentrations:
  - Civil and Infrastructure Engineering
  - Information Security
  - Information Systems
  - Operations Research
  - Software Engineering
  - Systems Engineering

Interdisciplinary Studies MAIS

Concentrations:
  - Anthropology
  - Community College Teaching
  - Folklore
  - Higher Education
  - Individualized Studies
  - Religion, Culture, and Values
  - Video-Based Production
  - Women's Studies
  - Zoo and Aquarium Leadership

International Commerce and Policy MA
Justice, Law and Crime Policy, MA, PhD

Law (For information about degree programs, contact the School of Law at 703-993-8000.)

Mathematics MS, PhD
Music MM

New Professional Studies
  - Knowledge Management MA
  - Organization Development and Knowledge Management MS

Graduate Certificate Programs


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 Liberal Arts and Human 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.

Office of the Provost
Computational Social Science Certificate, PhD

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 Resolution for Health Professionals Certificate (with CHHS)
Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Contexts Certificate
Conflict Analysis and Resolution Minor, BA, BS, MS, PhD

College of Education and Human Development
Graduate School of Education Counseling and Development MEd
Concentrations:
- Community Agency Counseling
- School Counseling PK–12

Curriculum and Instruction MEd
Concentrations:
- Adult Education
- Advanced Studies in Teaching and Learning
- Alternative Education
- Advanced Studies in Teaching and Learning History
- Early Childhood Education
- Advanced Studies in Teaching and Learning Gifted Child Education
- Advanced Studies in Teaching and Learning Mathematics
- 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
- FAST TRAIN Elementary PK–6
- FAST TRAIN English as a Second Language
- Foreign Language or Latin PK–12
- Instructional Technology: Assistive and Special Education Technology
- Instructional Technology: Immersion Instructional Design and Development
- Instructional Technology: Integration of Technology in Schools
- Instructional Technology: Part-Time Instructional Design and Development
- Multilingual and Multicultural Education
- Secondary Education 6–12 Biology
- Secondary Education 6–12 Chemistry
- Secondary Education 6–12 English
- Secondary Education 6–12 History and Social Sciences
- Secondary Education 6–12 Mathematics
- Secondary Education 6–12 Physics Education PhD

Education Leadership MEd
Special Education MEd
Teaching (New Professional Studies)
MA Certificates:
- Alternative Education
- Applied Behavior Analysis

Network Technologies and Applications
Nonprofit Management
Nursing Administration
Nursing Education
Operations Research and Engineering
Physical Education
Professional Development (Piano Pedagogy)
Professional Ethics
Professional Writing and Editing
Quality Improvement and Outcomes Management in Health Care Systems
Regional Economic Development and Technology Policy
Regional Trade Policy and Planning
Remote Sensing and Earth Image Processing
School Counseling Leadership
Science (Education)
Science and Technology Policy
Science, Technology, and the Global Economy
Secondary Education Licensure
Severe Disabilities Licensure
Teacher Leadership Teaching of English as a Second Language Telecommunications Forensics and Security Telecommunications Systems Modeling Transportation Policy, Operations, and Logistics Usability (Psychology) VLSI Design Manufacturing Web-Based Software Engineering Wireless Communications Women’s Studies World Religions, Diplomacy, and Conflict Resolution World Religions, Web-Based Software Engineering
Minors:
- Health Promotion
- Exercise Science
- Severe Disabilities
- Secondary Education
- Mental Retardation
- Emotional Disturbance
- Early Childhood Special Education
- Assistive Technology
- Teacher Leadership

College of Health and Human Services

School of Nursing
- Nursing BSN, MSN, MSN/MBA, PhD
- Concentrations:
  - Advanced Clinical Nursing MSN
  - Clinical Nurse Leader MSN
  - Nursing Administration, MSN
  - Nurse Educator MSN, PhD
  - Nurse Practitioner, Adult or Family MSN
  - Gerontology
  - Nutrition Minor
  - Health Science BS, MS
  - Community Health BS
  - Health Care Coordination BS
  - Gerontology BS, MS
  - Global Health MS
  - Nutrition Minor
  - Undergraduate Certificates:
    - Biostatistics
    - Conflict Resolution for Health Professionals
    - Gerontology
    - Global Health

College of Business and Economics
- Management MS
- Social Work Minor, BS, MSW

College of Humanities and Social Sciences
- (Formerly the College of Liberal Arts and Human 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:
  - Linguistics
  - Literature
  - Professional Writing and Editing
  - Teaching of Writing and Literature
- Graduate Certificates:
  - Teaching English as a Second Language
  - Professional Writing and Editing
  - Professional Writing and Editing Certificate

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 (Spanish, French)
- Minors:
  - Chinese
  - Classical Studies
  - French
  - German
  - Latin
  - Russian
  - Spanish

Philosophy
- Philosophy Minor, BA, MA
- Professional Ethics Certificate

Psychology
- Neuroscience, BS
- Psychology Minor, BA, BS
- Psychology MA, PhD
- Concentrations:
  - Applied Developmental MA, PhD
  - Biopsychology MA, PhD
  - Clinical PhD
  - Human Factors/Applied Cognition MA, PhD
  - Industrial Organizational MA, PhD
- Graduate Certificates:
  - Aviation
  - Cognitive Neuroscience
  - Usability

Public and International Affairs
- Biodefense MS, PhD
- Government and International Politics BA
- Political Science MA, PhD
- Public Administration BS, MPA
- Minors:
  - American Government
Programs of Study

• International/Comparative Studies
• Legal Studies
Graduate Certificates:
• Administration of Justice
• Association Management
• Emergency Management and Homeland Security
• Nonprofit Management
• Public Policy and Management

Religious Studies
Judaic Studies Minor
Religious Studies Minor, BA

Sociology and Anthropology
Anthropology Minor, BA, MA
Sociology Minor, BA, MA

New Century College
Integrative Studies BA, BS
Leadership Minor
Multimedia Minor

Interdisciplinary Programs
Community College Education DA, Certificate
Cultural Studies PhD
Global Affairs Minor, BA
Interdisciplinary Studies MAIS

Concentrations:
• Community College Teaching
• Folklore
• Higher Education
• Individualized Studies
• Religion, Culture, and Values
• Video-Based Production
• Women's Studies
• Zoo and Aquarium Leadership

Russian Studies BA
Interdisciplinary Minors:
• African American Studies
• Ancient Mediterranean Art and Archaeology
• Asia-Pacific Studies
• Film and Media Studies
• Folklore and Mythology
• Global Systems
• Islamic Studies
• Linguistics
• Multimedia
• New Europe

Electronics and Communications Engineering BS
Signal Processing Certificate
VLSI Design/Manufacturing Certificate

Information and Software Engineering
Data Mining Certificate
Database Management Certificate
Electronic Commerce Certificate
Foundations of Information Systems Post Baccalaureate Certificate
Information Engineering Certificate
Information Security and Assurance Applicable BS/Accelerated MS, MS
Information Security and Assurance Certificate
Information Systems Applicable BS/Accelerated MS, MS
Software Engineering Certificate
Software Engineering Minor, Applicable BS/Accelerated MS, MS
Web-Based Software Engineering Certificate

Civil, Environmental, and Infrastructure Engineering
Civil and Infrastructure Engineering BS, 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

Computer Science
Applied Computer Science BS
Biometrics Certificate
Computer Games Technology Certificate
Computer Networking Certificate
Computer Science Minor, BS, BS/Accelerated MS, MS, PhD
BS/Accelerated MS in Telecommunications
Intelligent Agents Certificate
Postbachelor Computer Science 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

The Volgenau School of Information Technology and Engineering

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

Systems Engineering and Operations Research
Architecture-Based Systems Engineering Certificate
Command, Control, Communications, Computing, and Intelligence Certificate

Computational Modeling Certificate
Military Operations Research Certificate
Operations Research and Engineering Certificate
Operations Research Applicable BS/Accelerated MS, MS
Operations Research and Statistical Science Dual-Degree MS
Systems Engineering BS, BS/Accelerated MS in Systems Engineering, BS/Accelerated MS in Telecommunications
Systems Engineering Applicable BS/Accelerated MS, MS

Interdisciplinary Programs
E-commerce MS
Information Technology, PhD

Concentrations:
• Civil and Infrastructure Engineering
• Operations Research
• Systems Engineering
• Information Security
• Software Engineering

Information Technology Engineering Degree (Post-Master)
Network Technology and Applications Certificate
Operations Research and Statistical Science Dual-Degree MS
Telecommunications Applicable BS/Accelerated MS, MS
Telecommunications Certificates:
• Advanced Networking Protocols for Telecommunications
• Network Technologies and Applications
• Systems Modeling
• Telecommunications Forensics and Security
• Wireless Communications
School of Management
Accounting BS, MS, Certificate
Bioscience Management MS
Business Administration MBA
Business Minor
Chief Information Officer Certificate
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
Knowledge Management (New Professional Studies) MA
Organization Development and Knowledge Management (New Professional Studies) MS
Peace Operations (New Professional Studies) MS
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 and Health Policy
- Global Trade Management
- Governance Systems and Policy Management
- International Business Planning
- International E-commerce and Telecommunications Policy
- 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 Policy, Operations, and Logistics

College of Science
Bioinformatics and Computational Biology
Bioinformatics MS, PhD, Certificate
Bioinformatics Management, MS
Chemistry and Biochemistry
Chemistry Minor, BA, BS, MS
Environmental Chemistry Certificate
Climate Dynamics
Climate Dynamics PhD
Computational and Data Sciences
Computational Science MS
Computational Sciences and Informatics PhD
Computational Social Science Certificate, PhD
Computational Techniques and Applications Certificate
Nanotechnology and Nanoscience Certificate
Physical Sciences PhD
Earth Systems and Geoinformation Sciences
Earth Systems Science MS
Remote Sensing and Earth Image Processing Certificate
Environmental Science and Policy
Earth Science Minor, BS
Earth Systems Science MS
Environmental Management Certificate
Environmental Science and Policy MS
Environmental Science and Public Policy PhD
Geology Minor, BA, BS
Geography
Geographic Information Systems Minor
Geographic and Cartographic Sciences MS
Geography Minor, BA, BS
Mathematical Sciences
Actuarial Sciences Certificate
Mathematics Minor, BA, BS, MS, PhD
Mathematics for School of Management Students Minor
Molecular and Microbiology
Biology Minor, BA, BS, MS
Biosciences PhD
Medical Technology BS
Neuroscience
Neuroscience PhD
Physics and Astronomy
Applied and Engineering Physics MS
Astronomy BA, BS, Minor
Physical Sciences PhD
Physics Minor, BS

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 (Instrumental Performance) Certificate
Artist (Piano Performance) Certificate
Artist (Vocal Performance) Certificate
Jazz Studies Minor
Music Minor, BA, BM, MM
Professional Development (Piano Pedagogy) Certificate
World Music Minor
Theater
Theater Minor, BA
About George Mason

Vision for the New Century

George Mason 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, George Mason is among the nation’s most innovative universities.

George 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, Templeton Foundation, National Science Foundation, National Endowment for the Arts, National Endowment for the Humanities, and are winners of 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 127 countries and regions, 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

George 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, and Reston. Each Mason campus has a distinctive academic focus that plays a critical role in the economy of the surrounding region. At each campus, students and faculty have access to all the university’s resources, while 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 5,000 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 by 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 in the heart of the Washington, D.C., metropolitan area, the Arlington Campus enjoys an alliance with approximately 200 high-tech firms. George Mason’s commitment to form relationships with area businesses provides students with direct access to employment experience and career opportunities.

The newest building is the beginning of a three-phase plan to develop the 5.2-acre site. Upon completion of all three phases, 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 it 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 Train to Technology 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. In addition, the campus houses the Professional Center, which works with the community to provide a venue for special events.

Prince William Campus

This 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 recreational 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. Design and construction plans have begun for a regional biocountermeasure laboratory, funded in part by the National Institute of Allergy and Infectious Diseases. This laboratory will house research on emerging infectious diseases or those caused by biological threat agents.

Programs in 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 (OCPE).

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. Additionally, there are numerous opportunities to get involved in campus life through a variety of co-curricular 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.

**Ras Al Khaimah Campus**
Recognizing the need for higher education in various fields for the people of the Middle East, George Mason University, with the support of the Ras Al Khaimah Human Development Foundation (RAK-HDF), 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, and nursing. In addition, a Foundation Program in English Language 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 completed, 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**
George Mason University’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, and 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 OCPE’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 Master of Business Administration program and the Volgenau School of Information Technology and Engineering’s (IT&E) Train to Technology program are located here.

**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, Mason sought to ensure a society in which government could not become all-powerful.

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.

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 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 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 fledging 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’s 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...
In 2006 the university opened its first facility dedicated to state-of-the-art electronic classrooms and a television studio. On the Fairfax Campus, the innovative George W. Johnson 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 has 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 underway.

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 Northern Virginia and Commonwealth of Virginia, but also the nation and the world at large.

**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**

George Mason University 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 chairman. The vice president of university development and alumni affairs serves as the foundation president.
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/common/onapps.asp. A nonrefundable and nontransferable fee must accompany the application.

Application Deadlines

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 either 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, engineering, geology, mathematics, or physics. Note that one unit equals one academic year of study.

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<th>Required Minimum</th>
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<td>Mathematics*</td>
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<td>Total</td>
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* 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.

The requirement for graduation is 45 credits of upper-level course work. 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 under Readmission after Previous Attendance may re-enter by completing a re-enrollment form available through the Registrar’s Office or at registrar.gmu.edu/forms/index.html. For applicants to 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**

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 be offered provisional admission if sufficient evidence is presented to suggest the applicant has the ability to pursue graduate work. As 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 each institution 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 students are listed in this catalog under the relevant discipline.

**Graduate Applications**

Applicants are strongly encouraged to apply online at admissions.gmu.edu. Applications for the School of Law can be found at www.law.gmu.edu. Applying online saves students time and money. In addition, students should collect all supplementary materials and submit them to the appropriate graduate processing center listed below.
Admission

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: nursegrad@gmu.edu

College of Science (COS)
Graduate Admissions
4400 University Drive, MS 6A3
Fairfax, VA 22030
Phone: 703-993-1990
Fax: 703-993-1993
E-mail: cosgrad@gmu.edu

College of Education and Human Development (CEHD)
4400 University Drive, MS 4D1
Fairfax, VA 22030
Phone: 703-993-2010
Fax: 703-993-2082
E-mail: gseadmit@gmu.edu

The Volgenau School of Information Technology and Engineering (VITE)
For master’s and certificate programs, and nondegree studies
4400 University Drive, MS 3D5
Fairfax, VA 22030
Phone: 703-993-1512
Fax: 703-993-1242
E-mail: itegadm@gmu.edu

For PhD programs
The Volgenau School PhD Processing Center
4400 University Drive, MS 5C8
Fairfax, VA 22030
Phone: 703-993-1512
Fax: 703-993-1242
E-mail: itegadm@gmu.edu

School of Management (SOM)
4400 University Drive, MS 5A2
Fairfax, VA 22030
Phone: 703-993-2136
Fax: 703-993-1778
E-mail: somgrad@gmu.edu

School of Public Policy (SPP)
Graduate Admissions
3401 Fairfax Drive, MS 3B1
Arlington, VA 22201
Phone: 703-993-8099
Fax: 703-993-4876
E-mail: spp@gmu.edu

College of Visual and Performing Arts (CVP A)
Graduate Admissions
4400 University Drive, MS 1C9
Fairfax, VA 22030
Phone: 703-993-2400
Fax: 703-993-4622
E-mail: masongrad@gmu.edu

School of Law
3301 Fairfax Drive, MS 1G3
Arlington, VA 22201
Phone: 703-993-8010
Fax: 703-993-8088
E-mail: aprice1@gmu.edu

Institute for Conflict Analysis and Resolution (ICAR)
Graduate Admissions
3401 Fairfax Drive, MS 5E9
Arlington, VA 22201
Phone: 703-993-1300
Fax: 703-993-1302
E-mail: icarinfo@gmu.edu

Graduate Admission Exams
Although a number of 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 information desk in the Johnson Center, the University Admissions Office, and in many of the college or school admissions departments.

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 of Information Technology and Engineering 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.mpcweb.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 graduate 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.
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 visa are a letter of admission, evidence of financial support, documentation submitted for immigration status. They do not need to submit financial-support documents unless they plan to change to a student visa. 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 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 (with a minimum score of 20 in each section), or 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 the Educational Testing Service, CN 6151, Princeton, NJ 08541-6151, USA; phone: 609-921-9000; web site: www.toefl.org, or the IELTS site at www.ielts.org.

• All transcripts from colleges or universities outside the United States must be translated into English and evaluated by a recognized U.S. evaluation service before an admission decision can be made. Applicants are responsible for the timely translation and evaluation of documents and all costs and fees associated with these services. A list of suggested evaluation agencies is available in the Admissions Office or at www.naces.org.

• International students already in the United States with F-1 status must complete immigration transfer procedures within 15 days of the program start date. For processing of immigration transfers, contact OIPS at 703-993-2970 or oips.gmu.edu.

Graduate Requirements
International students interested in pursuing graduate study must meet the following requirements:

• Applicants must complete the Application for U.S. Graduate Study.

• Applicants whose native language is not English are required to submit TOEFL results. To be considered for admission, applicants must have scored at least 230 on the computer-based TOEFL, 88 on the Internet-based TOEFL (with a minimum score of 20 in each section), or 570 on the paper-based TOEFL and 4.5 on the TOEFL essay. A TOEFL score of at least 250 (computer-based) or 600 (paper-based) is required to qualify for a teaching or research assistant-ship. Official test scores must be sent to the admissions office directly from the Educational Testing Service. In addition, students may substitute the IELTS exam in lieu of the TOEFL. The IELTS total score must be 6.5 or higher.

• All transcripts from colleges or universities outside the United States must be translated into English, if applicable, and submitted for evaluation to the graduate school to which the applicant is applying. Mason will provide 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, students 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 and 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 Record Form Card signed by a health professional. The form, available at 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 that is valid through August 15 of the following year. The plan must include coverage for health care expenses of at least $50,000 per year, and the deductible amount must 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.

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. The plan must include costs associated with medical evacuation up to $10,000 and costs associated with repatriation up to $7,500.

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 the following:

- 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 of the student's first semester at the university. 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. For more information, contact the Student Health Insurance Office at 703-993-2827.

## 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, SAT or ACT scores, and a secondary school report along with a written recommendation from their guidance counselor.

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, and 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. 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.

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. Volgenau School nondegree graduate application forms are available on the web at admissions.gmu.edu. The following application materials should be submitted for consideration:

- 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 Volgenau School programs and course offerings may be obtained from 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/common/onapps.asp. In addition to completing the online application, students are required to submit official transcripts from all institutions attended. Non-native English speakers must present a minimum TOEFL score of 230 on the computer-based exam or 575 on the paper version. For more information, contact 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. The summer term offers day and evening classes in four sessions from five to eight weeks. 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 the summer term to continue their academic progress.

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**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 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 on the web 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, Expenses, and Financial Aid

Tuition and Fees

General Guidelines

• Students are responsible for maintaining current addresses via Patriot Web (patriotweb.gmu.edu) and activating and checking their George Mason University e-mail accounts.

• Registration will not be considered completed unless all outstanding balances are paid in full.

• By registering for classes, students accept responsibility for charges for the entire semester.

• Payments are due in the Cash Office, Student Union Building (SUB) 1, 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. For more information on payment due dates and penalties, refer to the payment schedule and Academic Calendar in the Schedule of Classes.

• Students who have not completed the financial aid process must be prepared to pay for their courses by the tuition due date or late payment fees will apply. The amount of financial aid accepted and processed will be reflected in the account 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 for these funds to be considered in the balance. Federal work-study awards cannot be deducted from the balance.

• Failure to receive a reminder bill confirming charges does not waive the requirement for payment when due. Balances are available via Patriot Web.

• Students are responsible for dropping unwanted courses (including waitlist courses) by the drop dates and using the drop and withdrawal procedures published in each term’s Schedule of Classes. Full or partial tuition liability may apply.

• Nonreturning students are responsible for submitting a written withdrawal to the Offices of the Registrar, Housing and Residence Life, and Student Financial Aid. Penalties may apply.

• Some of Mason’s 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.

• Students enrolling in Mason’s off-campus courses are assessed tuition and fees at the same rates as those for on-campus courses.
Tuition, Expenses, and Financial Aid

2007–08 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. Students are charged tuition rates according to their academic level; graduate rates vary.

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<tr>
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<th>In-State Undergraduate</th>
<th>In-State Graduate</th>
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<td>Full-time (12–16 credits)</td>
<td>$3,420</td>
<td>N/A*</td>
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<tr>
<td>Per credit</td>
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<td>$337</td>
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<table>
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<th></th>
<th>Out-of-State Undergraduate</th>
<th>Out-of-State Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time (12–16 credits)</td>
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<td>N/A*</td>
</tr>
<tr>
<td>Per credit</td>
<td>$822</td>
<td>$845</td>
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</table>

* Graduate students are charged by the credit.

Related Fees
These fees apply to all students and are subject to change:
- Application Fee, Undergraduate $50
- Application Fee, Graduate $70
- Lab Fee $25
- AVT Arts Bus Fee $50
- SOM, AVT Course Fee (per credit) $15
- Volgenau, CVP A, SCS Course Fee (per credit) $10
- Orientation/Undergraduate New Student Fee $160 (nonrefundable)
- Graduate New Student Fee $60 (nonrefundable)
- International Student Health Insurance Fee $1,345

Note: New student fees are mandatory and nonrefundable, and are charged to the account of every newly admitted student at the time of registration, regardless of orientation attendance or enrollment status.

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. 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. The refund request form is available online at the Student Accounts web site. Check refunds will be mailed to the address on file with the university. Credit card refunds will be 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 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 pursuing a master’s or doctoral degree must maintain continuous enrollment. For more information, see the Graduate Policies section in the Academic Policies chapter.

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), $329. Note: 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.

Tuition Surcharges
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 credit hours 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-hour 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.

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.
Tuition, Expenses, and Financial Aid

Payment

Where
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. Postmarks are not considered proof-of-payment date.

How
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.
Credit card (subject to credit approval): MasterCard or Visa. Daytime phone number must be provided. Written authorizations or patriotweb.gmu.edu.

When
Payment is due the first day of the semester. See the payment schedule in the Schedule of Classes. Payments received at the Cash Office by 4:30 p.m. Monday through 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 an account, go to patriotweb.gmu.edu. Allow ample time for processing payments.

Payment Options
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 and Global Education programs and International Student Health Insurance cannot be deferred. A payment contract, available on the Student Accounts website, 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 nonrefundable. Failure to pay the outstanding balance will result in a financial hold, a late fee up to $250, and university collection activity. Failure to pay may prevent students from being eligible to use this contract in future semesters.

The Sallie Mae TuitionPay monthly installment plan allows students to budget all or part of their tuition, room, and meal expenses in equal monthly payments. Budgets are determined by the student or parent. A life insurance benefit is included in this plan. A minimum budget of $500 is required, and a fee is charged. Failure to make budget payments will result in a canceled plan, financial suspension, a late fee up to $250, and normal university collection activity. For more information, call Sallie Mae TuitionPay, 800-635-0120.

Students may use a third-party billing authorization if their employer or agency accepts the responsibility for tuition and fees payment. Students must submit the third-party billing authorization, financial guarantee letter, or government training voucher to the Student Accounts Office before the tuition due date. All third-party arrangements incur a $25 processing fee, which is nonrefundable. Students may receive an individual bill and are responsible for any default in payments by the sponsoring agency. For a copy of third-party billing procedures, call 703-993-2484 or go to studentaccounts.gmu.edu, and select the Third-Party Billing information link.

Penalties
A late registration fee of $250 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 fee of 10 percent, up to $250.

Classes will not be canceled for nonpayment of tuition. 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 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 $250 may be charged, and a financial hold will be placed on the account.

Financial Suspension
Students who are not in good financial standing with the university will be placed on financial suspension. While on suspension, students are not allowed to register for future semesters or receive any student services, including the release of transcripts, diplomas, or any other student records. Outstanding obligations may include, but are not limited to, fines owed for traffic and parking violations, and debts owed to libraries of institutions and participating public libraries of the Consortium of Universities of the Washington Metropolitan Area.

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.
Tuition, Expenses, and Financial Aid

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. Upperclass students may choose from living environments that include traditional-style residence halls, suites, apartments, and townhouses. The university requires freshmen to live in Presidents Park or University Commons, which have traditional-style residence hall rooms that accommodate five, three, or two students. The estimated housing costs for the 2007–08 academic year are approximately $3,240 to $7,250 per year. Housing rates are subject to change; actual rates will be available early in the spring 2007 semester on the Office of Housing and Residence Life website. 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 1013
Phone: 703-993-2870
Web: www.gmu.edu/univ_ctr/services/dining

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 traditional all-you-care-to-eat dining facility, Ciao Hall, in SUB II; Damon’s, Damon’s Express, Jazzman’s, Chik-fil-A in SUB I; and several options including a food court featuring national names, such as Charlie Chiang’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 2007–08 academic year, meal plans for students living on campus range from approximately $2,100 to $3,350 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 or 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, Federal Unsubsidized 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 currently enrolled 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 any future emergency loans. Application is made through the Office of Student Financial Aid.

- 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.

**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 the level of qualitative performance expected of its students 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/docs/worddocuments/PatentPolicy.doc and www.gmu.edu/research/OSP/docs/worddocuments/CopyrightPolicy.doc.

Official Communication with Students
Web: www.gmu.edu/email

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 ombudsman for student academic affairs (see next page).
Academic Policies

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 will 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 usually meets twice each semester to ensure the timely resolution of cases. The committee communicates its decision to the student, the relevant unit, and the provost.

Ombudsman for Student Academic Affairs

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

The ombudsman is a neutral, independent, informal, and confidential person who listens to student academic concerns, provides advice and referrals, and helps students resolve academic conflicts. The ombudsman is an advocate for fairness and the equitable treatment of students and operates independently of all formal grievance processes at the university. Meetings with the ombudsman are confidential. The ombudsman does not overturn academic actions but may recommend academic policy changes, where appropriate.

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 upon 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.

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. For more information, go to www.gmu.edu/email.

Honor System and Code

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:

**Honor Code**

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 will 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 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 have a responsibility 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 that they believe warrant it.

**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 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.

**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 or that involve faculty, staff, or students as participants must be submitted to the Office of Sponsored Programs for review and approval. The form for submission can be found at [www.gmu.edu/research/ORSP/HumanSubjects.html](http://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 of the vice provost for academic affairs is required for survey research involving Mason students that requires the use of contact information stored in the university database. 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.
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.

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 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 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 their registration is canceled for nonpayment; 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 Patriot Web.

The last day for adding a 14-week course is two calendar weeks after and including 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.

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 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 Patriot Web prior to the first day of classes for the semester. Refunds of tuition on and after the first day of classes are made according to the tuition-liability dates published in this catalog and the Schedule of Classes.

Elective Withdrawal for Undergraduates
Undergraduates enrolled in degree programs are eligible to withdraw from a limited number of classes without dean's approval and at the student's own discretion. Students may process a maximum of three such elective 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. This policy began in the fall 2005 semester; 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 elective withdrawal for all courses for a semester; see the Elective 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 an elective withdrawal, if eligible, will receive Fs in all courses. Withdrawal forms are available at the appropriate academic dean's office.

Effects of Course or Semester Withdrawal
Approved or elective withdrawal results in a grade of W on the student's transcript for the course or courses that 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 taken 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 warning, termination, or dismissal; the transcript shows grades for all courses attempted; and only one grade per course may be presented on the degree application.
- For courses that are repeatable for additional credit, such as special topics courses, 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.

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 in those undergraduate programs that request or encourage seniors to take graduate courses to meet undergraduate degree requirements and 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 of 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 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, minor, 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 12 credits for undergraduates 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.asp. 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 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:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.00</td>
<td>Passing</td>
</tr>
<tr>
<td>A</td>
<td>4.00</td>
<td>Passing</td>
</tr>
<tr>
<td>A-</td>
<td>3.67</td>
<td>Passing</td>
</tr>
<tr>
<td>B+</td>
<td>3.33</td>
<td>Passing</td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
<td>Passing</td>
</tr>
<tr>
<td>B-</td>
<td>2.67</td>
<td>Passing</td>
</tr>
<tr>
<td>C+</td>
<td>2.33</td>
<td>Passing</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
<td>Passing</td>
</tr>
<tr>
<td>C-</td>
<td>1.67</td>
<td>Passing</td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
<td>Passing</td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
<td>Failing</td>
</tr>
</tbody>
</table>

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 from the professor an official extension of time for a student to complete course work. IX affects the academic record the same way as an 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.

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.

Administrative Failure (FA): For students who appear on the official roster and final grade form for a course, but who never attended or who stopped attending a course, a grade of FA is noted on internal documents. Official documents contain the official grade of F.

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 unsatisfactory 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 record 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 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 challenge and have replaced one of the three 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.

• Track: A second-order component of a degree program approved by SCHEV.

• 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/dtwebguide.

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
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/ssa

Student Academic Affairs and Advising consists of five centers: the Freshman Center, Transfer Center, University Scholars, Postgraduate Fellowships and Scholarships, 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 Medical Sciences Advisory Committee. The committee reviews all qualified candidates for admission to health profession 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 excluded will not retroactively affect Dean’s List status. This notation will be placed on the individual’s permanent record.
Good Academic Standing
Students are 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:

GPA Retention Levels

<table>
<thead>
<tr>
<th>Credit Level</th>
<th>Warning Cumulative GPA Range</th>
<th>Probation Cumulative GPA Range</th>
<th>Suspension Cumulative GPA Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempted Credit Hours</td>
<td>GPA Range</td>
<td>GPA Range</td>
<td>GPA Range</td>
</tr>
<tr>
<td>7–16</td>
<td>0.00–1.99</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>17–29</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>1.85–1.99</td>
<td>1.25–1.84</td>
<td>0.00–1.24</td>
</tr>
<tr>
<td>60–89</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>1.85–1.99</td>
<td>0.00–1.84</td>
<td>–</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 evidence that the student is interested in pursuing an academic career.
• Provide evidence of a renewed ability to achieve academic success.

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 after 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 academic 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 1, 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 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 graduate 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. To do so, the student must secure approval on the appropriate Student Request Form. 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 appropriate Transfer of Credit form. 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.
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 student has met the requirements of their admission and had the provisional qualifier removed from their records.

To be eligible for transfer credit, the credit must be graduate credit earned at another accredited university, earned at another institution and recommended for graduate credit in the American Council on Education guidebook, or earned at Mason while in a nondegree status or enrolled through extended studies. 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. The course must be applicable toward a degree at the institution offering the course. Extension and in-service courses that are not intended by the institution offering the courses to be applied to a degree program are not eligible for transfer credit to Mason. The credits cannot have been previously applied toward a degree at another institution or Mason; however, up to 3 credits previously applied to a degree program at another institution may be transferred into a certificate program at Mason.

Reduction of Credit
The number of credits required by a doctoral, master of fine arts, or master’s program of more than 39 credits may be reduced on the basis of a previously earned master’s degree. Reduction of credit requires the approval of the program director and the dean or director of the school, college, or institute. They determine whether the credits are eligible for reduction of credit and applicable to the degree program and the number of credits to be reduced. Reduction of credit is limited to a maximum of 30 credits in a doctoral program, 20 in an MFA program, and 18 in the MA in psychology concentration in school psychology, and derive from the degree requirements given below.

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.) 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. Students who are terminated are no longer eligible to take courses in the program but may apply to another degree program or take courses in other programs through nondegree studies.

**Academic Dismissal**
A degree-seeking graduate student is dismissed after accumulating grades of F in two courses or 9 credits of unsatisfactory grades in graduate courses. These are minimum standards of academic performance; some programs have higher standards. A student may also be dismissed for failure to meet other program requirements such as doctoral competency exams. The notation of academic dismissal 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 graduation 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.

**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 enrolled in 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 nonthesis 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.

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 in the course materials store in the Johnson Center or at www.gmu.edu/library/specialcollections/dtwebguide.htm. 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 original and one copy of the master’s thesis with two original signed cover sheets must be deposited with the college, school, or institute dean or director for signature prior to being transferred to the University Libraries.

For degree conferral, two copies with signed cover sheets must be submitted to the library by 5 p.m. on the last Friday of classes. (For specific deadlines, go to registrar.gmu.edu.) This is also the deadline for participation in the May commencement.

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+ or C- 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 or 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 998 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.

Registration for dissertation proposal (998) or research (999) must be completed by the end of the schedule adjustment period as published in the Schedule of Classes. If this date is missed, students must register for these courses the following semester. Failing to register on time in a particular semester does not alter the requirement for continuous registration for 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 www.gmu.edu/library/specialcollections/dtwebguide.htm. 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**

Two original copies on 100 percent cotton bond and one photocopied copy of the dissertation must be deposited with the college, school, or institute’s dean or director for signature prior to being transferred to the University Libraries.

For degree conferral, two copies with cover sheets signed by the committee and dean or director must be submitted to the library by 5 p.m. on the last Friday of classes. (For more information, go to registrar.gmu.edu.) This is also the deadline for participation in the May commencement. To be included in Mason’s published commencement program, students must submit copies to the library by April 15.

In addition, submission of the dissertation to University Microfilms International is required; a fee of $55 is paid by the student for this process. All copies of the dissertation must be submitted and all fees paid before the doctoral degree is awarded.

**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, www.gmu.edu/library/specialcollections/dtwebguide.htm, provides students with useful tools, including downloadable templates of necessary elements, forms required for the submission process, and links to related web sites. 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. Employees with disabilities may contact the Americans with Disabilities Act (ADA) coordinator in Mason Hall, Room D11, 703-993-8730 or 703-993-8787 (TTY). Students with disabilities may contact the Office of Disability Services in Student Union Building (SUB) I, Room 222, 703-993-2474.

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. 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.
- Students must be immunized against tuberculosis (TB) screening is required for all students at high risk for contracting TB as defined by the Centers for Disease Control and Prevention. TB screening is also required for all students from countries where TB is endemic as defined by the CDC.
- Tuberculosis (TB) screening is required for all students 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.

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.
Alcohol
- The possession and consumption of alcoholic beverages is limited to those locations and circumstances authorized by university policy.
- No alcoholic beverages are permitted in Presidents Park or designated first-year residential areas in University Commons.
- Students 21 years of age or older are permitted to possess alcohol in residence hall rooms other than those located in Presidents Park or designated first-year residential areas in University Commons.
- No alcoholic beverages may be consumed in public areas of residence halls, which includes, but is not limited to, hallways, study rooms, and lounges.
- 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, *Broadsider*.

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**Responsible Use of Computing Policy**

The responsible use of computing (RUC) policy applies to all academic and operational departments and offices at all university locations, owned and leased. The policies and procedures apply to all university faculty, staff, students, visitors, and contractors.

The university provides and maintains computing and telecommunications technologies to support the education, research, and work of faculty, staff, and students. To preserve the security, availability, and integrity of computing resources, and protect all users’ rights to an open exchange of ideas and information, this policy sets forth the responsibilities of each member of the university community in the use of these resources. This policy supports investigations of complaints involving computing abuse including sexual harassment, honor code, and federal or state law violations.

Violations of this policy may result in revocation of access, suspension of accounts, disciplinary action, or prosecution. In addition, evidence of illegal activity will be turned over to the appropriate authorities. It is the computer user’s responsibility to read and follow the policy and all applicable laws and procedures (user sign-on agreement). Those who observe someone violating this policy or another university policy using university computing resources should report it by e-mail to the Security Review Panel at stopit@gmu.edu or abuse@gmu.edu. Many local computing systems have similar e-mail reporting addresses.

**Definitions**

**Mason computing resources:** All computers, systems, workstations, networks, networking equipment, peripheral devices, servers, and any other university property attached to the Mason network. It also includes all software, files, documents, and databases stored in Mason computing systems. It does not include equipment of Internet service providers and personal equipment owned by members of the university community who may use this equipment to access university computing resources.

**System administrators (SAs):** Mason employees who are responsible for maintaining, configuring, operating, or repairing university computing resources. SAs have special privileges and special responsibility under this policy.

**Security Review Panel (SRP):** A committee of faculty, information technology staff, and students who interpret this policy, provide oversight, and offer security advice.

**Stopit Group:** A group including the SRP and other Mason officials who are responsible for university policies that may be violated using university computing resources.

**Stopit address:** The e-mail address (stopit@gmu.edu or abuse@gmu.edu) that anyone can use to file a complaint.

**Stopit procedure:** A graduated set of warnings and responses for people suspected of violating this policy.

**Information Technology Unit (ITU):** The organizational entity responsible for information technology (IT) equipment and services within the 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 faculty and staff who provide advice and recommendations to the VPIT regarding the selection and architecture of technologies used to provide IT services.

Responsibilities of the Various Groups
SAs have been granted extraordinary powers, which they should exercise with great care and dignity, to override or alter access controls, configurations, and passwords. SAs manage computers and administer policies, but they do not create policies. Their actions are constrained by this policy and the policies of local administrative units.

A set of guidelines and standards for all SAs is created and maintained by ITU with the review and concurrence of the SRP. These guidelines address job responsibilities, integrity issues, and standard system administration actions that do not violate privacy. Managers of university units who employ SAs are responsible for ensuring that they comply with and enforce the requirements of this policy in the systems for which they are responsible. SAs who violate this policy or misuse their powers are subject to disciplinary action beyond the Stopit procedures.

If an SA observes someone engaging in activities that would seriously compromise the security or integrity of a system or network, including intrusions, break-ins, unauthorized service or access denials, or Trojan horses, the SA may take immediate action to stop the threat or minimize the damage. Actions may include termination of processes, scanning for rogue programs, disconnection from a network, protecting and holding evidence for an investigation, or temporary suspension of an account. Account suspensions must be reported immediately to the SRP. SAs who observe suspected violations of law should immediately alert University Police.

The SRP is responsible for reviewing SA decisions, responding to complaints, providing security advice, and periodically reviewing the computing policy. The SRP consists of the IT security coordinator, three faculty members, two members of the 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 is a faculty member appointed by the VPIT.

SAs must report all violations and their responses to the SRP immediately. Any member of the community can report a violation to the SRP via the Stopit mechanism. The SRP will establish a dispatching procedure for routing Stopit complaints to the appropriate official or staff member for action. All those who investigate complaints under this policy should use the three-step Stopit process, which is described below.

The SRP is authorized to create subgroups to assist in its mission. An example is the George Mason Computer Emergency Response Team (GMU-CERT), which coordinates responses to abuses, provides technical assistance on security matters to SAs, and issues security advisories.

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

Rules of Use
Access to university computing resources is a privilege granted on a presumption that every member of the campus community will exercise it responsibly. Because it is impossible to anticipate all the ways in which individuals can damage, interrupt, or misuse computing facilities, this policy focuses on a few simple rules.

Rule 1: Use university computing resources consistently with stated priorities.
These priorities are set on the use of Mason computing resources:
- High—All educational, research, and administrative purposes of the university
- Low—Other uses indirectly related to university purposes that have an educational or research benefit, including news reading, web browsing, chat sessions, and personal communications
- Forbidden—Selling access to Mason computing resources; engaging in commercial activity not sanctioned by the Provost’s Office; intentionally denying or interfering with any network resources, including spamming, jamming, and crashing any computer; using or accessing any university 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; and violating federal or state law or university policy.

Please note: Employees and contractors of the Commonwealth of Virginia may not use university computing resources for recreation or entertainment.

Rule 2: Don’t allow anyone to use your account for illegitimate purposes.
Your account username identifies you to the entire Internet user community. You may be held responsible for another person’s actions in your account. Any policy violations will be traced back to your username, and you may be held responsible. If you have a legitimate reason to give someone access, keep it strictly temporary, and change your password after that person finishes using your account.

If someone offers use of an account you are not authorized to use, decline the offer. If you discover someone’s password, don’t use it; report access of the password to the owner or to stopit@gmu.edu.

Rule 3: Honor the privacy of other users.
The university respects the desire for privacy and voluntarily refrains from inspecting users’ files except in certain well-defined cases (description follows). SAs 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. Examples of privacy violations are as follows:
- Accessing the contents of files of another user without explicit authorization from that user
- Intercepting or monitoring any network communications not explicitly meant for you
- Using systems to transmit personal or private information about individuals unless you have explicit authorization from the individuals affected
- Creating programs that secretly collect information about users. Software on university computing resource is subject...
to the same guidelines for protecting privacy as any other information-gathering project at Mason. Systems that keep audit trails and usage logs are not secret and are considered normal parts of system administration.

**Rule 4: Don't impersonate someone else.** Using university computing resources to impersonate someone else is wrong. If you use someone else’s account without their permission, you may be committing acts of fraud because the account owner’s name will be attached to the transactions you have performed. If, while using someone else’s account, you communicate with others, you should clearly identify yourself as doing so.

If you send anonymous mail or postings, you should realize that it is normal etiquette to identify that your message is anonymous or is signed by a pseudonym. Because policy violators often use anonymous communication to hide their identities, many people give less credence to anonymous communication than to signed communication. In addition, SAs who receive anonymous complaints and cannot locate the sender for additional information or clarification may be unable to assist the sender or provide witnesses to support claims of illegal activity.

**Rule 5: Don’t use computing resources to violate other policies or laws.** Examples are given below to assist in avoiding inadvertent violations, but the list is not comprehensive. In case of doubt, check with the SRP or e-mail stopit@gmu.edu.

• Don’t violate copyright laws and licenses. Many programs and their documentation are owned by individual users or third parties and are protected by copyright and other laws, licenses, and contractual agreements. You must abide by these restrictions; to do otherwise may be illegal.

• Don’t use Mason computing resources to violate harassment laws or policies. Various types of harassment, including sexual or racial, are proscribed by university policies.

• Don’t use Mason computing resources to violate the Honor Code.

• Don’t extend the Mason network without explicit permission from ITU Network Engineering. The unauthorized use of routers, switches, modems, and other devices can affect the security and stability of the network.

• Don’t use Mason computing resources to attack computers, accounts, or other users by launching viruses, worms, Trojan horses, or other attacks on computers here or elsewhere.

• Don’t perform unauthorized vulnerability scans on systems; such scanning is considered a hostile act.

• Don’t use Mason computing resources to harass or threaten others.

• Don’t use Mason computing resources to transmit fraudulent messages.

• Don’t use Mason computing resources to transmit, store, display, download, print, or intentionally receive obscene material or to distribute pornographic material to minors.

All users of university computing resources are subject to federal and state obscenity laws. State employees should also be aware of 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 university equipment, and personal web pages are all part of a unique electronic information environment. This environment creates unique privacy issues that involve federal and state laws, as well as university policies. E-mail is not secure. It is easily forwarded to a multitude of recipients and may be altered. Intruders to the network may be able to bypass password protection. E-mail may also be accessible under Freedom of Information laws, and backup computer tapes may contain deleted e-mail for more than a year. Mail undelivered for any reason may be copied to the mailbox of a “postmaster” on the sender or recipient computer. For all of these reasons and others, expectations of privacy concerning e-mail and electronic files should take these realities into account.

Most systems have public directories for temporary files. Examples are print spoolers, systemwide web caches, and scratch areas used by document editors. The temporary files stored in these directories are usually restricted to being readable only by the owner. To protect privacy and prevent these directories from overflowing, SAs empty them regularly. Do not count on these files surviving after you log out.

No user may intentionally read personal files, including those storing e-mail, without the owner’s consent. In the event of a lawful investigation of misconduct, law enforcement and university officials involved in the investigation may inspect user files and communications.

The university reserves the right, to the fullest extent permitted by law, to inspect user files and communications for the purposes of investigating allegations of illegal activity and violations of university policies, or to protect the integrity and safety of network systems.

**Web Pages**

The university’s official web site, www.gmu.edu, contains public information about Mason’s offerings, programs, and promises. These pages project the public identity of the university and are the first electronic point of contact with the general public, students, parents, and employers. The university exercises editorial control over the content of its official web pages.

The university is not responsible for information, including photographic images, published on or accessible through personal web pages, including personal home pages. Personal web pages are created and maintained by employees, students, or university-recognized student groups, and are the sole responsibility of the person or student group identified by the account. The university does not monitor the contents of these personal web pages. The individual creating or maintaining personal web pages may be held criminally or civilly liable for materials posted on the site. For example, an individual who posts obscene material may be subject to criminal prosecution, and an individual who posts copyrighted material might be liable to the owner of the copyrighted material under copyright law.

Personal web pages contain the personal expression of their creators. The contents, including link identifiers, of these pages include academic subjects, hobbies, religion, art, and politics, as well as materials that some viewers may find offensive. Neither the contents nor the link identifiers are reviewed or endorsed by the university. If you feel you might be offended by material following a link identifier or material on the page itself, do not continue.

The university will investigate all complaints involving personal web pages and remove or block material or links to material that violates federal or state law or university policy.
**Schools, Institutes, Centers, and Departments**
Organizational units at Mason operate computers and networks to support their missions. The principles of this policy apply to all organizational units, as well as to any computers owned or operated by the university. Units may set additional local policies and expectations that are consistent with this policy. For example, local units may stipulate that material displayed for public access from their sites should be consistent with their public image and mission. They may set guidelines for format and content of material in home pages, ftp directories, listservs, netlib, and info servers, and may appoint an editor or moderator for such material. They may prioritize and prohibit types of use to efficiently manage computing resources.

**Compliance**
The Stopit process was modeled after a similar program at the Massachusetts Institute of Technology. Using a graduated approach to handle policy violations, it is based on two premises: the vast majority of users are responsible, and most offenders, given the opportunity to stop uncivil or disruptive behavior without having to admit guilt, will do so and will not repeat the offense.

This policy distinguishes between incidents that pose no immediate dangers to others or system integrity and incidents that do. The three-step Stopit process described below is designed for cases in which there are no immediate dangers. Incidents posing immediate dangers to people or systems require immediate action. These include active system break-ins or intrusions, denials of service, and fraud or criminal activity conducted with 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 SRP chair 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 computer labs on university premises. The same information will be given to new users and each user annually. New users will be asked to sign their agreement to the RUC policy as a condition of activating their account.
- **Standard reporting mechanism**—The Stopit e-mail address is monitored regularly by SRP members, who respond promptly to complaints. Anyone observing harmful or disruptive behavior should report it to the Stopit e-mail address or University Police. The SRP member who responds to a complaint usually forwards it to the SA of the system on which the infraction apparently occurred. That SA investigates the complaint, determines its validity, and takes appropriate actions such as sending the first warning (see below).

The steps of the process are as follows:
- **First warning**—The SRP member handling a case (or SA, if the case is delegated) sends a warning letter to the alleged perpetrator of improper use of computing resources, harassment, or other uncivil behavior. The letter has this form:

  "Someone using your account did [whatever the offense is.]" This line is followed by an explanation of why the behavior violates 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 alleged perpetrators are aware that a policy violation may have occurred and there was a complaint. It offers them a chance to desist without having to admit guilt and a chance to secure their account against unauthorized use.
- **Second warning**—If there is a second offense from an account that received a first warning, 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.
- **Disciplinary procedures**—If the previous steps do not persuade the perpetrators to desist, the matter will be turned over to the appropriate university 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 suspend the account pending the outcome of an investigation.

**Amendments and Additions**
All amendments and additions to the RUC policy (administrative policy number 1301) are to be reviewed and approved by the Office of the Provost and the Office of the Senior Vice President.

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

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 are subject to citation.

Restricted areas such as yellow curbs, crosswalks, sidewalks, landscaped or barricaded areas, loading zones, disabled 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. Three types of parking permits are available: annual, semester, and summer. Permits may be purchased 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.
Disability 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 are in the Information Guide available at Parking Services. For more information, call the Parking Services Office at 703-993-2710. 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.

Other Policies

Ombudsman for Administrative Services
Student Union Building (SUB) II, Room 2028
Phone: 703-993-2789

The Office of University Services assists students, faculty, and staff who are having difficulty obtaining administrative services or need help negotiating the university’s administrative support structure. The director is designated as the university ombudsman for student administrative services. The office is open 8:30 a.m. to 5 p.m. Monday through Friday; no appointments are necessary. For more information, e-mail ochisler@gmu.edu.

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.

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:
to the campus or local police, seeking a remedy through civil
operations of the university. When such actions materially affect
the learning environment occurring on or off campus are subject
to university discipline. The university can take action and
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
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.

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 disabili-
ties 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 accommoda-
tions 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 ap-
plicants 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.

Other Regulations
Annual Security Report
Mason’s 2006 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, firearm, explosive, air rifle,
air pistol, or other lethal instrument is prohibited on univer-
sity 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
Craig Gibson, Associate University Librarian for Research, Instructional, and Outreach Services
Clyde W. Grotophorst, Associate University Librarian for Digital Programs and Systems
Clyde W. Grotophorst, Associate University Librarian for Digital Programs and Systems
John C. Walsh, Associate University Librarian for Resources and Collection Management Services
John C. Walsh, Associate University Librarian for Resources and Collection Management Services

Professional Faculty

Administrative Faculty
Chase, Ercolano, 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 1.1 million books and bound journal volumes; more than 10,500 current print serial subscriptions; 3 million microform units; more than 340,000 in-house government documents; 213,000 maps; 38,000 multimedia materials; 540 electronic databases, including access to 28,000 electronic journals and proceedings as well as 79,000 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 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:

**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 the Library Systems Office. The MARS librarian offers expert advice on archiving these materials, considering file formats, copyright issues, long-term management of archived materials, and issues pertaining to scholarly communication.

**University Copyright Assistance Office**

Johnson Center, Rooms 120, 121

Phone: 703-993-2562, 3158, or 2427

Fax: 703-993-4116

Web: library.gmu.edu

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**

Web: specialcollections.gmu.edu/dtwebguide.htm

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: 703-993-2201

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**

Fenwick Library Government Documents

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. Intercampus 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 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)  
Administration  
Deborah M. Keene, Associate Dean,  
Library and Technology  
Phone: 703-993-8106
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 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 Scholars Community  
Student Academic Affairs  
Johnson Center, Room 245  
Phone: 703-993-9082
Administration  
Erica Hernandez

University Scholars Program  
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. They are limited in size to encourage interaction between students and specialized 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 assistantships, 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. Restricted to undeclared students.

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 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 in public administration, 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 website: 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
Tanith Fowler Corsi, Associate 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, create unforgettable memories, and travel while earning credit. Whatever a student’s academic goals, CGE has a corresponding program. 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 all 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) provides assistance and services to international students, visiting scholars, faculty, staff, and families. OIPS advises on all matters pertaining to immigration status and provides assistance with practical information to ease transitions. At the start of each semester, OIPS conducts a comprehensive orientation program for new international students. During the year, OIPS organizes intercultural programs such as receptions and outings, coffee hours, holiday celebrations, spouse networks, workshop series, and most notably, Mason’s annual International Week 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.

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, 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. Courses are typically delivered through classroom settings but are increasingly delivered through electronic modes such as video conferencing and the Internet.
OCPE offices are strategically located at the Fairfax Campus in Krug Hall, 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 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 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-tech 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.
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 Tuesdays 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 upon 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 upon 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 $900, 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 96 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 pursing 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 see.orau.org or by calling either of the contacts below.

### Center for Global Studies

Phone: 703-993-4625
Web: cgs.gmu.edu

**Administration**
Peter Mandaville, Co-Director and Associate Professor, Government and Politics
Terrence Lyons, Co-Director 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 periodic small grants to support faculty. The center also manages multicademic unit research projects on an ad-hoc basis and a number of regional and thematic working groups.

### Krasnow Institute for Advanced Study

Phone: 703-993-4333
Web: krasnow.gmu.edu

**Administration**
Jim Olds, Director
Ken De Jong, Associate Director

**Faculty**
Giorgio Ascoli, Rob Axtell, Ernest Barreto, Avrama (Kim) Blackwell, Ann B. Butler, Juan Cebral, Claudio Cioffi, John Cressman, Ken De Jong, Barbara Given, Layne Kalbfleisch, Kevin McCabe, Harold Morowitz, Jim Olds, Ann Palkovich, Dawn Parker, Nathalia Peixoto, Paul So, Jim Thompson, Maksim Tsevetostat

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.
Krasnow 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 Institute in 2005. In 2007 the Institute became an academic unit along with faculty lines. 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.

Academic Programs
The Krasnow Institute, together with the COS and CHSS, oversees the campus-wide 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.

Center for Social Complexity
Phone: 703-993-1402
Web: socialcomplexity.gmu.edu
Administration
Claudio Cioffi-Revilla, Director
Christina Bishop, Administrative Assistant
Faculty
Axtell, Bainbridge, Beach, Cioffi-Revilla, De Jong, Gentle, Grefenstette, Guillory, Luke, McCabe, Palkovich, Parker, Schin菲尔er, Snead, Tsvektorat, Wagner, Wong
Research Programs
Computational Social Science (CSS) is an interdisciplinary field that combines the application of computer simulation and other computational methods to the analysis of social systems and processes at all levels or scales of complexity: cognitive, individual, group, societal, national, and world systems. Examples of social complexity include the evolution of civilization and technology, economic market and firm dynamics, human organizations, warfare and terrorism, and the emergence of language and symbol systems. Every social science field includes a computational subfield: anthropology, economics, geography, history, linguistics, political science, and sociology. CSS also includes the interaction between human and natural systems, including environmental and ecological systems.

Academic Programs
The Krasnow Institute’s Center for Social Complexity offers all course work designated CSS in the Course Descriptions chapter of this catalog. CSS courses are intended for students who are interested in taking individual CSS courses, seeking a concentration in CSS, or pursuing a graduate degree in CSS.

GRADUATE PROGRAM
Students must maintain a minimum GPA in the program of 3.00. The Center for Social Complexity offers a graduate certificate in computational social science and a PhD in computational social sciences.

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 degree 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 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 ap-
  proved 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 substan-
  tive 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, evolucii
  tionary 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 methodologi-
ical knowledge in CSS as a whole and in the chosen area of
concentration; 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 disserta-
tion that represents a detailed written report of an original and
significant research contribution to the CSS field.

**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.

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 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 and 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 contact the director no later than two semesters prior to
the completion of the required credits.

**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 College of Science
Fairfax Campus Graduate Admissions Processing Center a
completed Mason graduate application, two copies of of-
official transcripts from each college and graduate institution
attended, and a current résumé. TOEFL scores are required
for all international applicants.
University General Education

Marilyn Mobley, Associate Provost for
Educational Programs
Office of the Provost
Phone: 703-993-8770
Web: www.gmu.edu/departments/provost/gened

All undergraduates seeking a baccalaureate degree must complete the University General Education Program requirements. Additional requirements for specific degree programs can be found in the college or school chapter of this catalog.

Mission
The mission of the program is to educate, liberate, and broaden the mind, and instill a lifelong love of learning. In conjunction with each student’s major program of study and other electives, minors, or certificates, this program seeks to produce graduates with intellectual vision, creative abilities, and moral sensibility, as well as skills to ensure a well-rounded and usable education.

General education courses ensure that all undergraduates develop skills in information gathering, written and oral communication, and analytical and quantitative reasoning; expose students to the development of knowledge by emphasizing major domains of thought and methods of inquiry; enable students to attain a breadth of knowledge that supports their specializations and contributes to their education in personal and professional ways; and encourage students to make important connections across boundaries, for example, among disciplines, between the university and the external world, and between the United States and other countries.

Summary of Requirements
The course list reflects approved courses as of press time. For additional approved programs, go to www.gmu.edu/departments/provost/gened/GENEDapprovedcourses.htm. The list will be updated as needed.

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; RUS 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, 135, 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; HIST 230; HIST 120; LING 326; PSYC 100, 211, 231; SOCI 101; TOUR 311; WMST 200

Global understanding (3 credits)
ADJ 405; ANTH 201, 304, 306, 309, 311, 312, 313, 331, 332, 333, 335; ARHT 205, 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, 282, 328, 329, 356, 364, 365, 387, 459, 460, 462; MUSI 305; MUSI 103, 431; RELI 100, 211, 212, 313, 315, 341, 374; RUS 354; SOCI 120, 320, 322; SPAN 322; THR 359; TOUR 210; WMST 100

Natural science (7 credits total)
Non-lab (3 credits): CHEM 101, 102, 201, 202; EVPP 201; GEOG 102; UNIV 301
Lab (4 credits): ASTR 111, 112, 113, 114; BIOL 103, 104, 213, 303, 304; CHEM 103, 104, 155, 211, 212, 251; EVPP 110, 111; GEOL 101, 102; PHYS 103, 104, 160, 243 and 244, 245 and 246, 260 and 261, 263 and 265

Synthesis requirement
ADJ 303; ANTH 400; ARHT 394; AVT 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; EDCL 490; ENGL 325; EOS 304; 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, 343, 377, 378; RELI 490; RUS 353; SOCI 377, 483; SOCW 323; SOM 498; SYST 495; THR 440, 496; UNIV 342, 442

Total: 40 credits

Category Goals and Requirements

Foundation Requirements

Written communication goal: Courses emphasize written communication as a way of thinking and discovering ideas and meanings, as well as expressing them. Students must develop basic writing skills at the freshman level in English 101 (100 for ESL students), and build on those skills in English 302. In addition, at least one course in a student’s major must be 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 students with the ability to express themselves in public or group settings. Students should gain an understanding of the cultural, psychological, political, and practical significance of communication, with special emphasis on the role of communication in a free society. Through oral presentations, group discussions, and critical assessment of public messages, students understand various modes of communication and improve oral communication skills. They should also learn how to support and defend their positions, how to respond to different communication situations, and how to clearly organize and develop ideas. By developing an understanding of the importance of communication in society, students also learn to respect the freedom of expression of all members of the community.

Required: One approved course; increased emphasis on oral communication in appropriate general education courses.

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 exposure and practice grounded in important problems and ideas. Students must take a placement exam to determine their proficiency level before attempting courses that satisfy this requirement. Students who demonstrate a higher proficiency level 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, which is designed to advance students to the higher proficiency level.

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 will possess a command of basic software and hardware concepts, terminology and functions, and file and data structures. They will also be expected to 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.

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

Core Requirements

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,
perspective, 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. Addressed are 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; a course offering an overview of the principles of physics, chemistry, and life sciences will be one of the two courses required of some students. At least one course will have 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. All courses in this category help students develop an understanding of global issues and an awareness of how these issues are perceived and dealt with in different cultural and historical traditions and, where relevant, by different formal and informal institutions throughout the world. 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: Students will engage in the connection of meaning and the synthesis of knowledge. Courses may link issues in the student’s major to wider intellectual and community concerns; other courses might be interdisciplinary. This course may be a capstone course in the major. This component also requires students to demonstrate advanced skills in oral and written presentations that build not only on the communication and synthesis experience of the third year, but also on the recurrent attention to these skills in the entire general education program.

Required: One approved upper-division course.

English Composition Requirement

Students must complete at least two semesters of English composition. For more information, go to the Academic Policies chapter of this catalog.

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.
Institute for Conflict Analysis and Resolution

Phone: 703-993-1300
Web: icar.gmu.edu

Administration
Sara Cobb, Director
Kevin Avruch, Associate Director

Faculty
Professors: Avruch, Cheldelin, Gopin, Jeong, Rothbart, Rouhana, Rubenstein, Sandole
Associate professors: Cobb, Hirsch, Lyons, Warfield
Assistant professors: Goodale, Howard, Nan, Paczynska, Schoeny, Simmons
Research professors: Korostelina, 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.

UNDERGRADUATE PROGRAM
Phone: 703-993-4165
E-mail: ugradcar@gmu.edu
Location: Fairfax Campus
Susan 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 global 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.
Confl ict 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:
• 15 credits of required core courses—CONF 101, 300, 301, 302, and 490
• 9 credits of required bridge courses—CONF 320, 330, 340
• 12 credits of concentration courses at the interpersonal, community and organizational, or global level—Students should choose classes that pertain to their concentration and are listed as approved. For the full listing of approved courses, go to www.gmu.edu/departments/ICAR/undergrad/undergrad.htm. 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.
• 3 credits of field experience—Field experience can take the form of an internship, service learning, or study abroad. Students register for internship and service-learning credits through New Century College. More information is available at www.ncc.gmu.edu.

Confl ict Analysis and Resolution, BS
In addition to satisfying the university-wide general education requirements, CAR majors must complete 54 credits for the BS degree:
• 15 credits of required core courses—CONF 101, 300, 301, 302, and 490
• 9 credits of required bridge courses—CONF 320, 330, 340
• 12 credits of concentration courses at the interpersonal, community and organizational, or global level—Students should choose classes that pertain to their concentration and are listed as approved. For the full listing of approved courses, go to www.gmu.edu/departments/ICAR/undergrad/undergrad.htm. 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.
• 6 credits of research methods courses—STAT 250 and one other research methods course approved by the department (see advisor for full list of approved courses)
• 3 credits of non-Western culture—Course should be chosen from the CHSS list (course may not count for global understanding).
• 6 credits of major electives chosen from CAR electives, CAR concentration course lists, or independent study options
• 3 credits of field experience—Field experience can take the form of an internship, service learning, or study abroad. Students register for internship and service-learning credits through New Century College. More information is available at www.ncc.gmu.edu.

Minor in Confl ict Analysis and Resolution
Students are required to take 18 credits: 6 credits in required core courses CONF 101 and 300; 3 credits in the bridge course (CONF 320, 330, or 340) that corresponds to their chosen concentration; and 9 credits from the list of courses approved for the concentration. Students will choose classes that pertain to their concentration and are listed as approved. The full listing of approved courses can be found at www.gmu.edu/departments/ICAR/undergrad/undergrad.htm. Students are encouraged to check special topics courses each semester and think creatively about the applicability of courses that might support learning in their chosen concentration. Students may also elect to fulfill this requirement by taking any other 300- or 400-level CONF course.

Students are required to achieve a minimum 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.

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 nonactivity PHED courses for elective credit for CAR degrees.

GRADUATE PROGRAMS
Phone: 703-993-1300
E-mail: icarinfo@gmu.edu
Location: Arlington Campus

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 technique. 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. The semester in which courses are generally offered is indicated in parentheses.

- CONF 501 Introduction to Conflict Analysis and Resolution (fall and spring)
- CONF 601 Theories of Conflict and Conflict Resolution (spring)
- CONF 610 Philosophy and Methods of Conflict Research (fall)
- CONF 642 Integration of Theory and Practice (fall and spring)
- CONF 713 Laboratory and Simulation I (fall)

**Elective Courses**

Students take 20 credits of elective course work. Elective courses 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 is intended to provide 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 before the internship begins by the student, site supervisor, and internship coordinator.

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.

**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 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 Laboratory and Simulation I
- CONF 801 Introduction to Conflict Analysis and Resolution
- CONF 802 Micro Theories
- CONF 803 Macro Theories
- CONF 810 Philosophy of the Social Sciences
- CONF 811 Advanced Research Methods I
CONF 812 Advanced Research Methods II
CONF 900 Integrating Theory, Practice, and Method in Conflict Analysis

Elective Courses
Eighteen elective credits must be completed prior to comprehensive exams. Elective courses 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 graduate credit or 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.

The Department of Modern and Classical Languages conducts tests from 10 a.m. to 3 p.m. Monday through Friday on a first-come, first-served basis. Check with the doctoral program coordinator for more details, such as how to obtain tapes for language practice.

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 and passing written comprehensive exams, 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 and Loudoun Site
Susan Allen Nan, Undergraduate Program Director

Four graduate certificate programs are administered exclusively by the Institute for Conflict Analysis and Resolution. They are 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; and World Religions, Diplomacy, and Conflict Resolution.

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. The semester in which the courses are generally offered is indicated in parentheses:

- CONF 502 Intensive Introduction to Conflict Analysis and Resolution (fall)
- CONF 660 Conflict Assessment and Program Evaluation (spring)
- CONF 668 Applied Integration for Graduate Certificates (summer)

Each certificate requires one core course (3 credits), corresponding with the certificate title:

- CONF 650 Conflict Analysis and Resolution Advanced Skills (fall)
- CONF 651 Conflict Analysis and Resolution for Collaborative Leadership in Community Planning (fall)
- CONF 652 Conflict Analysis and Resolution for Prevention, Reconstruction, and Stabilization Contexts (fall)
- CONF 653 World Religions, Diplomacy, and Conflict Resolution (fall)

Elective Courses
In addition, each student may choose one elective. Students may select their elective course from the following courses:

- 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.

Certificate in Conflict Resolution for Health Professionals
For more information, see the College of Health and Human Services chapter.
College of Education and Human Development

Phone: 703-993-2010
Web: cehd.gmu.edu

School of Recreation, Health, and Tourism

Undergraduate Degree Programs
- Athletic Training, BS
- Health, Fitness, and Recreation Resources, BS
  Concentrations:
  - Exercise Science
  - Health Promotion
  - Parks and Outdoor Recreation
  - Sport Management
  - Therapeutic Recreation
  - Tourism and Events Management
- Health and Physical Education, BSEd

Graduate Degree Programs
- Exercise, Fitness, and Health Promotion, MS

Division of Undergraduate Studies

Undergraduate Degree Programs for PK–12
- Dance Education
- Health and Physical Education
- Music Education

Undergraduate Certificate Program
- Outdoor Adventure

Undergraduate Minors
- Recreation, Health, and Tourism:
  - Exercise Science
  - Health Promotion
  - Parks, Recreation, and Leisure Studies
  - Sport Management
  - Tourism and Events Management
- Secondary Education:
  - Secondary Education English
- Special Education:
  - Assistive Technology
  - Early Childhood Special Education
  - Emotional Disturbance and Learning Disabilities
  - Mental Retardation
  - Severe Disabilities

Graduate School of Education

Graduate Degree Programs
- Art Education, MAT
- Counseling and Development, MEd
  Concentrations:
  - Community Agency Counseling
  - School Counseling PK–12
- Curriculum and Instruction, MEd
  Concentrations:
  - Adult Education
  - Advanced Studies in Teaching and Learning
  - Alternative 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
Advanced Studies in Teaching and Learning Gifted Child Education
Advanced Studies in Teaching and Learning History
Advanced Studies in Teaching and Learning Instructional Technology
Advanced Studies in Teaching and Learning Literacy
Advanced Studies in Teaching and Learning Mathematics
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]; Initial Teacher Licensure)
Early Childhood Education PK–3
Educational Psychology—Learning, Cognition, and Motivation
Educational Psychology—Assessment, Evaluation, and Testing
Educational Psychology—Teacher Preparation
Elementary Education PK–6 (Initial Teacher Licensure)
English as a Second Language PK–12 (Initial Teacher Licensure)
FAST TRAIN Elementary PK–6 (Initial Teacher Licensure)
FAST TRAIN English as a Second Language (Initial Teacher Licensure)
Foreign Language or Latin PK–12 (Initial Teacher Licensure)
Instructional Technology—Immersion Instructional Design and Development
Instructional Technology—Part-Time Instructional Design and Development
Instructional Technology—Integration of Technology in Schools
Instructional Technology—Assistive and Special Education Technology
Multilingual and Multicultural Education
Secondary Education 6–12 Biology (Initial Teacher Licensure)
Secondary Education 6–12 Chemistry (Initial Teacher Licensure)
Secondary Education 6–12 Earth Science (Initial Teacher Licensure)
Secondary Education 6–12 English (Initial Teacher Licensure)
Secondary Education 6–12 History and Social Sciences (Initial Teacher Licensure)
Secondary Education 6–12 Mathematics (Initial Teacher Licensure)
Secondary Education 6–12 Physics (Initial Teacher Licensure)
Education Leadership, MEd
Concentrations:
Mathematics Education Leadership (K–8)
Math Specialist Leader (K–8)
Science Education Leadership (PK–12)
New Professional Studies: Teaching, MA
Special Education, MEd
Education, PhD
Exercise, Fitness, and Health Promotion, MS (Recreation, Health, and Tourism)
Recreation Resources Management, MAIS Concentration (Recreation, Health, and Tourism)

Graduate Certificate Programs
• Alternative Education
• Applied Behavior Analysis
• Assistive Technology
• E-Learning
• Early Childhood Education
• Early Childhood Special Education Licensure
• Emotional Disturbance/Learning Disabilities Licensure
• English as a Second Language Licensure
• English as a Second Language/Special Education
• ESL/Special Education
• FAST TRAIN Special Education
• Foreign Language Licensure
• Gifted Child Education
• History
• Instructional Technology
• Integration of Technology in Schools
• Learning Disabilities, Emotional Disturbance, and Mental Retardation Licensure
• Literacy
• Mathematics
• Mental Retardation Licensure
• Physical Education
• Post-Master’s Counseling Licensure
• School Counseling Leadership
• Science
• Secondary Education Licensure
• Severe Disabilities Licensure

Administration
Jeffrey Gorrell, Dean
Martin E. Ford, Senior Associate Dean
Ellen B. Drogin Rodgers, Associate Dean, Teaching and Academic Affairs
Joan P. Isenberg, Associate Dean, Outreach and Program Development
Jeanine Tate, Director, Field Relations
David K. Wiggins, Director, School of Recreation, Health, and Tourism

The College of Education and Human Development (CEHD) comprises the School of Recreation, Health, and Tourism (RHT), the Division of Undergraduate Studies in Education (USIE), and the Graduate School of Education (GSE). Together, we are 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 students and faculty demonstrate their growth and development in ways meaningful to their communities 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 desiring to complete requirements for licensure programs approved by the state 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 education, music education, physical education and secondary education English is offered through the major program’s unit (College of Visual and Performing Arts, RHT, and the Division of Undergraduate Studies in Education). 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, emotional disturbance and learning disabilities, emotional disturbance/learning disabilities/mental retardation, mental retardation, and severe disabilities.

For more information and dates and times of Think You Want to Be a Teacher? information sessions, call 703-993-2010 or go to gse.gmu.edu. Praxis exam pass rates for those who complete Mason’s teacher education program are also available on the web site.

School of Recreation, Health, and Tourism

Phone: 703-993-2060
Web: rht.gmu.edu
E-mail: 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 sport 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 (PK–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 and the American Association for Physical Activity and Recreation (NRPA/AAPAR). The MS in exercise, 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.

Faculty
Professors: Anderson, Brayley, D. Wiggins (Director)
Associate professors: Baker, Banville, Bever, Dieke, Kozlowski, Miller, Rikard, E. Rodgers, P. Rodgers, Schack, Walker, B. Wiggins
Assistant professors: Ambegaonkar, Caswell, Daniels, Harmon, Park
Instructors: Norden, Parham
Professional faculty: Lux, Waddell

Course Work
RHT offers all 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 Mason students. These courses are included under PHED and PRLS.

UNDERGRADUATE MINORS

Minor in Exercise Science (EXS)
16 credits (8 unique to the minor):
PHED 200
PHED 300 (prerequisites: BIOL 124 and 125)
PHED 365
PHED 450
HEAL 330

Minor in Health Promotion (HPR)
18 credits (8 unique to the minor):
PHED 200
PRLS 310 or HEAL 323
HEAL 370
HEAL 372
HEAL 430
HEAL 450

Minor in Parks, Recreation, and Leisure Studies (PRLS)
18 credits (8 unique to the minor):
PRLS 210
PRLS 310
PRLS 316
PRLS 327
PRLS 410
After completion of the above courses and a corequisite of PRLS 410, students complete PRLS 241.

Minor in Sport Management (SPMT)
18 credits (8 unique to the minor):
SPMT 201
SPMT 405
SPMT 412
SPMT 420
SPMT 455
PRLS 410
Minor in Tourism and Events Management (TEM)
15 credits (8 unique to the minor):
TOUR 200
TOUR 220
TOUR 340
6 additional credits from TOUR courses

Minor in Special Education
For this 15-credit minor, please see the Division of Undergraduate Studies in Education (USIE) section in this chapter.

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 theoretical-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.

Other Certificates
Students also may complete a certificate program outside RHT in environmental management (27 credits, see the Environmental Science and Policy section of the College of Science chapter) and gerontology (24 credits, see the College of Health and Human Services chapter). Students interested in the environmental management certificate should take BIOL 213 and either BIOL 303 or 304 instead of BIOL 103 and 104. Students interested in the gerontology certificate should take BIOL 124 and 125.

UNDERGRADUATE DEGREE PROGRAMS

■ Health and Physical Education, BSEd
This degree prepares students for a career in teaching.

Teacher Licensure in Health and Physical Education PK–12 (PHED)
The teacher education program is accredited and approved by the National Council for Accreditation of Teacher Education and the Virginia Department of Education. The application process for admission depends on the applicant. For four-year students, those entering as freshmen can apply to the BSEd program after taking a minimum of 45 credits, attaining a cumulative GPA of 2.50, and submitting a passing score for the Praxis I test. Students must have passing grades in BIOL 124 and 125 and PHED 201 and 202. Degree-seeking transfer students can apply to the BSEd program by using their cumulative GPA of 2.50 or higher for a minimum of 45 credits from their previous university, or they can complete 12 credits at Mason with a minimum of a 2.50 GPA. They must submit passing scores on the Praxis I and have passing grades in BIOL 124 and 125 and PHED 201 and 202.

Students who already have a degree from any discipline and are seeking licensure can apply to BSEd if they have a cumulative GPA of 2.50 or higher on their last 60 credits of course work from their previous university, or after completing 12 credits at Mason. Applicants must submit a passing score on the Praxis I test and have passing grades in BIOL 124 and 125.

Degree Requirements
The degree requires a minimum of 120 credits, with the final semester devoted to student teaching. To enroll in student teaching, students must have a minimum 2.50 GPA or higher in their last 60 credits of course work. They must submit scores on all parts of Praxis I. For majors only: Students are not permitted to enroll in the following courses until they have met BSEd application requirements: HEAL 405 and PHED 308, 403, 404, and 415.

Student Teaching Internship Application
Student teaching applications are available from RHT (Prince William and Fairfax Campuses) and the Office of Student and Faculty Services (GSE, Robinson Hall A, Room 103). Applications must be completed one semester before taking PHED 415 Student Teaching in Physical Education. Application deadlines for student teaching internships for the fall semester are February 1 (advisor) and February 15 (Office of Student and Faculty Services). Deadlines for spring semester are September 1 (advisor) and September 15 (Office of Student and Faculty Services). Students must maintain a GPA of at least 2.50 during their last 60 degree-specific credits.

Writing-Intensive Requirement
The university’s writing-intensive requirement is satisfied by the successful completion of PHED 365.

General Education Requirements

<table>
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<tr>
<th>Credit</th>
<th>General Education Requirements</th>
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<tbody>
<tr>
<td>6</td>
<td>Written communication</td>
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<td>Quantitative reasoning</td>
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<td>Literature</td>
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<td>3</td>
<td>Arts</td>
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<td>3</td>
<td>Western civilization</td>
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<td>3</td>
<td>Social and behavioral science</td>
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<tr>
<td>3</td>
<td>Global understanding</td>
</tr>
<tr>
<td>8</td>
<td>Natural science</td>
</tr>
</tbody>
</table>

(PhED majors are required to take BIOL 124 and 125 to meet state licensure.)

TEM or SPMT may enroll in any approved science (one lecture and one lab course).

Synthesis

(PhED students are required to take PHED 415.) 12

Professional Sequence

<table>
<thead>
<tr>
<th>Credit</th>
<th>Professional Sequence</th>
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<tbody>
<tr>
<td>3</td>
<td>EDRD 300</td>
</tr>
<tr>
<td>22</td>
<td>HEAL 110, 205, 220, 310, 325, 330, 405</td>
</tr>
<tr>
<td>22</td>
<td>PHED 108, 110, 150 or 159, 200, 201, 202, 273, 274, 275, 300, 306, 308, 365, 403, 404, 450</td>
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<tr>
<td>6</td>
<td>PRLS 316, 460</td>
</tr>
</tbody>
</table>

Total credits 120

■ 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 within an entry-level athletic training education program.

Degree Requirements

The degree requires a minimum of 121 credits. Students begin the preprofessional phase (Level I) upon 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 Level I prerequisite courses, students may enroll in didactic and clinical education courses, along with other professional courses. In Level II, students begin clinical education assignments. Typically, athletic training didactic courses are paired with a clinical education course. Levels II through IV require prerequisites, including satisfactory maintenance of at least a 2.50 GPA for all professional courses, successful completion of prerequisite professional courses, concurrent enrollment in didactic and clinical courses, and current emergency cardiac care (ECC) certification.

The following describes the preprofessional and professional courses that students should take in each level of the program:

Level I preprofessional courses:
- BIOL 124, 125
- HEAL 110, 205, 330
- ATEP 228, 229

Level II professional courses:
- PHED 200, 300
- ATEP 310, 315, 320, 325

Level III professional courses:
- ATEP 350, 354, 357, 413
- PHED 365, 410, 450
- PRLS 410

Level IV professional courses:
- EFHP 524
- ATEP 441
- PRLS 405, 450, 460

During Level IV, students complete all courses, including ATEP 441 Practicum. This course is a capstone 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.

Levels II, III, and IV involve 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. Students will be assigned to a clinical instructor to satisfy clinical education requirements. Students will develop a schedule with their clinical instructor requiring approximately 15 to 20 hours per week throughout the semester at the clinical setting. Total clinical hours equal 225. Clinical assignments may be 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 competencies and proficiencies in athletic training. Evaluation will occur in academic courses and in the clinical setting by George Mason University athletic training education program-approved clinical instructors. To transfer course work from other universities, students must produce results of competency and proficiency evaluations. There will be further evaluation of these proficiencies related to those courses that transfer to Mason. Students should meet with their 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

Written communication.................................................6
Oral communication......................................................3
Information technology..................................................3
Quantitative reasoning..................................................3
Literature........................................................................3
Arts..............................................................................3
Western civilization.........................................................3
Global understanding.....................................................3
Natural science..............................................................8

(ATT majors are required to take BIOL 124 and 125 as prerequisites to other courses.)

Synthesis

ATT students are required to take ATEP 441.

Professional Sequence

- ATEP 228, 229, 310, 315, 320, 325, 350, 354, 357, 413 .30
- HEAL 110, 205, 330 ..................................................10
- PHED 200, 300, 365, 410, 450 ..................................10
- PRLS 405, 410, 450, 460 .........................................12
- EFHP 524 ..................................................................3
- Electives ..................................................................... 8

Total credits ..................................................................120

Health, Fitness, and Recreation Resources, BS

Concentrations include the following:

Exercise Science (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.

Health Promotion (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.

Parks and Outdoor Recreation (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 NRPA/AAPAR. 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.

**Sport Management (SPM)**

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.

**Therapeutic Recreation (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 foundations course, as well as law, issues, and assessment courses, prepares students for an internship under a certified therapeutic recreation specialist and preparation for the national exam. The program is accredited by NRPA/AAPAR. Graduates find employment in local, state, and federal recreation settings, in commercial, private, and public agencies and in a wide variety of jobs and many geographic or business settings. A minor is available with a work-experience option.

**Tourism and Events Management (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 and many geographic or business settings. A minor is available with a work-experience option.

**General Education Requirements**

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<thead>
<tr>
<th>Credits</th>
<th>Contents</th>
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<tbody>
<tr>
<td>6</td>
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<td>Social and behavioral science</td>
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<tr>
<td>3</td>
<td>Global understanding</td>
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<tr>
<td>7–8</td>
<td>Natural science</td>
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<tr>
<td>7–8</td>
<td>Concentrations in exercise science, health promotion, and therapeutic recreation require BIOL 124 and 125...8</td>
</tr>
</tbody>
</table>

Parks and outdoor recreation students interested in the environmental management certificate are encouraged to take BIOL 213 and either BIOL 303 or 304. Students interested in the gerontology certificate are encouraged to take BIOL 124 and 125. Students in tourism and events management, and sport management may enroll in any approved science course (one lecture and one lab).

**Synthesis**

Tourism and events management concentration:
- TOUR 490 ............................................................12

Exercise science, health promotion concentrations:
- HEAL 490 ...........................................................12

Parks and outdoor recreation, therapeutic recreation concentrations: PRLS 490 ..........................12

**Professional Sequence by Concentration**

**Exercise Science (EXS)**

- PRLS 310, 405, 410, 411, 450, 460 ..........................15
- Electives ..........................................................15
- Total ..................................................................120

**Health Promotion (HPR)**

- PRLS 210, 241, 300, 302, 310, 316, 317, 327, 402, 405, 410, 411, 450, 460, 501 ......................57
- TOUR 362 ..........................................................3
- Electives ..........................................................18
- Total ..................................................................120

**Sport Management (SPM)**

- PRLS 323 ................................................................3
- Electives ..........................................................12
- Total ..................................................................120

**Therapeutic Recreation (TR)**

- PRLS 323 ................................................................3
- Electives ..........................................................12
- Total ..................................................................120

**Tourism and Events Management (TEM)**

- PRLS 310, 405, 410, 450, 460 ................................12
- Electives ..........................................................15
- Total ..................................................................120

**Writing-Intensive Requirement**

The university’s writing-intensive requirement for HFRR majors is satisfied by successful completion of PRLS 450.
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 all 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 (1)
PHED 118 Advanced Life Guarding (1)
PHED 127 Social Dance II (1)
PHED 128 Fencing II (2)
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 (1)
PHED 137 Intermediate Tae Kwon Do (1)
PHED 138 Brazilian Jiu-Jitsu (1)
PHED 139 Brazilian Jiu-Jitsu II for Men and Women (2)
PHED 140 Golf (1)
PHED 144 Intermediate Golf (2)
PHED 145 Beginning Judo for Men and Women (1)
PHED 146 Introduction to Badminton (1)
PHED 147 Advanced Tae Kwon Do (2)
PHED 149 Tai Chi (1)
PHED 150 Intermediate Swimming (1)
PHED 151 Introduction to Tennis (1)
PHED 153 Intermediate Tennis (1)
PHED 155 Introduction to Springboard Diving (2)
PHED 156 Intermediate Springboard Diving (2)
PHED 157 Aikido for Men and Women (1)
PHED 158 Underwater Hockey (1)
PHED 159 Advanced Swimming (1)
PHED 160 Intermediate Tai Chi (1)
PHED 162 Introduction to Bowling (1)
PHED 163 Karate (1)
PHED 164 Intermediate Karate (1)
PHED 165 Introduction to Racquetball (1)
PHED 166 Intermediate Racquetball (1)
PHED 168 Water Safety Instruction (2)
PHED 175 Intermediate Rock Climbing (2)
PRLS 110 Exploring Outdoor Adventure (2)
PRLS 115 Introduction to Fly Fishing (1)
PRLS 117 Rock Climbing (2)
PRLS 118 Intermediate Rock Climbing (2)
PRLS 119 Trap and Skeet Shooting (2)
PRLS 120 Introduction to Backpacking (2)
PRLS 121 Intermediate Trap and Skeet Shooting (2)
PRLS 170 Introduction to Whitewater Kayaking (1)
PRLS 173 Introduction to Coastal Kayaking (2)
PRLS 174 Open Water Coastal Kayaking (2)
PRLS 175 Introduction to Rowing (1)
PRLS 180 Whitewater Canoeing (2)
PRLS 181 Whitewater Canoeing II (2)
PRLS 190 Downhill Skiing (1)
PRLS 191 Snowboarding (2)
PRLS 195 Introduction to Hot Air Ballooning (2)
PRLS 200 Wilderness First Responders (2)
PRLS 250 Wilderness Travel and Sustainability (2)
PRLS 253 Florida Everglades Canoe Expedition (3)

GRADUATE PROGRAMS

Exercise, Fitness, and Health Promotion, MS
The Master of Science in Exercise, Fitness, and Health Promotion (EFHP) 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 the MS EFHP degree.

Core Course Work ............................................................................................................................... 18

EFHP 606 Foundations of Exercise, Fitness, and Health Promotion
EFHP 611 Advanced Exercise Physiology
EFHP 611 Fitness Assessment: Theory and Practice
EFHP 614 Advanced Exercise Nutrition
EFHP 618 Exercise and Sport Psychology
EFHP 623 Research Design and Statistical Reasoning

Thesis Option*
Electives (6 graduate credit hours) ..................................................6
EFHP 799 (6 graduate credit hours) ..................................................6

OR
Nonthesis Option
Electives (12 graduate credit hours) ..................................................12
Written comprehensive examination

Total .................................................................................................................. 30

* 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 of 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.

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 fall enrollment is recommended given the sequence of courses.
Division of Undergraduate Studies in Education (USIE)

Phone: 703-993-2078
Web: usie.gmu.edu

USIE is the unit of 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 has strong ties with GSE; RHT; the College of Humanities and Social Sciences, including New Century College and the bachelor of individualized study; 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 Secondary Education English Minor

This 24-credit minor in Secondary Education English provides undergraduates with all coursework that fulfills the Virginia Department of Education’s professional education requirements to teach English in grades 6–12. For information, call the USIE advisor at 993-2078 or visit the web at usie.gmu.edu.

Undergraduate Special Education Minors

These 15-credit minors in special education provide undergraduate students with background knowledge in special education in one of the following specializations: assistive technology, emotional disturbance and learning disabilities, mental retardation, severe disabilities, or early childhood special education. Completing one of these minors may partially fulfill requirements for licensure in special education in Virginia. For other undergraduate minors, see the RHT section in this chapter.

GRADUATE DEGREE PROGRAMS

Counseling and Development, MEd

The master’s program offers concentrations in school counseling (state licensure) and community agency 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. A graduate certificate is also available in school counseling leadership. For more information, see the Graduate Certificate Programs section of this chapter.

Course Work

Core Courses

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<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDCD 525</td>
<td>Advanced Human Growth and Development</td>
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<tr>
<td>EDCD 601</td>
<td>Introduction to Research in Counseling</td>
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<tr>
<td>EDCD 602</td>
<td>Foundations of Counseling</td>
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<tr>
<td>EDCD 603</td>
<td>Counseling Theories and Practice</td>
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<td>EDCD 604</td>
<td>Analysis of the Individual</td>
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<td>EDCD 608</td>
<td>Group Processes and Analyses</td>
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<td>EDCD 610</td>
<td>Career and Educational Counseling</td>
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<tr>
<td>EDCD 628</td>
<td>Counseling and Social Justice</td>
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<tr>
<td>EDCD 660</td>
<td>Multicultural Counseling</td>
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<td>EDCD 755</td>
<td>Practicum in Counseling</td>
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<td>EDCD 791</td>
<td>Internship in Counseling</td>
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<tr>
<td>EDCD 797</td>
<td>Special Topics/Electives</td>
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Community Agency Concentration

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>EDCD 609</td>
<td>Advanced Counseling Skills and Strategies</td>
<td>15</td>
</tr>
<tr>
<td>EDCD 652</td>
<td>Introduction to Substance Abuse Counseling</td>
<td></td>
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<tr>
<td>EDCD 654</td>
<td>Counseling, Ethics, and Consultation in Community Agencies</td>
<td></td>
</tr>
</tbody>
</table>
EDCD 656 Diagnosis and Treatment Planning for Mental Health Professionals
EDCD 658 Couples and Family Counseling

School Counseling PK–12 Concentration ........................................8
EDCD 606 Counseling Children and Adolescents
EDCD 611 Introduction to Legal Issues in Counseling
EDCD 626 Principles and Practices of School Counseling

Curriculum and Instruction, MEd
This degree is offered to those preparing for initial teacher licensure, advanced teacher education, and ancillary educational programs. Concentrations are as follows:

Adult Education
The master’s degree program prepares skilled and critically reflective professionals through knowledge development about adult learners and conditions for adult learning and through strengthening students’ competence within their specialized field of practice. The program reflects a flexible and cross-disciplinary focus to appeal to a widely diverse group of professionals. For information, call the Office of Adult Learning and Professional Development at 703-993-3675 or consult the web site at gse.gmu.edu.

Course Work

Core Courses.........................................................................................12
EDAL 541 Understanding Adult Learners
EDAL 542 Arranging Conditions for Adult Learning

Individual Specialization .................................................................18
EDRS 590 Education Research
EDUC 598 Independent Study

Specialization Courses:
Approved concentration of courses (12 credits, usually four 3-credit courses)

Advanced Studies in Teaching and Learning (ASTL)
This master’s program is for teachers and other educators with three or more years of teaching or education-related experience who want to continue to grow professionally. The program offers advanced study in Virginia’s Standards of Learning (SOL) content areas, cohort classes, an innovative schedule, and the use of technology. The courses, aligned with the National Board for Professional Teaching Standards (NBPTS), 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 develops teacher expertise in a concentration that will identify the teacher as a potential leader in that area.

The ASTL program has a 12-credit education core and an 18- to 21-credit concentration in alternative education, early childhood education, elementary mathematics, gifted child education, history, instructional technology, literacy and reading specialist, mathematics, physical education, science, special education, or an individualized concentration. The concentrations are also available as stand-alone graduate certificates. See the Graduate Certificate Programs section for courses.

Program Options
The program provides experienced teachers and other educators with three options. Educators without a master’s degree may apply for a master’s degree program, core, and concentration area; an 18- to 21-credit graduate certificate program for advanced study in a particular area; or a 12-credit graduate certificate in the NBPTS preparation core, for advanced study in teacher leadership or applying for NBPTS certification.

Course Work

Master’s Degree Core Courses .......................................................12
EDUC 612 Inquiry into Practice
EDUC 613 How Students Learn
EDUC 614 Designing and Assessing Teaching and Learning
EDUC 606 Education and Culture
EDUC 615 Educational Change

Concentration Courses .................................................................18–21
Complete one concentration below for the MEd:

Alternative Education .................................................................18
EDAE 600 Alternative Education for At-Risk Youth
EDAE 601 Curriculum and Methods in Alternative Education
EDAE 602 Preparing Students for Employment and Living Independently
EDSE 551 Classroom Management: Theory and Practice
EDAE 603 Communication and Management Strategies for Alternative Education
EDAE 604 Multidisciplinary and Interagency Collaboration

Early Childhood Education .........................................................18
EDCI 603 Trends, Issues, and Research in Early Childhood Education
EDCI 615 Advanced Human Development
EDCI 784 Capstone Seminar in Early Childhood Education

Elementary Mathematics ..............................................................18
MATH 600 Special Topics: Number Systems and Number Theory for K–8 Teachers
MATH 600 Special Topics: Geometry and Measurement for K–8 Teachers
MATH 600 Special Topics: Probability and Statistics for K–8 Teachers
MATH 600 Special Topics: Algebra and Functions for K–8 Teachers
MATH 600 Special Topics: Rational Numbers and Proportional Reasoning for K–8 Teachers

French
FREN 515 Medieval French Literature
FREN 517 Studies in 17th-Century French Literature
FREN 518 Studies in 18th-Century French Literature
FREN 519 Studies in 19th-Century French Literature
FREN 525 Studies in Modern French Literature
FREN 550 Special Topics
Choose 6 credits (two courses) in Language/Linguistics
FREN 560 History of the French Language
FREN 575 Grammatical Analysis
FREN 576 Advanced Translation

Choose 6 credits of Electives in Literature or Language
(select from above and/or below)
FREN 580 Contemporary French Society and Culture
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
Other, with permission of advisor

Spanish
Required Courses (9 credits)
SPAN 502 Hispanic Sociolinguistics
SPAN 505 Applied Spanish Stylistics
SPAN 510 Introduction to the Graduate Study of Literature in Spanish

Choose 9 credits (three courses) from among the following:
SPAN 501 Applied Spanish Grammar
SPAN 520 Studies in Medieval Spanish Literature
SPAN 525 Studies in Renaissance Literature
SPAN 530 Studies in Literature of the Golden Age
SPAN 540 Studies in 20th-Century Literature
SPAN 545 Studies in Hispanic Literature
SPAN 551 Special Topics in Spanish
SPAN 560 Studies in Spanish American Poetry
SPAN 565 Studies in Spanish American Drama
SPAN 576 Advanced Translation
SPAN 580 Contemporary Hispanic Institutions
SPAN 635 Seminar in Don Quixote
SPAN 650 Seminar in 20th-Century Drama
SPAN 655 Seminar in 20th-Century Prose
SPAN 670 Seminar in Spanish American Prose
SPAN 675 Seminar in Literature and Art
SPAN 680 Seminar in Literature and Society
SPAN 685 Seminar in Literature and Ideas
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 650 The Teaching of Culture in Foreign Language Programs
FRLN 660 Approaches to the Study of Language
FRLN 670 Foreign Language Learning and Teaching
Other, with permission of advisor

Gifted Child Education ...................................................21
EDCI 621 Introduction to Gifted and Talented Learners
EDCI 622 Curriculum Differentiation for Diverse Learners
EDCI 623 Models and Strategies for Teaching Gifted Learners
EDCI 624 Assessment, Identification, and Evaluation of Gifted Learners
EDCI 625 Contemporary Issues and Trends in Gifted Education
EDCI 626 Action Research in Gifted Education
EDCI 627 Advanced Practicum and Research in Gifted Education

History .................................................................18
GEOG 520 Geography for Teachers
HIST 601 Themes in U.S. History I
HIST 602 Themes in U.S. History II
HIST 508 Themes in World History
HIST 603 Themes in European History
HIST 510 Approaches to Modern World History

Instructional Technology ...........................................18
EDIT 611 Innovation in Distance Learning
EDIT 725 Technology and Diversity
EDIT 746 Educational Technology and Assessment
EDIT 750 Emerging Technology

Choose two of the following:
EDIT 742 Engineering Learning Environments
EDIT 743 Technology and Community Partnerships
EDIT 747 Technology and Teacher Education

Literacy/Reading Specialist ........................................21
EDRD 630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood
EDRD 631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood
EDRD 632 Literacy Assessments and Interventions for Groups
EDRD 633 Literacy Assessments and Interventions for Individuals
EDRD 634 School-Based Leadership in Literacy
EDRD 635 School-Based Inquiry in Literacy
EDRD 637 Supervised Literacy Practicum

Mathematics .............................................................18
MATH 601 Analysis I for Teachers
MATH 604 Geometry for Teachers
MATH 605 Discrete/Finite Mathematics for Teachers
MATH 607 Algebraic Structures for Teachers
MATH 608 Problem Solving in Mathematics

Secondary Education, Grades 9–12
EDCI 597 Special Topics in Education
MATH 601 Analysis I for Teachers
MATH 604 Geometry for Teachers
MATH 605 Discrete/Finite Mathematics for Teachers
MATH 607 Algebraic Structures for Teachers

Physical Education .....................................................18
PHED 670 Analysis of Teaching in Physical Education
PHED 672 Curriculum Development and Assessment in Physical Education
PHED 673 Motor Development for Special Populations
PHED 680 Mentoring and Supervision in Physical Education

Gifted Child Education ..................................................21
DANC 553 Teaching Creative Movement
DANC 580 Laban Movement Analysis
EDIT/EDCI 705 Instructional Design
EDLE 610 Leading Schools and Communities
EDUC 539 Human Development and Learning: PK–12
EDUC 672 Human Development and Learning: Secondary Education
EFHP 606 Foundations of Exercise, Fitness, and Health Promotion
EFHP 610 Advanced Exercise Physiology
EFHP 611 Fitness Assessment: Theory and Practice
EFHP 614 Advanced Exercise Nutrition
EFHP 618 Exercise and Sport Psychology
Science..................................................................................18
EDCI 663 Research in Science Teaching
EDCI 683 Curriculum Development and Evaluation in Science Education
EDCI 693 Leadership and Organizational Issues in Science Education
EDLE 791 Internship in Education Leadership
6 credits of science courses relevant to school level with advisor approval
Special Education........................................................................18
Complete 18 credits from one or more areas:
Applied Behavior Analysis
EDSE 619 Introduction to Applied Behavior Analysis
EDSE 621 Advanced Applied Behavior Analysis I
EDSE 623 Advanced Applied Behavior Analysis II
EDSE 624 Seminar in Applications of Applied Behavior Analysis I
EDSE 625 Seminar in Applications of Applied Behavior Analysis II
EDSE 790 Internship in Special Education
Emotional Disturbance/Learning Disabilities (ED/LD) K–12
EDSE 501 Introduction to Special Education
EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 503 Language Development and Reading
EDSE 504 Characteristics of Students with ED/LD
EDSE 507 Psychoeducational Assessment
EDSE 508 Elementary Reading, Curriculum, and Strategies for Mild Disabilities (3 credits)
EDSE 509 The Inclusive Classroom
EDSE 517 Secondary Curriculum/Strategies for Mild Disabilities
EDSE 545 Positive Behavior Supports
EDSE 546 Communication and Severe Disabilities
EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities
EDSE 557 Language Development and Emergent Literacy for Diverse Learners
EDSE 660 Augmentative Communication
EDSE 663 Research in Special Education
EDSE 664 Assessment in Special Education
EDSE 665 Consultation and Collaboration
EDSE 666 Interdisciplinary Approaches for Children with Sensor/Motor Disabilities
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio
EDSE 790 Internship Special Education
Teacher Leadership...............................................................18
EDLE 620 Organizational Theories and Leadership Development
EDLE 612 Educational Law
EDLE 618 Supervision of Instruction
EDLE 610 Schools and Communities
EDUC 597 Special Topics in Education: Trends and Issues in Instruction
EDUC 598 Directed Reading, Research, and Individual Projects

■ Early Childhood Education (Unified Transformative Early Education Model [UTEEM]) Initial Teacher Licensure
This master’s program prepares students to apply for triple teacher licensure. It provides professionals with the skills to work with culturally, linguistically, and ability-diverse young
Early Childhood Education Program PK–3 Initial Teacher Licensure

This master’s program 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 ages 3 to 5. The MEd must be completed within six years of admission.

Portfolio
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.

Course Work

<table>
<thead>
<tr>
<th>Year One, Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUT 511 University and Diversity in Child and Family Development, Ages 3 to 5</td>
<td>15</td>
</tr>
<tr>
<td>EDUT 512 Assessment of Diverse Young Learners, Ages 3 to 5</td>
<td></td>
</tr>
<tr>
<td>EDUT 513 Language Development and Emergent Literacy for Diverse Learners, Ages 3 to 5</td>
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</tr>
<tr>
<td>EDUT 514 Creating Environments and Adapting Curriculum for Diverse Learners, Ages 3 to 5</td>
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<tr>
<td>EDUT 790 Internship with Diverse Learners, Ages 3 to 5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year One, Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUT 521 Infant/Toddler Development in Family and Cultural Contexts</td>
<td>15</td>
</tr>
<tr>
<td>EDUT 522 Family-Centered Assessment of Diverse Infants and Toddlers</td>
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<tr>
<td>EDUT 523 Language Acquisition and Communication for Diverse Infants and Toddlers</td>
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<tr>
<td>EDUT 524 Culturally, Linguistically, and Developmentally Appropriate Practices with Infants, Toddlers, and Their Families</td>
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<tr>
<td>EDUT 791 Internship with Diverse Infants and Toddlers and Their Families</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Year One, Summer Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDRS 590 Education Research</td>
<td>6</td>
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<tr>
<td>EDSE 517 Computer Applications for Special Populations</td>
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</table>

<table>
<thead>
<tr>
<th>Year Two, Fall Semester</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDUT 612 Development and Assessment of Diverse Learners, K to 3</td>
<td>15</td>
</tr>
<tr>
<td>EDUT 613 Language and Literacy Development for Diverse Learners, K to 3</td>
<td></td>
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<tr>
<td>EDUT 614 Integrating and Adapting Curriculum across the Content Areas for Diverse Learners, K to 3</td>
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<tr>
<td>EDUT 615 Developing Concepts in Early Childhood Mathematics and Science for Diverse Learners, K to 3</td>
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<tr>
<td>EDUT 792 Internship with Diverse Learners, K to 3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two, Spring Semester</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDUT 781 Frameworks for Unified, Transformative Early Care and Education</td>
<td>12</td>
</tr>
<tr>
<td>EDUT 782 Policy Perspectives Affecting Diverse Young Learners and Their Families</td>
<td></td>
</tr>
<tr>
<td>EDUT 793 Specialization Internship with Diverse Learners and Their Families</td>
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<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDEP 550 Theories of Learning and Cognition</td>
<td>9</td>
</tr>
<tr>
<td>EDEP 551 Principles of Learner Motivation (Prerequisite: EDEP 550)</td>
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</tr>
</tbody>
</table>

Educational Psychology

This 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 creating a supportive and collegial environment with faculty from numerous educational disciplines and expertise, prospective students are expected to develop skills to meet the needs of diverse populations, and design and implement effective educational programs appropriate for a broad range of cultural contexts.

Course Work

<table>
<thead>
<tr>
<th>Educational Psychology Core</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDEP 550 Theories of Learning and Cognition</td>
<td>9</td>
</tr>
<tr>
<td>EDEP 551 Principles of Learner Motivation (Prerequisite: EDEP 550)</td>
<td></td>
</tr>
</tbody>
</table>
Elective (Prerequisites: EDEP 550 and 551), choose from the following:
EDUC 539 Human Development and Learning PK–12
PSYC 666 Cognitive and Perceptual Development
EDUC 672 Human Development and Learning: Secondary Education
EDUC 597 Special Topics in Education (Focus on Human Development)

Research Methodology Core .................................................9–12
EDRS 590 Education Research
EDRS 620 Quantitative Inquiry in Education (Prerequisite: EDRS 590 or appropriate prior experience)
EDRS 621 Qualitative Inquiry in Education (Prerequisite: EDRS 590 or appropriate prior experience)
Elective (Prerequisites: EDRS 620 and 621), choose from the following:
EDRS 531 Educational and Psychological Measurement
PSYC 541 Survey Research
PSYC 654 Naturalistic Methods in Psychology
EDUC 597 Special Topics in Education

Areas of Concentration .....................................................9
Complete one concentration area from below.
Learning, Cognition, and Motivation
EDEP 652 Processes of Learning and Development
Electives: 6 credits (Prerequisite: EDEP 652), choose from the following:
EDEP 653 Culture and Intelligence
EDEP 654 Learning, Motivation, and Self-Regulation
EDSE 667 Cognitive Development of Diverse Young Children
EDUC 597 Special Topics in Education

Assessment, Evaluation, and Testing
EDRS 630 Educational Assessment
Electives: 6 credits (Prerequisite: EDRS 630), choose from the following:
EDRS 631 Program Evaluation
EDRS 650 High Stakes Assessment and Accountability Systems
EDRS 651 Test Design and Interpretation
PSYC 557 Psychometric Methods
EDUC 597 Special Topics in Education

Teacher Preparation
Any 9 credits within one teacher licensure certificate program, including emotional disturbance/learning disabilities, severe disabilities, mental retardation, early childhood special education, ED/LD/MR, severe disabilities, secondary education, foreign language, or English as a second language.

Supervised Project or Thesis .................................................3–6
Choose from the following:
EDUC 598 Directed Reading, Research, and Individual Projects
EDUC 599 Thesis

Elementary Education (PK–6)
The master's program with 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. Full- and part-time program options are available; both require a student-teaching internship. Full-time students are admitted for the spring term; part-time students are admitted for the fall term.

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.

Course Work

Professional Development Schools (PDS): Full-Time Program

Required Sequence: Licensure Component .........................32
Spring Semester
EDUC 542 Introduction to Elementary Curriculum
EDUC 543 Children, Family, Culture, and School
Summer Term, condensed schedule
EDCI 552 Mathematics Methods for the Elementary Classroom
EDCI 554 Social Studies Methods for the Elementary Classroom
EDCI 555 Literacy Teaching and Learning in Diverse Elementary Classrooms I
Fall Semester
EDCI 552 Mathematics Methods for the Elementary Classroom
EDCI 553 Science Methods for the Elementary Classroom
EDCI 554 Social Studies Methods for the Elementary Classroom
EDCI 556 Literacy Teaching and Learning in Diverse Elementary Classrooms II
EDCI 790 Internship in Education
Spring Semester
EDCI 556 Literacy Teaching and Learning in Diverse Elementary Classrooms II
EDCI 557 Integrating Technology in the Elementary Curriculum
EDCI 558 Integrating Fine Arts, Movement, and Health in the Elementary Classroom
EDCI 790 Internship in Education

Additional Course Work .....................................................15
EDCI 631 Research in Elementary Education (must be taken first)
EDCI 632 Advanced Social Studies Methods for the Elementary Classroom
EDCI 633 Advanced Mathematics Methods for the Elementary Classroom
EDCI 634 Advanced Science Methods for the Elementary Classroom
EDCI 635 Applied Research in Elementary Education (must be taken last)

Extended Partnership Schools (PS) Program

Required Sequence: Licensure Component .........................32
Fall Semester
EDUC 542 Introduction to Elementary Curriculum
EDUC 543 Children, Family, Culture, and School
Spring Semester
- EDCI 555 Literacy Teaching and Learning in Diverse Elementary Classrooms I
- EDCI 554 Social Studies Methods for the Elementary Classroom

Summer Term, condensed schedule
- EDCI 553 Science Methods for the Elementary Classroom
- EDCI 558 Integrating Fine Arts, Movement, and Health in the Elementary Classroom

Fall Semester
- EDCI 557 Integrating Technology in the Elementary Curriculum
- EDCI 556 Literacy Teaching and Learning in Diverse Elementary Classrooms II

Spring Semester
- EDCI 552 Mathematics Methods for the Elementary Classroom
- EDCI 790 Internship in Education

**Additional Course Work**
- EDCI 631 Research in Elementary Education (must be taken first)
- EDCI 632 Advanced Social Studies Methods for the Elementary Classroom
- EDCI 633 Advanced Mathematics Methods for the Elementary Classroom
- EDCI 634 Advanced Science Methods for the Elementary Classroom
- EDCI 635 Applied Research in Elementary Education

**English as a Second Language (PK–12)**
The master’s program with an initial licensure component prepares professionals with the specialized knowledge, skills, and professional dispositions required to meet the educational needs of culturally and linguistically diverse populations. Students whose first language is not English are required to pass an oral and written proficiency assessment in English. Six credits of a foreign language are also required.

**Licensure Component**
The first 21 credits of course work and a 6-credit internship make up the licensure component for individuals who are pursuing a full initial license or need to satisfy the state’s requirements of a provisional license.

**Internship Options**
A 6-credit, 15-week daytime internship is required for completion of the state-approved licensure program. Both an elementary and a middle school or secondary school placement are required. Two options are available to meet the needs of most individuals:

- Internship: 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 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. In lieu of an internship, provisionally licensed teachers may use their full-time teaching to satisfy the experience requirements for a full license; however, the 42-credit master’s degree requires that 6 credits in approved courses be substituted for the internship.

**Field Experience**
Field experiences in public schools are required throughout the program: a maximum of 15 clock hours per course or 30 clock hours per term. Arrangements are to be made at the beginning of each term.

**Course Work**

**Licensure Course Work**
- Credits
- Prerequisite: Foreign language (6 credits, undergraduate or graduate level; do not count in master’s degree)
- EDUC 537 Foundations of Multicultural Education
- EDUC 539 Human Development and Learning PK–12
- EDCI 510 Linguistics for Teachers
- EDCI 516 Bilingualism and Language Acquisition Research
- EDCI 519 Methods of Teaching Multilingual Students
- EDCI 520 Assessment of Language Learners
- EDRD 615 Reading/Writing for Multilingual Students
- EDCI 790 Internship in Education

**Additional Course Work**
- Credits
- Prerequisites: All licensure course work listed above
- EDRS 590 Education Research
- EDCI 521 Curriculum Development for Language Learners
- Elective: EDUC 611 Cultural Issues in Second Language Acquisition (3 credits) or approved elective
- EDCI 777 Research to Practice (exit course)

**FAST TRAIN (Elementary PK–6)**
The master’s program is an alternative teacher licensure program that prepares educators for international teaching assignments. The curriculum for licensure in elementary education PK–6 consists of six required education courses offered over one year. On successful completion of course work and passing scores on the Praxis exams, participants receive a statement of eligibility. After completing an internship requirement overseas, either one term of student teaching or one year of full-time teaching in an international school abroad, students are eligible to receive the elementary PK–6 Virginia license. The program can be completed part or full time; either schedule requires a year of enrollment.
The program has a licensure component of 27 credits and prepares professionals with the knowledge, skills, and professional dispositions needed to teach specific foreign languages, including Spanish, German, French, Russian, Japanese, Chinese, or Latin, to students in PK through 12. The program has a licensure component of 27 credits and requires an additional 15 credits for completion of the MEd. Internships at the elementary and middle or secondary levels are required. A language proficiency test is also required. Students are admitted each term. The graduate certificate licensure program offers required course work for teacher licensure to students currently enrolled in nonlicensure graduate programs at Mason.

Licensure Component

The first 21 credits of course work and a 6-credit internship make up the licensure component for individuals who are pursuing a full initial license or need to satisfy the state's requirements for a provisional license.

Internship Options

A 6-credit, 15-week daytime internship is required for completion of the state-approved licensure program. Both an elementary and a middle school or secondary school placements are required. Two options are available to meet the needs of most individuals:

- Internship: 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 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. In lieu of an internship, provisionally licensed teachers may choose to use their full-time teaching to satisfy the experience requirements for a full license; however, the 42-credit master's degree requires that 6 credits in approved course work be substituted for the internship.

Field Experience

Field experience in public schools is required throughout the program: a maximum of 15 clock hours per course or 30 clock hours per term. Arrangements are made at the beginning of each term.

Course Work (Recommended Sequence)

<table>
<thead>
<tr>
<th>Licensure Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 537 Foundations of Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>EDRS 590 Educational Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 516 Language Acquisition in Multilingual Settings</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 519 Methods of Teaching Multilingual Students (prerequisite: EDCI 516)</td>
<td>3</td>
</tr>
<tr>
<td>EDRD 615 Reading/Writing for Multilingual Students (prerequisites EDCI 516 and 519)</td>
<td>3</td>
</tr>
<tr>
<td>LING 520 Descriptive Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 520 Assessment in Bilingual/English as a Second Language Settings (prerequisites EDCI 516 and 519, EDRD 615)</td>
<td>3</td>
</tr>
<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>ESOL Endorsement Requirements for Licensed (In-Service) Teachers</td>
<td>3</td>
</tr>
</tbody>
</table>

The following courses are required for a licensed teacher who wants to add an endorsement in ESOL: EDCI 516, 519, 520, and 521; EDRD 615; EDUC 537; and LING 520.

Note: These courses are required for the Commonwealth of Virginia endorsement in ESOL. Students should check with the state where they currently hold a license to see whether these courses will meet their requirements.

No other internship is required for licensed teachers.

Foreign Language (PK–12)

This master's program 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, or Latin, to students in PK through 12. The program has a licensure component of 27 credits requiring an additional 15 credits for completion of the MEd. Internships at the elementary and middle or secondary levels are required. A language proficiency test is also required. Students are admitted each term. The graduate certificate licensure program offers required course work for teacher licensure to students currently enrolled in nonlicensure graduate programs at Mason.
Instructional Technology

The master’s program provides professionals with 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 program 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. Four 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.

Course Work
Concentration: Immersion Instructional Design and Development

<table>
<thead>
<tr>
<th>Master’s Degree</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDIT 526 Accessible Web Design</td>
<td>30</td>
</tr>
<tr>
<td>EDIT 705 Instructional Design</td>
<td></td>
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<tr>
<td>EDIT 791 Immersion Practicum</td>
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<tr>
<td>EDIT 732 Advanced Instructional Design</td>
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<tr>
<td>EDIT 730 Analysis and Design of Hypermedia/Multimedia Learning Environments</td>
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<tr>
<td>EDIT 792 Immersion Practicum</td>
<td></td>
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<tr>
<td>EDIT 590 Research Methods</td>
<td></td>
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<tr>
<td>EDIT 752 Design and Production of Hypermedia/Multimedia Learning Environments</td>
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</table>

Concentration: Part-Time Instructional Design and Development

<table>
<thead>
<tr>
<th>Master’s Degree</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EDIT 752 Design and Production of Hypermedia/Multimedia Learning Environments</td>
<td>30</td>
</tr>
<tr>
<td>Required Courses</td>
<td>23</td>
</tr>
<tr>
<td>EDIT 704 Instructional Technology Foundations and Learning Theories</td>
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</tr>
<tr>
<td>EDIT 705 Instructional Design</td>
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<tr>
<td>EDIT 732 Advanced Instructional Design</td>
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<tr>
<td>EDIT 730 Analysis and Design of Learning Environments</td>
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<tr>
<td>EDIT 752 Design and Production of Learning Environments</td>
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<tr>
<td>EDRS 590 Education Research</td>
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<td>EDIT 601 IDD Portfolio</td>
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<td>EDIT 701 Advanced IDD Portfolio</td>
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</table>

Electives

Any EDIT course may be used as an additional elective.

Concentration: Integration of Technology in Schools

<table>
<thead>
<tr>
<th>Master’s Cohort Program</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDCI 710 Technology and the Culture of Schools</td>
<td>36</td>
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<tr>
<td>EDCI 712 Technology and Learning</td>
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<tr>
<td>EDCI 714 Methods of Integration</td>
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<tr>
<td>EDCI 716 Principles of Integration and Leadership</td>
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<tr>
<td>EDIT 711 Technology Tools 1: Telecommunications and Databases</td>
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<tr>
<td>EDIT 713 Technology Tools 2: Graphics, Video Simulations</td>
<td></td>
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<tr>
<td>EDIT 715 Technology Tools 3: Publishing and Computational Tools</td>
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</tbody>
</table>

Multilingual/Multicultural Education

This master’s program 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 are required.

Course Work

Recommended Sequence

<table>
<thead>
<tr>
<th>Foreign language requirement</th>
<th>30</th>
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</thead>
<tbody>
<tr>
<td>EDCI 516 Bilingualism and Language Acquisition Research</td>
<td></td>
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<tr>
<td>EDCI 519 Methods of Teaching Multilingual Students</td>
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<tr>
<td>LING 520 Descriptive Linguistics</td>
<td></td>
</tr>
<tr>
<td>EDUC 537 Foundations of Multicultural Education</td>
<td></td>
</tr>
<tr>
<td>EDCI 520 Assessment of Language Learners</td>
<td></td>
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<tr>
<td>EDCI 521 Curriculum Development for Language Learners</td>
<td></td>
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<tr>
<td>EDRD 615 Reading/Writing for Multilingual Students</td>
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</tbody>
</table>

Electives

8 credits from the following:
EDSE 662 Augmentative Communication or
EDSE 534 Communication and Severe Disabilities
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-Tech Assistive Technology Solutions
EDSE/EDIT 529 Internet as an Assistive Technology Tool
EDIT 772 Web-Based Instructional Tools: Electronic Portfolio
EDSE 669 Interdisciplinary Approach for Children with Sensory and Motor Disabilities
Any EDIT course may be used as an additional elective.
EDRS 590 Education Research
Elective: EDUC 611 Cultural Issues in Second Language Acquisition or approved elective
EDCI 777 Research to Practice (exit requirement)

Add-on Endorsement in ESL PK–12……………………21
(plus foreign language):
For licensed teachers only
Foreign Language (undergraduate or graduate level)
EDUC 537 Foundations of Multicultural Education
EDCI 516 Bilingualism and Language Acquisition Research
EDCI 519 Methods of Teaching Multilingual Students
EDCI 520 Assessment of Language Learners
EDCI 521 Curriculum Development for Language Learners
LING 520 Descriptive Linguistics
EDRD 615 Reading/Writing for Multilingual Students

Secondary Education (6–12)
This master’s program with a licensure component is 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, or physics. Add-on endorsements are available in speech communications, English as a second language, and algebra 1.

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 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.

Licensure Component
The first 15 credits of course work and a 6-credit internship make up the licensure component for individuals who are pursuing a full initial license or need to satisfy state requirements of a provisional license.

Internship Options
A 6-credit, 15-week daytime internship 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 or substitute with a small monthly stipend.
• Student teaching internship: one-term daytime internship in the classroom of a cooperating teacher. Intern assumes coteaching or 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 course work be substituted for the internship.

Field Experience
Field experiences in public schools will be required throughout the program: maximum of 15 clock hours per course or 30 clock hours per term. Arrangements will be made at the beginning of each term.

Course Work (Recommended Sequence)

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licensure Course Work</td>
<td>21</td>
</tr>
<tr>
<td>EDUC 522 Foundations of Secondary Education</td>
<td></td>
</tr>
<tr>
<td>EDCI 500-level Curriculum and Methods (prerequisite: EDCI 522 Foundations of Secondary Education)</td>
<td></td>
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<tr>
<td>EDCI 567 Social Science</td>
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<tr>
<td>EDCI 569 English</td>
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<tr>
<td>EDCI 572 Mathematics</td>
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<tr>
<td>EDCI 573 Science</td>
<td></td>
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<tr>
<td>EDUC 672 Human Development and Learning</td>
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<tr>
<td>EDUC 600-level Advanced Curriculum and Methods</td>
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<tr>
<td>EDUC 667 Social Science</td>
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<tr>
<td>EDUC 669 English</td>
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<tr>
<td>EDUC 672 Mathematics</td>
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<tr>
<td>EDCI 673 Science</td>
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<tr>
<td>EDRD 619 Literacy in the Content Areas</td>
<td></td>
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<tr>
<td>EDCI 790 Internship in Secondary Education</td>
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</tr>
</tbody>
</table>

Additional Courses

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Courses</td>
<td>12</td>
</tr>
<tr>
<td>EDUC 674 Assessing Learning and Teaching</td>
<td></td>
</tr>
<tr>
<td>Content elective with advisor approval (English endorsement requires EDRD 597 Young Adult Literature in Multicultural Setting.)</td>
<td></td>
</tr>
<tr>
<td>Education elective with advisor approval (History and social studies endorsement requires EDUC 671 Schools and Culture.)</td>
<td></td>
</tr>
<tr>
<td>EDUC 675 Research in Secondary Education</td>
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</tbody>
</table>

Education Leadership, MEd
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>
</tr>
</thead>
<tbody>
<tr>
<td>Required Sequence</td>
<td>30</td>
</tr>
<tr>
<td>EDLE 610 Leading Schools and Communities</td>
<td></td>
</tr>
<tr>
<td>EDLE 791 Internship*</td>
<td></td>
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<tr>
<td>EDLE 612 Education Law</td>
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<tr>
<td>EDLE 614 Managing Financial and Human Resources</td>
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<tr>
<td>EDLE 616 Curriculum Development and Evaluation PK–12</td>
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<tr>
<td>EDLE 618 Supervision and Evaluation of Instruction</td>
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<tr>
<td>EDLE 620 Organizational Theory and Leadership Development</td>
<td></td>
</tr>
<tr>
<td>EDLE 690 Using Research to Lead School Improvement</td>
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</tr>
</tbody>
</table>
After being admitted into the program, participants who already have a master's degree and completed 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 21 credits of the master's degree program and must be taken in the required sequence shown above.

The mathematics or science education leadership program offers a 30- to 33-credit master of education leadership degree with concentrations in mathematics education leadership (K–8), math specialist leader (K–8), or science education leadership (PK–12). The concentrations are unique, three-year programs for those who desire part-time study to become specialists in the teaching and leadership of school mathematics (K–8) or science (PK–12). Students in the program study teaching, curriculum, and professional development programs for teachers. They also explore school-based leadership issues in mathematics or science education.

The 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.

The 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.

The 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 the Commonwealth of 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

**Concentration: Mathematics Education Leadership (K–8)**

**Master’s Degree** ...............................................................33

- EDLE 618 Supervision and Evaluation of Instruction (3 credits)
- EDCI 666 Research in Mathematics Teaching (3 credits)
- EDCI 665 Curriculum Development in Mathematics Education
- EDCI 664 Mathematics Education Leadership for School Change
- EDCI 665 Curriculum Development and Evaluation
- EDCI 705 Instructional Design
- EDCI 704 Instructional Technology Foundations and Theories of Learning
- EDCI 663 Research in Science Teaching
- Mathematics Elective
- Technology Elective

**Concentration: Mathematics Specialist Leader (K–8)**

**Master’s Degree** ...............................................................33

- EDLE 618 Supervision and Evaluation of Instruction (3 credits)
- EDCI 664 Mathematics Education Leadership for School Change
- MATH 600 Special Topics: Number Systems and Number Theory for K–8 Teachers
- MATH 600 Special Topics: Geometry and Measurement for K–8 Teachers
- MATH 600 Special Topics: Probability and Statistics for K–8 Teachers
- MATH 600 Special Topics: Algebra and Functions for K–8 Teachers
- MATH 600 Special Topics: Rational Numbers and Proportional Reasoning for K–8 Teachers

**Concentration: Science Education Leadership (K–8)**

**Master’s Degree** ...............................................................30

- EDLE 618 Supervision and Evaluation of Instruction (3 credits)
- EDCI 663 Leadership and Organizational Issues in Science Education
- EDCI 666 Research in Science Teaching
- EDCI 667 Research in Mathematics Teaching
- Technology Elective
New Professional Studies: Teaching, MA

A teaching track of the New Professional Studies program is offered to teams of experienced teachers. Participants follow a two-year, three-summer integrated program of school-based research linked to a subject specialization. Specific information is available from the Initiatives in Educational Transformation administrative office at the Prince William Campus. For more information, call 703-993-8320 or e-mail iett@gmu.edu.

Course Work

Master's Degree ...............................................................30

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNPE 700 The New Professionalism: Theory and Practice</td>
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<tr>
<td>MNPE 702 The New Professional as Reflective Practitioner</td>
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<tr>
<td>MNPE 703 Technology and Learning in the New Professions</td>
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<tr>
<td>MNPE 704 Research Methodologies in the New Professionalism</td>
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<tr>
<td>EDUC 597 Apprenticeship in Classroom Research</td>
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<tr>
<td>IETT 750 Studies in Language and Culture I</td>
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<tr>
<td>IETT 751 Studies in Language and Culture II</td>
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<tr>
<td>IETT 752 Research in Practice: The Team Project</td>
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<tr>
<td>IETT 753 Teaching and Learning</td>
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</tbody>
</table>

Special Education, MEd

This program leads to a master of education degree for professionals who already hold a special education teacher license or are interested in working in a special education context outside the classroom. Students may also earn a master’s degree by completing initial licensure course work in addition to the master’s core.

The teacher licensure program offers required course work through five graduate certificate programs that vary from 15 to 36 credits, depending on the endorsement area and prior course work. It prepares professionals with the knowledge, skills, and dispositions needed to teach children with special needs. The endorsement areas are early childhood special education, emotional disturbance and learning disabilities, learning disabilities/emotional disturbance/mental retardation, mental retardation, and severe disabilities. Individuals who are seeking licensure and a master’s degree must apply to a graduate certificate program as well as to this program. For required course work, see the Graduate Certificate Programs section of this chapter.

Course Work

Concentration: Special Education (Nonlicensure program) 

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDSE 501 Introduction to Special Education</td>
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<tr>
<td>EDSE 503 Language Development and Reading or</td>
<td></td>
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<tr>
<td>EDSE 557 Language Development and Emergent Literacy for Diverse Learning</td>
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<tr>
<td>EDSE 517 Computer Applications for Special Populations</td>
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<tr>
<td>EDSE 590 Research in Special Education</td>
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<tr>
<td>EDSE 662 Consultation and Collaboration</td>
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<tr>
<td>EDSE 791 Midpoint Portfolio</td>
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<tr>
<td>EDSE 792 Final Portfolio</td>
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</tbody>
</table>

Electives from EDSE courses .................................13

Concentration: Early Childhood Special Education (Nonlicensure program)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSE 501 Introduction to Special Education</td>
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</tr>
<tr>
<td>EDSE 557 Language Development and Emergent Literacy for Diverse Learning (cross-listed with EDUT 513)</td>
<td></td>
</tr>
<tr>
<td>EDSE 517 Computer Applications for Special Populations</td>
<td></td>
</tr>
<tr>
<td>EDSE 665 Collaboration with Families of Children with Special Needs</td>
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<tr>
<td>EDSE 791 Midpoint Portfolio (1 credit) (must be taken concurrently with the fourth or fifth special education course)</td>
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<tr>
<td>EDSE 792 Final Portfolio (1 credit) (must be taken concurrently with the last course in the program)</td>
<td></td>
</tr>
<tr>
<td>Electives from EDSE or UTEEM prefix courses 13 credits from the graduate certificates for teacher licensure</td>
<td></td>
</tr>
</tbody>
</table>

GRADUATE CERTIFICATE PROGRAMS

Certificate in Alternative Education

This 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDAE 600 Alternative Education for At-Risk Youth</td>
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<tr>
<td>EDAE 601 Curriculum and Methods in Alternative Education</td>
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<tr>
<td>EDAE 602 Preparing Students for Employment and Living Independently</td>
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<tr>
<td>EDAE 551 Classroom Management: Theory and Practice</td>
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<tr>
<td>EDAE 603 Communication and Management Strategies for Alternative Education</td>
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<tr>
<td>EDAE 604 Multidisciplinary and Interagency Collaboration</td>
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<tr>
<td>Elective, with advisor approval</td>
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</tbody>
</table>

Certificate in Applied Behavior Analysis

This 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 mental retardation.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDSE 619 Introduction to Applied Behavior Analysis</td>
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<tr>
<td>EDSE 621 Advanced Applied Behavior Analysis I</td>
<td></td>
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<tr>
<td>EDSE 623 Advanced Applied Behavior Analysis II</td>
<td></td>
</tr>
<tr>
<td>EDSE 624 Seminar in Applications of Applied Behavior Analysis I</td>
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</tr>
<tr>
<td>EDSE 625 Seminar in Applications of Applied Behavior Analysis II</td>
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</tbody>
</table>
Certificate in Assistive Technology
This 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 ........................................................... 15

Required Courses ....................................................... 5
EDSE/EDIT 510 Introduction to Assistive Technology
EDSE 610 Designing Adaptive Environments

Electives ................................................................. 10
EDIT 593 Seminar in Hardware
EDIT 797 Special Topics
EDSE/EDIT 522 Assistive Technology for Individuals with Sensory Impairments
EDSE/EDIT 523 Accessibility and Input Modification
EDSE/EDIT 524 Assistive Technology for Individuals with Learning Disabilities
EDSE/EDIT 525 Software for Individuals with Special Needs
EDSE/EDIT 526 Assistive Technology and the Internet
EDSE 527 Adapted Sports, Recreation, and Leisure
EDSE 528 Low-Tech Assistive Technology Solutions
EDUC 600 Workshop in Education

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.

Course Work ........................................................... 15

Required Courses ....................................................... 9
EDIT 526 Web Accessibility ............................................ 3
EDIT 705 Instructional Design ........................................ 3
EDIT 611 Innovations in Distance Learning ..................... 3

Electives ................................................................. 6
EDIT 573 Project Management
EDIT 574 Networking Tools
EDIT 575 Authoring Tools
EDIT 575-A Authoring Tools: Authorware
EDIT 575-B Authoring Tools: Toolbook
EDIT 571 Tools for Visual Design
EDIT 572 Tools for Digital Video/Audio
EDIT 530 Scripting and Programming
EDIT 771 Overview of Multimedia/Hypermedia
EDIT 772 Web-Based Instructional Tools

Certificate in Early Childhood Education
This 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.

Certificate in Emotional Disturbance/Learning Disabilities Licensure
This certificate offers the required course work for teacher licensure in early childhood special education.

Course Work ........................................................... 18
EDCI 603 Trends, Issues, and Research in Early Childhood Education
EDCI 615 Advanced Human Development
EDCI 784 Capstone Seminar in Early Childhood Education

Electives (choose three from the following):
EDCI 516, 614, 616, 601
EDRD 630
EDSE 556, 557, 656, 667

Certificate in Early Childhood Special Education Licensure
This certificate offers the required course work for teacher licensure in early childhood special education.

Course Work ........................................................... 15–36
EDSE 501 Introduction to Special Education
EDSE 556 Language Acquisition and Communication for Diverse Infants and Toddlers
EDSE 557 Language Devel Cognit and Emergent Literacy for Diverse Learners, Ages 3–5
EDSE 558 Physical/Sensory Development Including Medical Aspects and Etiology for Atypical Development
EDSE 615 Early Intervention for Infants and Toddlers with Disabilities
EDSE 633 Policy Perspectives Affecting Diverse Learners and Their Families
EDSE 656 Assessment of Diverse Young Learners, Ages 3–5
EDSE 659 Curriculum and Methods: Early Childhood Special Education
EDSE 665 Collaboration with Families of Children with Special Needs
EDSE 667 Cognitive Development of Diverse Young Children
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio
EDSE 790 Internship in Special Education, two experiences

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.

Course Work ........................................................... 15

Required Courses ....................................................... 9
EDIT 526 Web Accessibility ............................................ 3
EDIT 705 Instructional Design ........................................ 3
EDIT 611 Innovations in Distance Learning ..................... 3

Electives ................................................................. 6
EDIT 573 Project Management
EDIT 574 Networking Tools
EDIT 575 Authoring Tools
EDIT 575-A Authoring Tools: Authorware
EDIT 575-B Authoring Tools: Toolbook
EDIT 571 Tools for Visual Design
EDIT 572 Tools for Digital Video/Audio
EDIT 530 Scripting and Programming
EDIT 771 Overview of Multimedia/Hypermedia
EDIT 772 Web-Based Instructional Tools
Certificate in English as a Second Language (ESL) Licensure
This certificate offers course work for teacher licensure to students who are currently enrolled in nonlicensure graduate programs at Mason or already hold a master's degree.

Course Work .......................................................... 18
EDUC 537 Foundations of Multicultural Education
EDUC 539 Human Development and Learning PK–12
EDCI 510 Linguistics for Teachers
EDCI 516 Bilingualism and Language Acquisition Research
EDCI 519 Methods of Teaching Multilingual Students
EDDR 615 Reading/Writing for Multilingual Students
EDCI 790 Internship in Education

Certificate in English as a Second Language/Special Education
This certificate offers course work for students and professionals seeking crossover training in ESL and special education.

Course Work .......................................................... 18
ESL Courses ............................................................. 9
EDCI 516 Bilingualism: Second Language Acquisition Research
EDCI 519 Methods of Teaching Multilingual Students
EDCI 520 Assessment of Language Learners
Special Education Courses ......................................... 9
EDSE 501 Introduction to Special Education or EDSE 540 Characteristics of ED and LD
EDSE 503 Language Development and Reading
EDSE 626 The Inclusive Classroom or EDSE 628 Elementary Reading, Curriculum, and Strategies for Mild Disabilities or EDSE 629 Secondary Curriculum/Strategies for Mild Disabilities

Certificate in FAST TRAIN Special Education
This certificate is designed for preservice and in-service international teacher educators who desire additional training in special education.

Course Work .......................................................... 18
EDSE 501 Introduction to Special Education
EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 540 Characteristics of Students with ED/LD
EDSE 627 Psychoeducational Assessment
EDSE 622 Consultation and Collaboration

Certificate in Foreign Language
This certificate offers course work for practicing teachers who wish to deepen their expertise in French or 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 .......................................................... 18
French
FREN 515 Medieval French Literature
FREN 517 Studies in 17th-Century French Literature
FREN 518 Studies in 18th-Century French Literature
FREN 519 Studies in 19th-Century French Literature
FREN 525 Studies in Modern French Literature
FREN 550 Special Topics
Choose 6 credits (two courses) in Language/Linguistics
FREN 560 History of the French Language
FREN 575 Grammatical Analysis
FREN 576 Advanced Translation

Choose 6 credits of Electives in Literature or Language (select from above and/or below)
FREN 580 Contemporary French Society and Culture
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 Other, with permission of advisor

Spanish
Required Courses (9 credits)
SPAN 502 Hispanic Sociolinguistics
SPAN 505 Applied Spanish Stylistics
SPAN 510 Introduction to the Graduate Study of Literature in Spanish

Choose 9 credits (three courses) from among the following:
SPAN 501 Applied Spanish Grammar
SPAN 520 Studies in Medieval Spanish Literature
SPAN 525 Studies in Renaissance Literature
SPAN 530 Studies in Literature of the Golden Age
SPAN 540 Studies in 20th-Century Literature
SPAN 545 Studies in Hispanic Literature
SPAN 551 Special Topics in Spanish
SPAN 560 Studies in Spanish American Poetry
SPAN 565 Studies in Spanish American Drama
SPAN 576 Advanced Translation
SPAN 580 Contemporary Hispanic Institutions
SPAN 635 Seminar in Don Quixote
SPAN 650 Seminar in 20th-Century Drama
SPAN 655 Seminar in 20th-Century Prose
SPAN 670 Seminar in Spanish American Prose
SPAN 675 Seminar in Literature and Art
SPAN 680 Seminar in Literature and Society
SPAN 685 Seminar in Literature and Ideas
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 650 The Teaching of Culture in Foreign Language Programs
FRLN 660 Approaches to the Study of Language
FRLN 670 Foreign Language Learning and Teaching
Other, with permission of advisor

- **Certificate in Foreign Language Licensure**
  This certificate offers course work for teacher licensure to students enrolled in nonlicensure graduate programs at Mason.

  **Course Work** ..............................................................21–27
  - EDUC 537 Foundations of Multicultural Education
  - EDUC 539 Human Development and Learning PK–12
  - EDCI 516 Bilingualism and Language Acquisition Research
  - EDCI 560 Methods of Teaching in Foreign/World Languages
  - EDCI 520 Assessment of Language Learners
  - EDRD 620 Reading/Writing in Foreign/World Languages
  - EDCI 684 Advanced Methods of Teaching Foreign/Second Languages in PK–12
  - EDCI 790 Internship in Education

- **Certificate in Gifted Child Education**
  This 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** ..............................................................21
  - EDCI 621 Introduction to Gifted and Talented Learners
  - EDCI 622 Curriculum Differentiation for Diverse Learners
  - EDCI 623 Models and Strategies for Teaching Gifted Learners
  - EDCI 624 Assessment, Identification, and Evaluation of Gifted Learners
  - EDCI 625 Contemporary Issues and Trends in Gifted Education
  - EDCI 626 Action Research in Gifted Education
  - EDCI 627 Advanced Practicum and Research in Gifted Education

- **Certificate in History**
  This certificate is designed for PK–12 classroom teachers who wish to gain depth in history content to become leaders in their discipline.

  **Course Work** ..............................................................18
  - GEOG 520 Geography for Teachers
  - HIST 601 Themes in U.S. History I
  - HIST 602 Themes in U.S. History II
  - HIST 508 Themes in World History
  - HIST 605 Themes in European History
  - HIST 510 Approaches to Modern World History

- **Certificate in Instructional Technology**
  This 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** ..............................................................21
  - EDIT 611 Innovation in Distance Learning
  - EDIT 725 Technology and Diversity
  - EDIT 746 Educational Technology and Assessment
  - EDIT 750 Emerging Technology

  Choose two from the following:
  - EDIT 742 Engineering Learning Environments
  - EDIT 743 Technology and Community Partnerships
  - EDIT 747 Technology and Teacher Education

- **Certificate in Integration of Technology in Schools**
  This 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** ..............................................................12
  - EDIT 561 Teaching with Telecommunications
  - EDIT 562 Teaching with Databases
  - EDIT 563 Teaching with Graphics
  - EDIT 564 Teaching with TV/Video
  - EDIT 565 Teaching with Educational Software
  - EDIT 566 Teaching with Multimedia/Hypermedia
  - EDIT 567 Teaching with Desktop Publishing
  - EDCI 714 Methods of Integration

- **Certificate in Learning Disabilities/Emotional Disturbance/Mental Retardation Licensure**
  This certificate offers required course work for teacher licensure in learning disabilities, emotional disturbance, and mental retardation.

  **Course Work** ..............................................................15–36
  - EDSE 501 Introduction to Special Education
  - EDSE 502 Classroom Management and Applied Behavior Analysis
  - EDSE 508 Language Development and Reading
  - EDSE 540 Characteristics of Students with ED/LD
  - EDSE 542 Characteristics of Students with Mental Retardation or
    - EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities
  - EDSE 627 Psychoeducational Assessment
  - EDSE 628 Elementary Reading, Curriculum, and Strategies for Mild Disabilities or
    - EDSE 626 The Inclusive Classroom
  - EDSE 629 Secondary Curriculum Strategies for Mild Disabilities
  - EDSE 661 Curriculum and Methods in Severe Disabilities
  - EDSE 662 Consultation and Collaboration
  - EDSE 791 Midpoint Portfolio
  - EDSE 792 Final Portfolio
  - EDSE 790 Internship Special Education (two experiences)

- **Certificate in Literacy**
  This certificate is designed for teachers who have a master’s degree and are seeking Virginia reading specialist licensure. Training is provided in literacy foundations from infancy to
adulthood and literacy assessments for groups and individuals. An advanced seminar focuses on literacy program supervision, staff development, and research-based inquiry.

**Certificate in Mathematics**
This certificate is designed for PK–12 classroom teachers who wish to gain depth in math content to become leaders in their discipline.

**Course Work** ................................................................. 18

*Middle Education, Grades 6–8:*
- EDCI 597 Special Topics in Education
- MATH 601 Analysis I for Teachers
- MATH 604 Geometry for Teachers
- MATH 605 Discrete/Finite Mathematics for Teachers
- MATH 607 Algebraic Structures for Teachers
- MATH 608 Problem Solving in Mathematics

*Secondary Education, Grades 9–12:*
- EDCI 597 Special Topics in Education
- MATH 601 Analysis I for Teachers
- MATH 602 Analysis II for Teachers
- MATH 604 Geometry for Teachers
- MATH 605 Discrete/Finite Mathematics for Teachers
- MATH 607 Algebraic Structures for Teachers

**Certificate in Mental Retardation Licensure**
This certificate offers the required course work for teacher licensure in mental retardation.

**Course Work** ................................................................. 15–33

- EDSE 501 Introduction to Special Education
- EDSE 502 Classroom Management and Applied Behavior Analysis
- EDSE 503 Language Development and Reading
- EDSE 542 Characteristics of Students with Mental Retardation or
- EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities
- EDSE 627 Psychoeducational Assessment
- EDSE 628 Elementary Reading, Curriculum, and Strategies for Mild Disabilities or
- EDSE 629 Secondary Curriculum Strategies for Mild Disabilities
- EDSE 661 Curriculum and Methods in Severe Disabilities
- EDSE 662 Consultation and Collaboration
- EDSE 791 Midpoint Portfolio
- EDSE 792 Final Portfolio
- EDSE 790 Internship Special Education (two experiences)

**Certificate in Physical Education**
This 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** ................................................................. 18

- PHED 670 Analysis of Teaching in Physical Education
- PHED 672 Curriculum Development and Assessment in Physical Education
- PHED 673 Motor Development for Special Populations
- PHED 680 Mentoring and Supervision in Physical Education
- EFHP 623 Research Design and Statistical Reasoning

**Elective**

Choose one of the following or a course preapproved by advisor:
- DANC 553 Teaching Creative Movement
- DANC 580 Laban Movement Analysis
- EDIT/EDCI 705 Instructional Design
- EDLE 610 Leading Schools and Communities
- EDUC 539 Human Development and Learning, PK–12
- EDUC 672 Human Development and Learning: Secondary Education
- EFHP 606 Foundations of Exercise, Fitness, and Health Promotion
- EFHP 610 Advanced Exercise Physiology
- EFHP 611 Fitness Assessment: Theory and Practice
- EFHP 614 Advanced Exercise Nutrition
- EFHP 618 Exercise and Sport Psychology

**Certificate in Post-Master's Counseling Licensure**
This certificate offers courses toward school counseling and community agency counseling licensure for post-master’s degree students.

**Course Work** ................................................................. 15

- 3 to 6 credits from the following: EDCD 606, 611, 626, 628, 652, 654, 656, 658
- 3 to 6 credits from the following: EDCD 895, 896, 897
- EDCD 797 Special Topics (3–6 credits):
  - Diagnosis and Treatment Planning in Mental Health
  - Issues of Loss
  - School Violence
  - Counseling At-Risk Youth
  - Urban Issues in Counseling
  - Eating Disorders
  - Counseling Children with Cancer
  - Multicultural/Multilingual Education
  - Clinical Supervision in Counseling
  - Eating Disorders
  - Counseling Children with Cancer
  - Multicultural/Multilingual Education
  - Clinical Supervision in Counseling

- 3 to 6 credits (if needed; may be substituted for other courses): EDCD 755 Practicum in Counseling,
- EDCD 791 Internship in Counseling

**Certificate in Science**
This 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.
Education & Human Development

Course Work ..............................................................15–33
EDSE 532 Transition and Community-Based Instruction
EDSE 547 Medical and Developmental Risk Factors for Children with Disabilities
EDSE 557 Language Development and Emergent Literacy for Diverse Learners
EDSE 561 Curriculum and Assessment in Severe Disabilities or EDSE 562 Augmentative Communication
EDSE 563 Curriculum and Assessment in Severe Disabilities or EDSE 627 Psychoeducational Assessment
EDSE 661 Curriculum and Methods—Severe Disabilities
EDSE 662 Consultation and Collaboration
EDSE 669 Interdisciplinary Approaches for Children with Sensor/Motor Disabilities
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio
EDSE 790 Internship Special Education (two experiences)

Certificate in Teacher Leadership
This certificate provides practicing teachers with course work in educational leadership that can be applied in their school settings.

Course Work ..............................................................18
EDLE 620 Organizational Theories and Leadership Development
EDLE 612 Educational Law
EDLE 618 Supervision of Instruction
EDLE 610 Schools and Communities
EDUC 597 Special Topics in Education: Trends and Issues in Instruction
EDUC 598 Directed Reading, Research, and Individual Projects

Admission
Information about the MEd in counseling and development, curriculum and instruction (including initial teacher licensure), education leadership, or special education, and graduate certificate programs can be obtained from the GSE Admissions Office in Robinson Hall A, Room 103; 703-993-2010. Information about the MA in new professional studies: teaching can be obtained from the Initiatives in Educational Transformation Office at 703-993-8320. For information about the adult education concentration in the MEd in curriculum and instruction, call Adult Learning and Professional Development at 703-993-3675.

Application Deadlines
Generally, the application deadlines are April 1 for fall, November 1 for spring, and March 1 for summer. Some programs have different application deadlines. For more information, go to gse.gmu.edu, or call the GSE Admissions Office in Robinson Hall A, Room 103, at 703-993-2010.

Admission Requirements for Graduate Programs
Applicants must hold a baccalaureate degree from an accredited institution of higher education. They must have attained a GPA of 3.00 or higher on a 4.00 scale on the last 60 credits of undergraduate study or successful postbaccalaureate course work. Some programs may offer provisional admission to applicants with a lower GPA if there is sufficient evidence of potential success. Candidates should submit a completed Application for Graduate Study, including a Virginia Domicile Classification form, and a nonrefundable application fee payable by check, money order, or credit card. Other requirements are as follows (the application contains the necessary forms):

- Three professional letters of recommendation
- Statement of goals
- Two official copies of transcripts from each institution attended. Unofficial copies of Mason transcripts are acceptable. Applicants with degrees from abroad must have transcripts officially translated and evaluated. Organizations providing this service are listed on the application.

In addition, some programs require standardized test scores, departmental forms, evidence of experience or licensure, and an interview and writing sample.
Education, PhD

The PhD in education provides advanced professional education for experienced educational practitioners pursuing or planning careers in educational settings. The program requires a minimum of 85 credits beyond the baccalaureate degree or a minimum of 55 credits beyond the master’s degree. 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 requirements, 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, instruction, 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 committee 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 knowledge 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.

Course Work

General Culture .................................................................8
EDUC 800 Ways of Knowing (required during the first fall semester in the program)
EDUC 802 Leadership Seminar (required during the first fall semester in the program)
EDUC 805 Doctoral Seminar
Research Methods .............................................................12
EDUC 810 Problems and Methods in Education Research
EDUC 811 Quantitative Methods in Education
EDUC 812 Quantitative Methods in Education Research
Elective
One of the following:
EDRS 820 Evaluation Methods for Educational Programs
EDRS 821 Advanced Applications of Quantitative Methods
EDRS 822 Advanced Applications of Qualitative Methods
EDRS 823 Advanced Research Methods in Single Subject/Case Design

Professional Specialization ..............................................21
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, curriculum and instruction, early childhood education, education leadership, educational psychology, secondary education, international education, instructional technology, literacy and reading, mathematics or science education leadership, multilingual or multicultural education (English as a second language), research methodology, and special education.

Secondary Concentration ..............................................12
Students have several options including secondary concentrations within GSE or other Mason departments, interdisciplinary secondary concentration, or using the master’s degree as part of the secondary concentration requirements.

Dissertation .................................................................12
EDUC 998 Doctoral Dissertation Proposal .........................3
EDUC 999 Doctoral Dissertation Research ......................9

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.

Admission Requirements
Candidates are admitted to study by GSE; admission is highly selective. Applicants must fulfill the following admission 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.
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 reformulated as the College of Nursing and Health Science. In 2006, the college was reorganized as 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 that include health administration, health policy, health information systems, health services research, nursing, nutrition, rehabilitation science, senior care, and social work.

Administration
Shirley Travis, Dean
Christena Langley, Acting Associate Dean and Director, School of Nursing
J. Goodlett McDaniel, Associate Dean, Practice, Marketing, and Finance
James Vail, Acting Associate Dean, Academic Affairs
Rosemarie C. Brenkus, Assistant Dean, Student Affairs and Enrollment Management
Lisa Pawloski, Chair, Global and Community Health
P. J. Maddox, Chair, Health Administration and Policy
Sunny Harris Rome, Chair, Social Work

Faculty
Faculty emeriti: Ailinger, Carty, Cohelan, Jenkins, Johnson-Brown, Parker-Smith, Redmond, Silva, Walker
Professors: Butler, Gerber, Maddox, Meiners, Metcalf, Raskin, Ritchie, Rose, Sluzki, Sorrell, Travis
Associate professors: Alemi, Baghi, Chong, Davidson, Davis, Douglas, Gaffney, Harris Rome, Langley, Mahon, McDaniel, Moore, Panniers, Pawloski, Vail, Vakalahi, Wolf-Branigin, Wu
Research professor: Palsbo
Instructors: Almond, Blasser, Campo, Cox, Davis, Dickman, Durham, Gillette, Hall, Henderson, Kiernan-Stern, Liss, Livsey, Maradiegue, Middle, Mulqueen, Moss, Oh, Stoehr, Telford, 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
  - Second Degree
  - LPN-BSN

- Master of Science in Nursing (MSN)
  - Advanced Clinical Nursing
  - Clinical Nurse Leader
  - Nurse Educator
  - Nurse Practitioner
  - Nursing Administration
  - RN-MSN
  - MSN/MBA
  - Master’s International

- PhD in Nursing
- Graduate Certificate Programs
  - Nursing Administration
  - Nursing Education

Global and Community Health
- Bachelor of Science in Health Science
  - Community Health
  - Gerontology
  - Health Care Coordination Traditional
  - Health Care Coordination Accelerated

- Master of Science in Epidemiology and Biostatistics
- Master of Science in Health Science
  - Gerontology
  - Global Health

- Undergraduate Minor in Nutrition
- Undergraduate Certificate Programs
  - Nutrition
  - Gerontology
  - Graduate Certificate Programs
  - Biostatistics
  - Conflict Resolution for Health Professionals
  - Gerontology
  - Global Health

Health Administration and Policy
- Bachelor of Science in Health Science
  - Health Systems Management Traditional
  - Health Systems Management Accelerated
  - Assisted Living Administration

- Master of Science in Health Systems Management
  - Assisted Living Administration
  - Health Information Systems
  - Health Policy Analysis
  - Health Systems Management
  - Health Care Security and Privacy

- Graduate Certificate Programs
  - Assisted Living Administration
  - Health Care Security and Privacy
  - Health Information Systems
  - Quality Improvement and Outcomes Management in Health Care Systems

Social Work
- Bachelor of Science in Social Work
- Master of Social Work (MSW)
- Undergraduate Social Work Minor

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.

Professional Conduct Policy
CHHS reserves the right to place on probation, suspend, or dismiss any student from 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 verifies degree completion, acts on all student issues with the exception of grade appeals (which are filed according to the 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 will be 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 or in the Truland Building on the Arlington Campus. Students must submit copies of required health records to the 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 strongly advised to maintain health insurance at all times. An accident and health insurance plan is available through Mason. 

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 program may be completed on a full- or part-time basis. Students who are interested in pursuing a major in nursing, with the exception of those currently licensed as registered nurses (RNs), must make an additional and separate application through the School of Nursing (SON). Special accelerated pathways for RNs and licensed practical nurses (LPNs) take into account the needs of the working RN and LPN. A 12-month, full-time accelerated pathway for students with a baccalaureate degree outside of nursing also is offered. Students interested in these pathways must contact the nursing program before admission. All pathways lead to completion of the objectives of the undergraduate program.

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. This does not apply to students who are already registered nurses.

Attendance at the first meeting of all nursing courses (lectures, on-campus laboratories, and agency laboratories) is mandatory.

Acceptance into the Traditional Nursing Program

To be eligible to apply for junior standing, traditional prenursing students must complete the designated nursing prerequisites 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 309, 3 credits). All university general education requirements, with the exception of ENGL 302, must be completed by the end of the summer semester preceding entry into the nursing program.

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 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. 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 Degree Requirements

Candidates for the degree must present at least 120 credits. Specific requirements for the BSN are as follows.

General Education ........................................................................................................30

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) .............................. 6

Communication ............................................................................................................3

Information technology .............................................................................................3

Literature (at the 200 level or above; does not include ENGL 101 and 302) .............................................. 3

Arts .....................................................................................................................................3

Western civilization .....................................................................................................3

Global understanding ..................................................................................................3

Sociology or anthropology ..........................................................................................3

Psychology (PSYC 100) ................................................................................................3

Designated Nursing Prerequisites ..............................................................................24

Anatomy and physiology (BIOL 124 and 125) ........................................................... 8

Microbiology (BIOL 246 and 306) ............................................................................... 4

Ethics (PHIL 151 or 309) .............................................................................................3

Statistics (STAT 250) ..................................................................................................3

Developmental psychology (PSYC 211) .....................................................................3

Nutrition (GCH 295) ..................................................................................................3
Traditional Nursing Major ..............................................62
Electives .............................................................................4
No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).

Acceptance into the LPN to BSN Nursing Program
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 309, 3 credits).

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 Degree Requirements
Candidates for the degree must present at least 120 credits. Specific requirements for the BSN are as follows.

Electives .............................................................................4

No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).

Advanced Placement Credit ...........................................11
On successful completion of NURS 334, LPN students will be awarded 11 AP credits in nursing.

Electives .............................................................................4

No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).

Acceptance into Accelerated, Second Degree Nursing Program
The Accelerated, Second Degree BSN Nursing Program 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 309, 3 credits).

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 Requirements
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 for the second degree program are as follows.

Electives .............................................................................4

No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).

Advanced Placement Credit ...........................................11
On successful completion of NURS 334, LPN students will be awarded 11 AP credits in nursing.

Electives .............................................................................4

No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).

Acceptance into Accelerated, Second Degree Nursing Program
The Accelerated, Second Degree BSN Nursing Program 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 309, 3 credits).

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 Requirements
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 for the second degree program are as follows.

Electives .............................................................................4

No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).

Advanced Placement Credit ...........................................11
On successful completion of NURS 334, LPN students will be awarded 11 AP credits in nursing.

Electives .............................................................................4

No more than 3 credits of nursing electives may be used to satisfy this requirement.
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 (NURS 465, 3 credits).
Developmental psychology (PSYC 211)..............................3
Nutrition (GCH 295)...........................................................................3
Second Degree Nursing Major..................................................47
NURS 305, 309, 310, 319, 334, 343, 350, 351, 419, 425,
427, 428, 429, 436, 440, 453, 465
Total............................................................................................................120
Nursing students must take an approved synthesis course (NURS 465, 3 credits).

Acceptance into Accelerated RN to BSN Program
Students who hold current RN licenses need to apply only to the school of Nursing. The Accelerated RN-BSN Program allows RNs to progress quickly through the program while meeting the objectives of the undergraduate curriculum. Upon completion of the general education requirements and designated nursing prerequisites, registered nurse 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 Requirements
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 for the program are as follows:

General Education and Prerequisites.................................51
Composition (ENGL 101 and 302; 3 credits of literature
are a prerequisite to ENGL 302) ...........................................6
Communication .......................................................................3
Information technology ..............................................................3
Literature (at the 200 level or above, does not include
ENGL 101 and 302).................................................................3
Arts ............................................................................................3
Western civilization .................................................................3
Global understanding ...............................................................3
Sociology or anthropology ........................................................3
Psychology .................................................................................6
Anatomy and physiology (BIOL 124 and 125)..........8
Microbiology (BIOL 246 and 306) ..................................4
Ethics (PHIL 151 or 309) ..............................................................3
Statistics (STAT 250) .................................................................3
RN to BSN Nursing Major..................................................27
NURS 334, 425, 436, 440, 441, 442, 453, 465, 400/500
level elective
Electives...............................................................................9
No more than 3 credits of nursing electives may be used
to satisfy this requirement.
Advanced Placement Credit .............................................33
On successful completion of NURS 334, RN students
will be awarded 30 AP credits in nursing and 3 AP
credits in general education.
Total..............................................................................................120

BIOL 124 and 125 meet the natural science portion of Mason’s
genral education requirements. Statistics 250 fulfills the
quantitative reasoning portion of Mason’s general educa-
tion requirements. Nursing students must take an approved
synthesis course (NURS 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 NURS 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 warn-
ing. They must notify the assistant dean for undergraduate
programs in writing of their intent to repeat the course within
two weeks of final exams. Students should be aware that space
may not be available in some clinical nursing courses that
they may need to repeat. Although placement attempts 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
NURS, GCH, HHS, or HAP prefixes. Before the course is
repeated, the student may not register for any other courses
with a NURS, GCH, HHS, or HAP prefix without permis-
sion from CHHS.

Students may repeat a nursing course in which they earned
a grade lower than C only one time. Those who fail to earn a
C or higher after repeating the course are dismissed from the
nursing program. Those who earn a grade of C or higher may
resume progress in the sequence of required courses. Earning
a grade of less than C in a second nursing course results in
dismissal from the nursing program.

Dismissal from any one of the nursing programs 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 nursing program 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 upon readmission, reasons readmission is
justified, and rationale to support expectation of success on
readmission. Students meeting the above criteria are consid-
ered 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 nursing program of up to two semesters. Readmis-
sion 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 students in the School of Nursing initiate a learning portfolio during the first six months 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 students, with the exception of RN-BSN students, must take a computerized version of a practice NCLEX-RN exam in the first semester of their senior year. Students must achieve a score of 850 or higher. Students who do not achieve this score must complete an individualized study program, repeat the NCLEX review exam, and score 850 or above. Successful completion of the NCLEX review exam and any required remediation is required to receive a passing grade in NURS 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 Academic Affairs.

All students must have CPR certification before entering the first clinical nursing course and maintain it throughout 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 nursing program.

No student or faculty member is 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 Academic Affairs.

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 and administration 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.

GRADUATE PROGRAMS

Master of Science 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 tracks are part of a collaborative program with George Washington University School of Medicine and Health Sciences. These tracks have been approved by the state boards of nursing and medicine in Virginia. The track 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 track 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 track prepares graduates for faculty positions in schools of nursing, as well as nurse educator positions in hospitals and community health care agencies. The clinical nurse leader track 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, and submit two letters of recommendation. 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.

Students applying to the advanced clinical nursing, clinical nurse leader, nurse educator, and all the nurse practitioner tracks must have a health assessment skills continuing education course within 18 months prior to taking NURS 514 or 554. In addition, applicants to the nursing administration track 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 track 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 track have the equivalent of one year's experience in direct patient care as a registered nurse.

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 CHHS Office of Student Academic Affairs. 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 tracks require an additional 24 credits; the nurse educator track, an additional 25 credits; advanced clinical nursing tracks, an additional 25 to 31 credits; adult nurse practitioner primary care track, an additional 29 credits; and the adult/gerontological and family nurse practitioner tracks, 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 students) may repeat no more than two courses in their total program of study.

RN to MSN Pathway
This pathway allows registered nurses 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 major through this pathway must meet all the requirements for admission to that major.

In addition to fulfilling admission requirements for degree status at Mason, applicants must hold a current license to practice nursing, be graduates of an accredited nursing program, 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 a registered nurse in clinical practice.

RN to MSN Bridge
NURS 595 RN-MSN Transition: Evidence-Based Community Health Nursing.................................3

After completion of the bridge course, students choose one of the five tracks and meet all requirements of the graduate program.

Program of Study

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSN Core Courses (required of all students)</strong></td>
<td><strong>13</strong></td>
</tr>
<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>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nursing Tracks (select one):</strong> Nurse Practitioner</td>
<td></td>
</tr>
<tr>
<td>Choose from one of the following concentrations:</td>
<td></td>
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<tr>
<td><strong>Adult Nurse Practitioner in Primary Care</strong></td>
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<tr>
<td>NURS 623 Clinical Concepts in Community-Oriented Primary Care</td>
<td>3</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>
<td>3</td>
</tr>
<tr>
<td><strong>Adult/Gerontological Nurse Practitioner in Primary Care</strong></td>
<td></td>
</tr>
<tr>
<td>NURS 623 Clinical Concepts in Community-Oriented Primary Care</td>
<td>3</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>
<td>3</td>
</tr>
<tr>
<td><strong>Family Nurse Practitioner in Primary Care</strong></td>
<td></td>
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<tr>
<td>NURS 623 Clinical Concepts in Community-Oriented Primary Care</td>
<td>3</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>
<tr>
<td><strong>Related Discipline Support Courses</strong></td>
<td></td>
</tr>
<tr>
<td>(At George Washington University, required of all nurse practitioner students)</td>
<td></td>
</tr>
<tr>
<td>NURS 552 Advanced Physiology and Pathophysiology*</td>
<td>4</td>
</tr>
<tr>
<td>NURS 554 Practicum in Advanced Health Assessment*</td>
<td>2</td>
</tr>
<tr>
<td>NURS 561 Clinical Decision Making*</td>
<td>2</td>
</tr>
<tr>
<td>NURS 547 Pharmacology*</td>
<td>3</td>
</tr>
<tr>
<td>NURS 548 Advanced Pharmacology in Disease and Pathophysiology*</td>
<td>1</td>
</tr>
</tbody>
</table>

* Colisted with George Washington University (GWU) School of Medicine and Health Sciences All courses offered at GWU are charged at GWU tuition rates. Nurse practitioner students must have taken a continuing education health...
### Advanced Clinical Nursing

**Major Courses**

- NURS 514* Application of Advanced Health Assessment Methods in Advanced Clinical Nursing
- NURS 550 Pathophysiologic Bases for Major Health Deviations of Individuals
- NURS 513 Advanced Pharmacology in Nursing

*Note:* A continuing education health assessment course with a skills component is required within 18 months prior to taking NURS 514.

Choose from one of the following concentrations:

**Basic Concentration**

- NURS 773 Advanced Clinical Nursing I
- NURS 776 Advanced Clinical Nursing II
- NURS 775 Advanced Specialty Practice I
- NURS 778 Advanced Specialty Practice II
- Electives

**Clinical Nurse Leader Support Courses**

- NURS 730 Leadership Strategies for the Clinical Nurse Leader
- NURS 731 Clinical Nurse Leader Role Integration
- NURS 732 Practicum—Clinical Nurse Leader

**Nursing Administration**

**Major Courses**

- NURS 736 Administrative Theory in Nursing
- NURS 765 Practicum in Nursing Administration I
- NURS 766 Administrative Strategies in Nursing
- NURS 768 Practicum in Nursing Administration II

**Support Courses**

- NURS 654 Nursing Administration Financial Management of HAP 703 Financial Management in Health Organizations
- Management/organizational theory
- (Recommended courses include HAP 621, LRNG 601 or PUAD 620.)
- Nursing or related discipline electives

**Nurse Educator**

**Major Courses**

- NURS 657 Perspectives in Nursing Education
- NURS 610 Curriculum Development
- EDRS 531 Educational and Psychological Measurement
- NURS 658 Practicum and Seminar in Nursing Education
- NURS 668 Practicum and Seminar in Nursing Education II

**Support Courses**

- NURS 514* Application of Advanced Health Assessment Methods
- Deviations of Individuals
- NURS 514 Application of Advanced Health Assessment Methods
- Nursing or related discipline electives

*Note:* A continuing education health assessment course with a skills component is required within 18 months prior to taking NURS 514.

### Clinical Nurse Leader

**Major Courses**

- HAP 586 Quality Management in Health Care
- NURS 654 Nursing Administration Financial Management
- NURS 730 Leadership Strategies for the Clinical Nurse Leader
- NURS 731 Clinical Nurse Leader Role Integration
- NURS 732 Practicum—Clinical Nurse Leader

**Support Courses**

- NURS 513 Advanced Pharmacology in Nursing
- NURS 550 Pathophysiologic Bases for Major Health Deviations of Individuals
- NURS 514 Application of Advanced Health Assessment Methods

*Note:* 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 the 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. Students benefit from a program that 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 Mason. The MSN offers five tracks, but two are more appropriate to the Peace Corps experience: the MSN in advanced clinical nursing, a 38-credit program, and the MSN in 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 non-refundable application fee; application for Virginia in-state rates for those claiming eligibility; original transcripts from all previously attended colleges or universities; GRE scores (cumulative undergraduate GPA may allow for waiver of the entrance exam requirement); two letters of recommendation from professional sources; résumé; and a goals statement. 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 the summer session. 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 are accepted into the Peace Corps.

For more information about MI, 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
The MSN/MBA program, offered jointly 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 59.5 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
- NURS 660 Seminar in the Ethics of Health Care ..................3
- NURS 680 Theoretical Foundations Related to Nursing ........2
- NURS 685 Advanced Nursing Research Methods ................3
- NURS 686 Projects in Nursing Research .........................2
- NURS 688 Organization of Nursing and Health Care Delivery Systems .................................................................3
- NURS 763 Administrative Theory in Nursing ....................3
- NURS 765 Practicum in Nursing Administration ...............3
- NURS 766 Administrative Strategies in Nursing ................3
- NURS 768 Practicum in Nursing Administration II ............3
- HAP 703 Financial Management of Health Systems ...........3

MBA Courses
- MBA 603 Managerial Economics and Decisions of the Firm .................................................................3
- MBA 612 Managing Costs and Evaluating Performance .................................................................1.5
- MBA 613 Financial Reporting and Decision Making ........3
- MBA 623 Marketing Management .................................3
- MBA 633 Statistics for Business Decision Making .........3
- MBA 638 Managing Operations and Technology for the Digital Enterprise ........................................3
- MBA 643 Managerial Finance ........................................3
- MBA 653 Organizational Behavior and Human Resource Management .....................................................3
- MBA 663 Introduction to Information Technology and Management .........................................................3
- MBA 673 Legal Environment for Management ..............3
- MBA 678 Strategy and Organizational Leadership ..........3

Graduate Certificates in Nursing
Certificate in Nursing 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
- NURS 763 Administrative Theory in Nursing ...............3
- NURS 765 Practicum in Nursing Administration I or NURS 768 Practicum in Nursing Administration II ....3
- Electives ........................................................................9
- Total ..................................................................................15

To earn the certificate, students must complete all courses with a 3.00 GPA.

Certificate in Nursing Education
This program combines foundation courses in education with courses in the principles and practices of nursing education. It prepares students to function in nursing educational roles in both academic and nonacademic settings.

Certificate Requirements
Applicants must hold a bachelor’s degree in nursing. Application is made through CHHS.

Required Courses
- EDRS 531 Educational and Psychological Measurement ....3
- NURS 610 Curriculum Development ...............................3
- NURS 657 Perspectives in Nursing Education ..............3
- NURS 658 Practicum and Seminar in Nursing Education .................................................................3–6

Total ..................................................................................15

To earn the certificate, students must complete all courses with a 3.00 GPA.

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 will exemplify administrative and 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) or 600 (paper-based)
- 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.

Degree Requirements
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, director of doctoral program, and 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.

Program of Study
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
Prerequisites for this concentration are PUAD 620 Organizational Behavior and NURS 597 Approaches to Quantitative Data Analysis in Health Care Research, or the equivalent.

Credits
Scientific Base/Research Core .................................................................19
NURS 799 Advanced Quantitative Data Analysis I ........................3
NURS 800 Advanced Quantitative Data Analysis 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 ........................................1

Nursing Education Core ..........................................................................18
EDRS 531 Educational and Psychological Measurement or EDEP 651 Test Design and Interpretation .....................................................3
NURS 610 Curriculum 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

Total ........................................................................................................58

Concentration in Nursing Administration
Prerequisites for this concentration are PUAD 620 Organizational Behavior and NURS 597 Approaches to Quantitative Data Analysis in Health Care Research, or the equivalent.

Credits
Scientific Base/Research Core .................................................................19
NURS 799 Advanced Quantitative Data Analysis I ........................3
NURS 800 Advanced Quantitative Data Analysis 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 ........................................1

Individualized Area of Concentration
The prerequisite for this concentration is NURS 597 Approaches to Quantitative Data Analysis in Health Care Research or the equivalent. Other prerequisites are determined individually.

Credits
Individualized Core (minimum 18 credits) ........................................18
NURS 866 Health Care Policy ...............................................................3
NURS 874 Internship in Health Care Administration/Policy/Education .........................................................4
Electives .................................................................................................11 (Students must complete a minimum of 11 credits from a cohesive set of existing doctoral-level university courses designed with their advisor and the program director to contribute to the student’s program of research. Course work must focus on specific content areas such as biostatistics, bioterrorism, gerontology, and genetics.)
Dissertation (minimum 12 credits) ........................................ 12
NURS 998 Dissertation Proposal Development .................. 3
(may be repeated up to four times)
NURS 999 Doctoral Dissertation ......................................... 1–9
Total ................................................................................. 51

Internship in Health Care Administration/Policy/Education
Students are required to enroll in NURS 874 Internship in Health Care Administration/Policy/Education, a one-semester, 4-credit internship that includes seminars for experiential learning in health care administration. Students are assigned to a doctorally prepared executive who serves as the preceptor in the student’s field of emphasis. A field experience of 126 hours is required. NURS 874 is scheduled at the end of the course sequence in the program of study.

Advancement to Candidacy
After students have successfully completed the qualifying exam and all required course work, the director of the CHHS 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, doctoral program director, and 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, doctoral program director, and CHHS dean.

Final Oral Doctoral Exam
The chair of the Doctoral Dissertation Committee, 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 Doctoral Dissertation 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.

Global and Community Health

UNDERGRADUATE PROGRAMS

Bachelor of Science in Health Science
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, gerontology, and health care coordination, with an accelerated health care coordination pathway available for students who have associate’s degrees in allied health and gerontology.

The community health track prepares students to understand health issues related to the community and larger populations at the national and international levels.

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 health care coordination traditional and accelerated tracks prepare graduates to work directly with clients, assisting them with managing their health and illness care. Graduates work as health care coordinators, client advocates, and members of interdisciplinary teams in hospitals, long-term care agencies, life care facilities, health maintenance organizations, and business and community health settings.

The program may be completed on a full- or part-time basis; the accelerated pathway for graduates of allied health technical programs takes into account the needs of the adult learner. 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 is required of all students prior to beginning the internship.

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 electives with their advisor to adjust for an appropriate overall curriculum.

Program Requirements

Concentration in Community Health

Credits

General Education ................................................................. 38
Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) ............................................ 6
Communication (COMM 101) ............................................... 3
Statistics (STAT 250) ................................................................. 3
Literature (at the 200 level or above; does not include ENGL 101 or 302) ................................................................. 3
Arts......................................................................................... 3
Anatomy and physiology (BIOL 124 and 125) ..................... 8
Western civilization................................................................. 3
Global understanding ............................................................. 3
Psychology 100........................................................................ 3
Information technology (IT 103) ............................................. 3

**Required Courses** .................................................................. 28

International health (GCH 205) .................................................. 3
American government (GOVT 103) ......................................... 3
Developmental psychology (PSYC 211) .................................. 3
Health behavior (HEAL 230) ..................................................... 3
Health communication ............................................................. 3
Microbiology (BIOL 246, 306) ................................................. 4
Foreign language/GCH focus ................................................... 9

**Community Health Concentration** ..................................... 33
GCH 295, 332, 350, 440, 460, 498
HAP 303, 378, 416
HHS 465

**Electives** .............................................................................. 21
Community Health Electives .................................................... 12
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.

**Health Care Coordination Traditional Track**

(No new students will be enrolled in this track beginning fall 2007.)

**General Education** .................................................................. 38

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) ......................................................... 6
Communication (COMM 101) .................................................... 3
Information technology (IT 103) ................................................. 3
Literature (at the 200 level or above; does not include ENGL 101 and 302) ................................................................. 8
Fine arts..................................................................................... 3
Western civilization................................................................. 3
Global understanding ............................................................. 3
Sociology or anthropology ......................................................... 3
Anatomy and physiology (BIOL 124 and 125) ......................... 8
Statistics (STAT 250) ................................................................. 3

**Required Courses** .................................................................. 27
COMM 305 and 320 ................................................................. 6
PHIL 309.................................................................................. 3
PSYC 100, 211, and 321 .......................................................... 9
ECON 100 or 103 ................................................................. 3
MGMT 301 and 312 ................................................................. 6
Health Care Coordination Track ............................................. 30
GCH 295, 332, 350, 440, 460, 498
HAP 378, 416
HHS 465

**Electives** .............................................................................. 25
(Three courses must be in GCH.)

**Total** .................................................................................... 120

BIOL 124 and 125 meet the natural science portion of Mason’s general education requirements. HHS 465 fulfills the university synthesis requirement.

---

**Health Care Coordination Accelerated Track for Students with Associate’s Degree in Allied Health**

(No new students will be enrolled in this track beginning fall 2007.)

**General Education** ................................................................. 38

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) ................................................................. 6
Communication (COMM 101) .................................................... 3
Information technology (IT 103) ................................................. 3
Literature (at the 200 level or above; does not include ENGL 101 and 302) ................................................................. 8
Arts......................................................................................... 3
Western civilization................................................................. 3
Global understanding ............................................................. 3
Sociology or anthropology ......................................................... 3
Anatomy and physiology (BIOL 124 and 125) ......................... 8
Statistics (STAT 250) ................................................................. 3

**Required Courses** .................................................................. 27
COMM 305 and 320 ................................................................. 6
PHIL 309.................................................................................. 3
PSYC 100, 211, and 321 .......................................................... 9
ECON 100 or 103 ................................................................. 3
MGMT 301 and 312 ................................................................. 6
Health Care Coordination Track ............................................. 30
GCH 295, 332, 350, 440, 460, 498
HAP 378, 416
HHS 465

**Electives** .............................................................................. 25
(Three courses must be in GCH.)

**Total** .................................................................................... 120

*Upon completion of bridge course HAP 334, students are awarded 19 AP credits from the associate’s degree program.

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**

**General Education** ................................................................. 38

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) ................................................................. 6
Communication (COMM 101) .................................................... 3
Statistics (STAT 250) ................................................................. 3
Literature (at the 200 level or above; does not include ENGL 101 or 302) ................................................................. 3
Arts......................................................................................... 3
Anatomy and physiology (BIOL 124 and 125) ......................... 8
Western civilization................................................................. 3
Global understanding ............................................................. 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, 498
HAP 307, 416
HHS 465
SOCI 441
PSYC 415
Undergraduate Certificate 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

Required Courses ..........................................................21
GCH 295 Nutrition for Health Professionals ......................3
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
One sociology or anthropology course (which may include GCH 583) .................................................3
One developmental course such as in psychology or education .................................................................3
**Graduate Programs**

### Master of Science in 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, 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

<table>
<thead>
<tr>
<th>Credits</th>
<th>Core Requirement</th>
<th>Credits</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>GCH 712 Introduction to Epidemiology</td>
<td>3</td>
<td>STAT 652 Statistical Inference</td>
</tr>
<tr>
<td></td>
<td>GCH 726 Advanced Seminar in Epidemiology</td>
<td>3</td>
<td>STAT 655 Analysis of Variance</td>
</tr>
<tr>
<td></td>
<td>STAT 554 Applied Statistics</td>
<td>3</td>
<td>STAT 656 Regression Analysis</td>
</tr>
<tr>
<td></td>
<td>STAT 660 Biostatistical Methods</td>
<td>3</td>
<td>STAT 667 Nonparametric Statistics</td>
</tr>
</tbody>
</table>

**Epidemiology and Biostatistics Requirements**

Select a minimum of three courses from the following:

<table>
<thead>
<tr>
<th>Credits</th>
<th>Core Requirement</th>
<th>Credits</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>GCH 605 Social Epidemiology</td>
<td>3</td>
<td>STAT 662 Multivariate Statistical Methods</td>
</tr>
<tr>
<td>3</td>
<td>GCH 722 Infectious Disease Epidemiology</td>
<td>3</td>
<td>STAT 665 Categorical Data Analysis</td>
</tr>
<tr>
<td>3</td>
<td>GCH 800 Advanced Quantitative Data Analysis for Health Care Research II</td>
<td>3</td>
<td>STAT 668 Survival Analysis</td>
</tr>
<tr>
<td>3</td>
<td>GCH 801 Advanced Multivariate Statistics and Data Analysis in Health Care Research</td>
<td>3</td>
<td>STAT 673 Statistical Methods for Longitudinal Data Analysis</td>
</tr>
<tr>
<td>3</td>
<td>GCH 802 Measurement Theories and Applications in Health Care Research</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Select a minimum of three courses from the following:**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Core Requirement</th>
<th>Credits</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>STAT 544 Applied Probability</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

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**Master of Science in Health Science**

This interdisciplinary program prepares students to focus on social, economic, and physiological aspects of global and community health.

The concentration in gerontology is designed for students interested in providing services to the elderly, conducting research, or influencing public policy concerning aging and the elderly, as program planners and evaluators, and administrators or managers in the field. Opportunities are provided to build leadership skills in this rapidly developing field and advocate for the fast-growing population of elderly citizens. The degree is suitable for students who wish to prepare for a career in gerontology, executives or practitioners already in the field, and individuals who wish to increase their understanding of the aging process and human development.

The concentration in global 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 terminated. Applicants to the gerontology concentration must complete a 128-hour practicum experience or 6 to 8 hours per week in an appropriate organization. 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.

#### Gerontology Program of Study

<table>
<thead>
<tr>
<th>Credits</th>
<th>Health Science Core</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>HHS 597 Approaches to Quantitative Data Analysis in Health Care Research</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Gerontology Program of Study**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Health Science Core</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>STAT 652 Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>STAT 655 Analysis of Variance</td>
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<td>3</td>
<td>STAT 656 Regression Analysis</td>
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<td>STAT 668 Survival Analysis</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>STAT 673 Statistical Methods for Longitudinal Data Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>
Gerontology Concentration..................................................15
GCH/NURS 578 Cultural Competence and Diversity
in Health Care .................................................................3
HAP 621 Management of Health Service Organizations ....3
GCH 637 Normal Aging and Health Deviations ..............3
HAP 662 Aging and Health Care Policy ..............................3
SOC 686 Sociology of Aging ............................................3
Gerontology Practicum.......................................................6
GCH 770 Gerontology Practicum I ...................................(3
GCH 771 Gerontology Practicum II ....................................3
Electives ...........................................................................6
Electives should be selected to provide a focus in a particu-
lar role related to gerontology, such as gerontological case
manager or health educator, or manager, director, or program
developer in a gerontological setting. A listing of the electives
is provided. Students must confer regularly with their advisor
for ongoing guidance and mentoring.

Global Health Program of Study

Health Science Core ..........................................................12
HHS 597 Approaches to Quantitative Data Analysis in
Health Care Research ......................................................3
GCH 712 Introduction to Epidemiology ..............................3
GAP 620 Organizational Theory and Management
Behavior .........................................................................3

Global Health Concentration ...........................................15
GCH 530 Nutrition: A Global Perspective ............................3
GCH 543 Global Health: Trends and Policies .................3
GCH 590 International Health Organizations ...............3
GCH 798 Practicum in International Health I ................3
GCH 799 Practicum in International Health II ...............3
Electives ...........................................................................9
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 502 U.S. Role in Global Health, Nutrition,
and Population ................................................................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
GCH 722 Infectious Disease Epidemiology ....................3
GOVT 641 Seminar on Global Systems .........................3
HAP 609 Comparative International Health Systems ....3
ITRN 718 Global Economic and Human Development ..3
PUAP 636 The NGO: Managing the International
Nonprofit Organization ....................................................3
PUBP 880 Global and International Public Policy ........3

Graduate Certificates in Global and Community Health

Certificate in Biostatistics
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, and 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. The program also 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 Infor-
mation 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 admis-
sion to the program.

Program 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.

Program Requirements

Required Core Courses ......................................................6
GCH 637 Normal Aging and Health Deviations ..............3
SOC 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

Certificate in Gerontology
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 Depart-
ment of Psychology and the Department of Sociology and
Anthropology. The program is administered by CHHS and
supervised by a committee with representatives from the par-
icipating 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.

Required Core Courses ......................................................6
GCH 637 Normal Aging and Health Deviations ..............3
SOC 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
### Certificate in Global Health

This program develops an understanding of international health through a practicum as well as a sequence of courses that includes global health, anthropology, international relations, communications, and geography.

#### Certificate Requirements

Applicants must hold a bachelor's degree. Application is made through CHHS.

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCH 799 Practicum in International Health II</td>
<td>3</td>
</tr>
<tr>
<td>GCH 543 Global Health: Trends and Policies</td>
<td>3</td>
</tr>
<tr>
<td>GCH 583 Food and Culture: Biocultural Perspectives on Food and Nutrition</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following:

- CONF 501
- GEOG 581
- SOCI 523

#### Electives

Select two of the following:

- CONF 501, 709, 720
- GCH 530, 577, 578
- GEOG 581
- SOCI 523

#### Total

18 credits

To earn the certificate, students must complete all courses with a 3.00 GPA.

### Certificate in Conflict Resolution for Health Professionals

This is a joint graduate certificate program offered through CHHS and the Institute for Conflict Analysis and Resolution. It enriches understanding of disputes that are specific to the health care arena through a series of courses on leadership, violence, health and conflict, organizational conflict, and links between conflict resolution theory and practice.

#### Certificate Requirements

Students applying to the certificate program must be in a graduate program or already hold a master's degree from an accredited program. Application to this program is made through CHHS.

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONF 501 Introduction to Conflict Analysis and Resolution</td>
<td>3</td>
</tr>
<tr>
<td>CONF 713 Lab and Simulation I: Interpersonal and Intergroup Conflict</td>
<td>3</td>
</tr>
<tr>
<td>CONF 738/GCH 635 Research Seminar in Health and Conflict Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the suggested following:

- ANTH 631 Refugees in Contemporary Society
- CONF 703 Conceptions of Practice

#### Total

15 credits

To earn the certificate, students must complete all courses with a 3.00 GPA.

### Health Administration and Policy

#### UNDERGRADUATE PROGRAMS

### Bachelor of Science in Health Science

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; the insurance industry; and financial consultant services. Concentrations are offered in health systems management and in assisted living and senior housing administration. An accelerated pathway in health systems management is offered for students who have an associate in science degree in social services or allied health.

The health systems management traditional and accelerated tracks 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 and senior housing 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 HAP, GCH, and HHS courses.

Students must check with their advisor to ensure that all university general education requirements have been met prior to graduation. The internship requirement is 3 or 6 credits, depending on the student's work experience in health, social services, or assisted living and senior housing sector, as determined by the program coordinator. In such cases, students substitute approved electives for internship credits.

#### Health Systems Management Traditional Pathway

<table>
<thead>
<tr>
<th>General Education</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition (ENGL 101 and 302)</td>
<td>3</td>
</tr>
<tr>
<td>Communication (COMM 101)</td>
<td>3</td>
</tr>
<tr>
<td>Information technology (IT103)</td>
<td>3</td>
</tr>
<tr>
<td>Literature (at the 200 level or above; does not include ENGL 101 and 302)</td>
<td>3</td>
</tr>
</tbody>
</table>
On completion of bridge course HAP 334, students are awarded 22 AP credits from the associate’s degree program.

++HAP 498 is taken for 3 or 6 credits, depending on the student’s experience as determined by the program coordinator. The internship is taken in a health-related organization.

HHS 465 satisfies the university synthesis requirement.

**Concentration in Assisted Living Administration**

**Credits**

**General Education** ..........................................................38

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) ........................................6

Communication (COMM 101) ..............................................3

Information technology (IT 103) ..........................................3

Literature (at the 200 level or above; does not include ENGL 101 and 302) ...................................................3

Western civilization .........................................................3

Arts ..................................................................................3

Global understanding ......................................................3

Sociology or anthropology .................................................3

Biology (BIOL 103 and 104) ................................................8

Statistics (STAT 250) ........................................................3

**Required Courses** ..........................................................22

PHIL 309 ...........................................................................3

PSYC 100 ...........................................................................3

ECON 103 ...........................................................................3

MIS 102 ..............................................................................1

ACCT 203 ...........................................................................3

MSOM 300, 306 .................................................................6

BULE 302 ...........................................................................3

**Health Systems Management Pathway** ..........................36–39

GCH 332, 440

HAP 302, 303, 378, 416, 417, 470, 498*, 512

HHS 465

**Electives** ...........................................................................21–24

Electives must be taken from a list of electives approved by the department, three of which must be CHHS courses.

**Total** .............................................................................120

*HAP 498 is taken for 3 or 6 credits, depending on student work experience as determined by the program coordinator.

HHS 465 satisfies the university synthesis requirement.

**Health Systems Management Accelerated Pathway for Students with an Associate’s Degree in Allied Health**

**Credits**

**General Education** ..........................................................38

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) ........................................6

Communication (COMM 101) ..............................................3

Information technology (IT 103) ..........................................3

Literature (at the 200 level or above; does not include ENGL 101 and 302) ...................................................3

Western civilization .........................................................3

Arts ..................................................................................3

Global understanding ......................................................3

Sociology or anthropology .................................................3

Biology (BIOL 103 and 104) ................................................8

Statistics (STAT 250) ........................................................3

**Required Courses** ..........................................................21

PHIL 309 ...........................................................................3

PSYC 100 ...........................................................................3

ECON 103 ...........................................................................3

MIS 102 ..............................................................................1

ACCT 203 ...........................................................................3

MSOM 300, 306 .................................................................6

BULE 302 ...........................................................................3

**Health Systems Management Accelerated Pathway** ..........................36–39

GCH 332, 440

HAP 302, 303, 334*, 378, 416, 417, 470, 498++, 512

HHS 465

**Total** .............................................................................120

*On completion of bridge course HAP 334, students are awarded 22 AP credits from the associate’s degree program.

**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 39-credit 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. Five concentrations are offered: executive management, health information systems management, health care security and privacy, health policy analysis, and assisted living and senior housing services management.
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 advocacy 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 and senior housing services 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 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 September 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 five concentrations.

Note: If students have not had recent, broad, relevant experience in the U.S. health system, an additional 3-credit core course is required (HAP 678 Introduction to the U.S. Health System), bringing the number of credits required to 42.

Core Courses .................................................................24
HAP 501 Business Statistics for Health Care Management3
HAP 512 Introduction to Health Services Research ..........3
HAP 586 Quality Management in Health Care ...............3
HAP 621 Management of Health Service Organizations ...3
HAP 715 Health Economics ............................................3
HAP 740 Management of Health Information Systems .......
HHS 750 Legal Issues Relevant to Health Care
Administration ............................................................3
HAP 790 Health Management Practicum and Capstone
Seminar .................................................................3

Concentration in Executive Management ....................15
HAP 702 Managerial Accounting in Health Care
Organizations .........................................................3
HAP 703 Financial Management in Health Organizations ..3
HAP 704 Contemporary Issues in Health Systems  
Leadership and Management .............................................3
HAP 705 Strategic Management and Marketing in  
Health Services .................................................................3
HAP 706 Integrated Health Services .................................3
Concentration in Health Policy Analysis .....................15
HAP 542 Health Policy .........................................................3
HAP 609 Comparative Health Care Systems in the World  
.................................................................................................3
HAP 730 Health Care Decision Analysis .........................3
HAP 866 Health Care Public Policy .................................3
Choose one of the following:
HAP 720 Health Data Integration .................................3
HAP 727 Program Evaluation in Health Care ................3
GCH 726 Advanced Seminar in Epidemiology ............3
GCH 800 Advanced Quantitative Data Analysis  
for Health Care Research II .........................................3
Approved elective................................................................3
Concentration in Health Care Security and Privacy ......15
HAP 610 Maintaining Business Continuity  
for Health Care .................................................................3
HAP 735 Risk Analysis in Health and Biosciences ........3
INFS 565 Database and Distributed Systems Security  
Principles ........................................................................3
HAP 745 Health Care Security Policy ..........................3
HAP 746 Advanced Seminar on Security ....................3
Concentration in Health Information  
Systems Management ......................................................15
HAP 720 Health Data Integration .................................3
HAP 601 Electronic Commerce and Online Marketing  
Health Services .................................................................3
HAP 709 Health Care Databases .................................3
HAP 745 Health Care Security Policy ..........................3
Approved elective................................................................3
Concentration in Assisted Living Administration .......15
HAP 650 Assisted Living and Operations Management ..3
HAP 702 Managerial Accounting in Health Care  
Organizations .................................................................3
HAP 703 Financial Management of Health Systems ..........3
HAP 705 Strategic Management and Marketing  
in Health Care .................................................................3
Approved elective................................................................3
Master’s International
The MS in health systems management offers high-quality  
academic preparation in health care management, policy  
analysis, health information systems, health care security  
and privacy, and assisted living and senior housing management.  
Courses are scheduled at the Fairfax Campus and are offered  
evenings, weekends, and online. Mason is a public institution  
with excellent tuition rates for those who qualify for Virginia  
residency. Out-of-state students accepted into both the Peace  
Corps and the MS program who enroll as a cohort through  
CHHS are eligible for a 45.5 percent reduction in tuition rates.  
Students benefit from the university’s proximity to Washing-  
ton, D.C., by taking classes from leading professors in health  
policy and adjunct instructors working in government manage-  
ment or nonprofit settings. The Northern Virginia technology  
corridor provides an excellent location for students who wish  
to focus on management information systems.

The Master’s International (MI), a joint program of Mason  
and the Peace Corps, enables participants to prepare for  
Peace Corps volunteer service while earning the MS in health  
systems management. Students apply separately to the Peace  
Corps and Mason. The 19-credit curriculum provides students  
with the skills and tools to work as leaders and executive-  
level managers in evolving health systems; health policy  
analysts; consultants and managers of electronic commerce  
and technology products and enterprises in the health system;  
and executive management of assisted living programs. An  
accelerated pathway is provided for Peace Corps volunteers to  
complete 30 credits in one year (including summer session).  
Three semester hours will be earned as internship credits for  
overseas Peace Corps service. Students return to Mason for  
their final 6 credits or take the 6 credits online.
Requirements
Applicants must submit a completed application for graduate  
admission along with the nonrefundable application fee; the  
application for Virginia in-state tuition rates for those claiming  
estates; and a letter of interest specifying study goals. Scores from a standardized graduate admissions  
test are not required but may be requested of students who  
do not have a graduate degree or an undergraduate GPA less  
than 3.00. Applications are reviewed throughout the year for  
admission to the fall or the spring semester, although new  
students may take their initial course during the summer  
session. 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 are accepted in the Peace Corps.
For more information, call the Peace Corps regional office  
at 1-800-424-8580. For the Fellows/USA program, call the  
above number and then extension 1440.
Graduate Certificates  
in Health Systems Management
■ 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 hos-  
hitals, 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.  
Knowledge of the health care system and design of data-  
bases is not required, but students without this knowledge  
are required to take additional courses. Application is made  
through CHHS.
Program of Study
Students are expected to have broad health care experience  
or complete HAP 678, and knowledge of health care databases  
and complete HAP 709 or INFS 601.
Required Courses ...............................................................15
HAP 525 Risk Analysis in Health and Biosciences ........3
INFS 565 Database and Distributed Systems Security  
Principles ........................................................................3
HAP 610 Maintaining Business Continuity for  
Health Care ........................................................................3
HAP 745 Health Care Security Policy ..........................3
HAP 746 Advanced Seminar on Security ....................3
Courses can be taken in any sequence. The recommended sequence is in the order of course numbers.

**Certificate in Assisted Living and Senior Housing Administration**

This 15-credit certificate is offered as part of the overall program in assisted living and 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>
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</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>
</tbody>
</table>

**Additional Requirements**

Applicants must hold a bachelor’s degree in a health-related field or business administration or management, or a non-health 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 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>
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<tr>
<th>Credits</th>
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</table>

| HAP 547 Regulatory Requirements for Health Care Systems | 3 |
| GCH 601 Introduction to Biostatistics | 3 |
| HAP 586 Quality Management in Health Care | 3 |
| HAP 709 Health Care Databases | 3 |
| HAP 730 Health Care Decision Analysis | 3 |

**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 for those who do not.

To earn the certificate, students must complete all courses with a 3.00 GPA.

**Certificate for 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.

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>15</td>
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</tbody>
</table>

| HAP 586 Quality Management in Health Care | 3 |
| HAP 601 Electronic Commerce and Online Marketing for Health Services | 3 |
| HAP 720 Health Data Integration | 3 |
| HAP 740 Management of Health Care Information Systems | 3 |
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.

Degree Requirements

Students must successfully complete the following requirements:

Credits

General Education and Required Courses .................54

Natural sciences (BIOL 103 and one 4-credit science elective) .........................................................8

Composition (ENGL 101 and 302; 3 credits of literature are a prerequisite to ENGL 302) .........................6

Literature (at the 200 level or above; does not include ENGL 101 and 302) .........................................3

Communication (COMM 100) ........................................3

Arts ........................................................................3

Global understanding .................................................3

American government (GOVT 103) ..........................3

Western civilization (HIST 100) .................................3

Information technology .............................................3

Mathematics (MATH 106 or higher) ............................3

Psychology (PSYC 100) .............................................3

Economics (ECON 100) .............................................3

Philosophy or religion ...............................................3

Sociology (SOCI 101) ...............................................3

Statistics (SOCI 313 or PSYC 300) ............................4

Social Work Major ..................................................41

SOCW 200, 301, 323, 324, 351, 352, 357, 359, 417, 452, 453, 454, 456, 471

Electives .....................................................................25

Six credits must be in social work at the 400- or 500-level;
SOCW 499 may be used to satisfy an additional 1–3 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.

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, PSYC 100, and a 4-credit science elective; 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.

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.

Note: For social work majors, BIOL 103 and an additional 4-credit science elective are required for graduation.

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. Students majoring in social work fulfill this requirement by successfully completing SOCW 471.

Minor in Social Work

A minor in social work requires 18 credits as follows:

Credits

Required Courses .......................................................18

SOCW 200 Introduction to Social Work .......................3

SOCW 301 Laboratory in Interpersonal Communication 3

SOCW 323 Human Behavior in the Social Environment 1.3

SOCW 351 Social Policy and Social Justice 1.3

Social Work Electives ..................................................6

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. Some 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 this requirement is 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
The MSW prepares students for advanced practice in social work. Following completion of a foundation year of study, students complete specialized course work in organizational leadership and social change. 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.

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.

Degree Requirements
Students must successfully complete the following:

Foundation Courses ..........................................................30
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 I ........3
SOCW 652 Social Policies, Programs, and Services II ........3
SOCW 657 Integrative Approaches to Social Work
  Intervention I ....................................................................3
SOCW 658 Integrative Approaches to Social Work
  Intervention II ..................................................................3
SOCW 670 Communication and Technology for Social Work
  Practice ...........................................................................3
SOCW 671 Research Methods for Social Workers ..........3
SOCW 672 Foundation Field Practicum and Seminar I .....3
SOCW 673 Foundation Field Practicum and Seminar II ....3

Concentration Courses ......................................................30
SOCW 684 Policy Practice for Social Workers .................4
SOCW 675 Selected Topics in Organizational Leadership
  or
SOCW 676 Selected Topics in Social Work and Social Change .........................................................3
SOCW 685 Organizational Leadership for Social Workers ........................................................................4

SOCW 687 Community Practice for Social Workers ..........4
SOCW 688 Advanced Research in Social Work ............3
SOCW 690 Concentration Field Practicum ....................6
SOCW 691 Integrative Field Seminar .............................3
SOCW 697 Thesis Project Seminar .................................3

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

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 three- or four-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. A course grade of F will result in termination 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.

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:

Foundation Course ..........................................................3
SOCW 670 Communication and Technology for Social Work Practice .................................................3
### Concentration Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>SOCW 684 Policy Practice for Social Workers</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 675 Selected Topics in Organizational Leadership</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 676 Selected Topics in Social Work and Social Change</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 685 Organizational Leadership for Social Workers</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 687 Community Practice for Social Workers</td>
<td>4</td>
</tr>
<tr>
<td>SOCW 688 Advanced Research in Social Work</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 690 Concentration Field Practicum</td>
<td>6</td>
</tr>
<tr>
<td>SOCW 691 Integrative Field Seminar</td>
<td>3</td>
</tr>
<tr>
<td>SOCW 697 Thesis Project Seminar</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

### Additional requirements

- Successful completion of 450 hours of supervised field practicum in agencies approved by the director of field education, taken in conjunction with SOCW 690
- Successful completion of a culminating thesis project

All other academic policies for the advanced standing program are identical to those for the regular MSW Program.

### 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 are 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 interdisciplinary programs. The college is also home to New Century College, an innovative interdisciplinary learning community; 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, 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.
CHSS boasts a distinguished faculty of more than 400, including two Nobel laureates 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  
Matthew Zingraff, Associate Dean for Research  
Walter Rankin, Deputy Associate Dean for Undergraduate Academic Affairs  
Donna Fox, Assistant Dean for Undergraduate Academic Affairs  
Jamie Cooper, Assistant Dean for Graduate 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 Degree Programs**

CHSS offers 16 master’s degrees, including a master of public administration and a master of fine arts in creative writing, and 8 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 CHSS graduate students.

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.

**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.

**University Consortium 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 current semester have been posted.

**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 (999) Registration**

Doctoral students must be advanced to candidacy before they may enroll in 999. Students must register for 999 before the end of 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 University Libraries. If they have completed the dissertation credits required on their program of study, they may maintain continuous enrollment by registering for only 1 credit of 999.

**Undergraduate Degree Programs**

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.

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.

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.

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, 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 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 CHSS Undergraduate Academic Affairs Office about a possible waiver of this requirement.
- Non-Western culture: 3 credits of an approved course in the study of a non-Western culture in addition to the course used to fulfill the university-wide general education requirement in global understanding. A course used to fulfill the university-wide general education global understanding requirement may not be simultaneously used to satisfy this college-level requirement. A course used to fulfill this requirement may be used simultaneously to satisfy other requirements (university-wide general education requirements, college-level requirements, or requirements for the major). This requirement may be fulfilled by 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, 340, 341, 345, 432, 433
  - MUSI 103
  - RELI 211, 212, 272, 313, 314, 315, 337, 374, 375, 490
  - 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 CHSS Undergraduate Academic Affairs Office.

Requirements for each major are listed in the departmental sections that follow.

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 wish to 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.

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
Research professors: Turner
Associate professors: Gallagher, Gould, Maguire, Wilson
Assistant professors: Agha, Johnson, Lum, Merola, Willis
Term instructor: Jones
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
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 Virginia 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.

In addition to satisfying the university and college general education requirements, students must complete the following 67 credits with a minimum GPA of 2.00.

- 16 credits of core courses: ADJ 100, 300, 303, 306, 424
- 36 credits of approved electives 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
- 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: 15 credits chosen from ADJ 302, 304, 305, 307, 400, 401, 402, 403, 404, 408, 409, 425, 471
Concentration in law and society: 15 credits chosen from ADJ 301, 308, 405, 406, 407, 408, 422, 423, 460

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. 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.

To receive this minor, students must complete 18 credits distributed as follows:
- ADJ 100 (3 credits)
- ADJ 306 or 424 (3 credits)
College of Humanities and Social Sciences

■ 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.

Admission Requirements
Applications are accepted for fall semester only. 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 who have 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.

Degree Requirements
Students must complete 30 credits distributed as follows.
- 12 credits of core courses in three fields:
  Justice and law: JLCP 700, 720
  Justice organizations, administration, and leadership: JLCP 740
  Crime and security: JLCP 760
- 9 credits of analytic methods: JLCP 780, STAT 554, 656 or JLCP 780, STAT 510 and SOCI 630
- 3–6 credits of electives in one or more fields of specialization
- 3–6 credits of thesis: JLCP 799

A maximum of 6 credits of thesis may be applied to the degree. The master’s thesis must be defended orally before a committee of three faculty appointed by the JLCP graduate coordinator.

A list of possible electives by field is given under the doctoral degree requirements below.

Students may request a maximum of 12 transfer credits for prior graduate course work in a relevant area, subject to approval by the graduate coordinator and dean in accordance with university policies.

■ Justice, Law, and Crime Policy, PhD
The goal of this program is to provide a rigorous course of study that will prepare students to do research, teach, develop and test policies, and administer agencies and programs designed to administer law, deliver justice, reduce crime, and enhance domestic security.

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.

Admission Requirements
Applications will be accepted for the fall semester only. See the Application for Graduate Study for admissions deadlines. Late applications will be considered on a space-available basis. Students should have a master’s degree in a relevant discipline, or they will be required to complete the JLCP master’s degree as an integral part of the doctorate. 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 who have first-hand knowledge of the applicant’s 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.

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.
Credit for Prior Graduate Work
Students entering the doctoral program with a master’s degree in a related discipline may request that the required credits for the doctoral degree be reduced by a maximum of 24 credits with approval of the program coordinator 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.

Degree Requirements
Students must successfully complete 48–60 credits of course work, pass two qualifying exams, and complete a dissertation proposal (3–6 credits), after which the student is advanced to candidacy for the doctorate in JLCP. The final requirement is a dissertation (9–21 credits) of original research representing a significant contribution to the field, which should be publishable in a refereed journal or a quality press.

The 72 required credits are distributed as follows.

- 12 credits of core courses in three fields:
  - Justice and law: JLCP 700, 720
  - Justice organizations, administration, and leadership: JLCP 740
  - Crime and security: JLCP 760

- 12 credits of analytic methods: JLCP 780; STAT 554, 656; and one elective chosen from list below, or JLCP 780, STAT 510 and SOCI 630, and one elective chosen from the list below
  - 18 credits of electives in two substantive fields of study (9 credits per field) chosen from list below
  - At least 3 credits of an elective relevant to JLCP
  - 3–6 credits of dissertation proposal JLCP 998
  - 12–21 credits of dissertation JLCP 999

A maximum of 6 credits of 998 may be applied to the degree. A maximum of 24 credits of 998 and 999 may be applied to the degree. The dissertation must be successfully defended in public in accordance with university policy.

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.

Questions from the two fields may be administered at one time or serially, depending on the preference of the committee. Students are not eligible to take the comprehensive exams until they have successfully completed required course work as well as course work in the 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 to retake a failed exam. Students who receive a grade of pass or below on part of the written qualifying exam are required to offer an oral defense of the answers graded by readers of both parts of the written exam.

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
The curriculum covers three substantive fields of study, as well as analytic methods. Elective courses in each of these areas of study are listed below.

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 Security
JLCP 761; SOCI 607; GOVT 745; PUAD 640, 644, 741; CONF 734; PSYC 616, 617

Analytical Methods
JLCP 781; SOCI 631, 632, 634; STAT 574, 674, 658, 662, 665, 673; PSYC 633, 640; PUAD 643; ECON 611, 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, coordinator of the JLCP program, and sponsoring program.

Communication
Phone: 703-993-1090
Web: communication.gmu.edu

Faculty
Professors: Boileau, Botan, Decker, Friedley, Kreps (Eileen P. and Steve A. Mandell Term Professor of Health Communication; chair), Lichter, Lont, McAuley, Rowan (associate chair)
Emeritus professors: Looney, Manchester, Taylor
Associate professors: J. Muir, S. Muir, Villagran
Assistant professors: Cai, Gibson, Hopson, Muthuswamy, Zhao
Term associate professor: Finn, Pober
Term assistant professors: Bedore, Powell, Wright
Term instructors: Anderson, M. Dickerson, Klein, R. Smith, Talkington, Tomasovic, Warren
Affiliate: J. R. Censer (professor)

Course Work
The Communication Department offers all course work designated COMM in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAM

Communication, BA
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.

In addition to satisfying the university-wide general education requirements and requirements for the BA degree in CHSS, students majoring in communication must complete 36 credits in communication:

- Five required courses (15 credits): COMM 250, 300, 301, 302, 305
  Students must complete COMM 250 with a grade of C (2.00) or better before enrolling in COMM 300, 301, 302, or 305.
- 12 credits in an approved concentration (see below).
  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.
- 9 credits of electives in communication

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.

Approved Concentrations
Specific sections of COMM 399 Special Topics in Communication may be applied toward a concentration with prior written approval of the undergraduate director.

Interpersonal and Organizational Communication
COMM 201, 230, 320, 332, 335, 344 (1), 349 (1), 401, 430, 434, 465

Journalism
One required course (3 credits): COMM 303

Media Production and Criticism

Persuasive and Political Communication
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

Public Relations
COMM 202, 230, 260, 261, 303, 320, 330, 335, 351, 362, 375, 389, 390, 391, 400, 430, 454

Individualized Concentration
With approval of their advisor and associate chair, students may construct an individualized concentration.

Communication Student Activities and Organizations
All students are encouraged to participate in one of the communication activities: Broadside, 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.

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).

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 250, 300, 301, 302, and 305. 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.
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, however, houses three minors: communication, electronic journalism, and telecommunications (see below). It also participates in several interdisciplinary minors, including film and media studies, multimedia, and women’s studies. For a description of these minors, see the Interdisciplinary Minors section of this chapter.

Minor in Communication
The Department of Communication offers a minor to students who major in any other discipline. Students in the minor complete 18 credits of course work in communication beyond the 3 credits used to satisfy the university general education requirement.

- 3 credits of COMM 250 Introduction to Communication Research
- 6 credits (two courses) chosen from:
  - COMM 300 Foundations of Public Communication
  - COMM 301 Foundations of Interpersonal Communication
  - COMM 302 Foundations of Mass Communication
  - COMM 305 Foundations of Intercultural Communication
- 3 credits (one course) 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 communication (COMM) courses
With the approval of the director of the minor, the requirement of COMM 250 may be waived for students who have had an equivalent research course. Those students take an additional 3 credits of COMM electives.

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 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
- 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.

Minor in Telecommunications
Beginning in Fall 2007, this minor will no longer be offered. In its broadest sense, telecommunications includes technology (software and hardware), policy issues (national and international), mass media, and management. No longer can computer technologists sit alone working on code; they must be able to manage technical and nontechnical people, understand policy issues, and present technical material to others in the corporate setting. Required and elective courses in this minor provide a solid introduction to the work world of telecommunications.

Students in this minor complete 18 credits with a minimum GPA of 2.00, distributed as follows.

- Two required courses (6 credits) chosen from:
  - IT 103, 212; CS 105; COMM 100, 202
- Two additional required courses (6 credits):
  - COMM 369, 469
- Two electives (6 credits) chosen from:
  - COMM 320, 435, 450, 554; ENGL 410; GOVT 359; MIS 201, 301; MSOM 302, 303; NCLC 249, 348, 350

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 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.

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: strategic communication/public relations and health communication.

Our strategic communication faculty teach courses on planning, developing, executing, and evaluating public communication campaigns based on their expertise in public relations theory and research. For its part, our health communication faculty explore the relationship between communication practices and the health and well-being of individuals and communities—including everything from how to improve relationships between health-care providers and patients to how agencies can develop more effective health information 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 nonprofit 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.

Admission 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
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.

Admission 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.

Degree Requirements

• 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.
Candidates for the PhD in cultural studies must complete 48 credits beyond the MA degree distributed as follows:

- **Core requirements (9 credits):**
  - CULT 802 Histories of Cultural Studies
  - CULT 806 Research Seminar in Cultural Studies
  - CULT 808 Colloquium (three semesters)
- **Theory (3 credits), selected from the following:**
  - CULT 810 Culture and Political Economy
  - CULT 814 Gender and Sexuality
  - CULT 820 After Colonialism: Race, Ethnicity, Nationalism
- **Methodology (3 credits):**
  - Under the guidance of faculty advisory committees, students select from departmental graduate offerings (600 level or above) a course in a relevant methodology in which they are not already trained.
- **Topic requirement (3 credits), selected from the following:**
  - CULT 816 Science/Technology
  - CULT 818 Social Institutions
- **Field requirement (18 credits; two fields of 9 credits each)**
  - 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 departmental graduate offerings (600 level or above), independent study courses, theory or topic courses not used to fulfill the requirements above, and special topics courses. Students also are required to take a 3-credit directed readings course, CULT 870, in each field. Students demonstrate competence in each field by producing a field statement that consists of a comprehensive, critical literature review.
- **Comprehensive (Qualifying) Exam**
  - Written field statements and an oral comprehensive exam based on them constitute the qualifying exam. On successful completion of this requirement, students are advanced to candidacy.
- **Dissertation research (12 credits; 998, 999)**
  - Students are required to register for a minimum of 3 credits of 998 or 999 each semester once they first register for 998, until only 3 credits of dissertation remain (as listed on their program of study). 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.

### Economics

**Course Work**

The Economics Department offers all course work designated ECON in the Course Description chapter of the catalog.

### UNDERGRADUATE PROGRAMS

#### Economics, BA

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.

In addition to satisfying the university-wide general education requirements and the requirements for a BA degree in CHSS, candidates must complete the following:

- 36 credits of economics courses, including 12 credits of required courses (ECON 103, 104, 306, and 311), and 24 credits of economics electives at the 300 and 400 level (ECON 103 and 104 fulfill the university general education requirement in behavior and social science and the college-level requirement in social science.)
- DESC 210, or STAT 250 and 350
- MATH 108 (fulfills university requirement in quantitative reasoning)
- IT 103 (fulfills university information technology proficiency requirement)

Students must earn a GPA of at least 2.00 in ECON courses.

Some economics courses may fulfill the university-wide general education global understanding requirement or the CHSS non-Western culture requirement. 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

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 private-sector 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.

In addition to satisfying the university-wide general education requirements, students must complete the following:

- 39 credits of economics courses, including 15 credits of required courses (ECON 103, 104, 306, 311, and 345), and 24 credits of economics electives at the 300 and 400 level (ECON 103 fulfills the university general education requirement in social and behavioral science.)
- STAT 362, ACCT 203, or MSOM 300
- DESC 210, or STAT 250 and 350
- MATH 113 and 114 (fulfills university-wide general education quantitative reasoning requirement)
- IT 103 (fulfills university-wide general education information technology proficiency requirement)
- 8 credits of a laboratory science sequence (fulfills university-wide general education natural science requirement)
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 global understanding requirement. 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
The minor consists of 21 credits in economics with a minimum GPA of 2.00: ECON 103, 104, and 306, and 12 credits of economics electives 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: DESC 210, or STAT 250 or 344 may substitute for up to 3 credits of economics electives.

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. This minor is unique and extremely marketable. The skills offered through this minor can be of use to e-commerce designers, policy analysts, systems designers, engineers, and computer scientists.

Requirements
This minor consists of three required courses (9 credits) and two elective courses (6 credits) distributed as follows:

Required Courses:
ECON 440: Economic Systems Design I: Principles and Experiments
ECON 441: Economic Systems Design II: Case Studies and Analysis
ECON 442: Economic Systems Design III: Implementation

Elective Courses
6 credits of electives, 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.

For policies governing all minors, see the Academic Policies chapter of this catalog.

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.

Bachelor’s/Accelerated Master’s Program
Highly qualified 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 conferment 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.

Admission 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
- 30 graduate credits in economics 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.

Certificate in Economic 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 electronic commerce, public policy, and internal firm resource-allocation processes.

Admission Requirements
The program is open to all students who hold a bachelor's degree from an accredited university. Interested students not already in a degree program should submit an application for graduate studies.

Certificate Requirements
The certificate consists of three graduate courses (9 credits) in economic systems design and two elective courses (6 credits) chosen in consultation with an advisor in economics. 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
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.

Admission 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. They also 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.

Degree Requirements
Students are required to complete 72 credits of course work, of which no more than 24 may be dissertation credits. 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. Students must pass comprehensive exams in microeconomics and macroeconomics. In addition, students must pass field exams in two of the fields listed below. Exams are usually given in August and January. Students who enter with a master's degree in economics may have their credit requirement reduced by up to 30 credits at the department's discretion. Credit is not given for comprehensive and field exams from other universities.

All doctoral students must take a year of microeconomic theory (ECON 811 and 812), a year of macroeconomic theory (ECON 715 and 816), mathematical economics (ECON 630), and econometrics (ECON 637). Also required are two courses beyond the other required courses in each of the student's two chosen fields in preparation for field exams.

A typical first-year program of study for a full-time doctoral student includes ECON 630, 715, and 811 in the fall; ECON 637, 812, and 816 in the spring; and microeconomics and macroeconomics comprehensive exams in August. A typical second-year program includes Field 1 and Field 2 in the fall; Field 1 (continued) and Field 2 (continued) in the spring; and field exams in August.

If possible, part-time students should arrange their work schedules so they can take two courses per semester in the first year. Doctoral students may not enroll at the Arlington Campus for their required theory and mathematics courses.

Subject to course availability, the department offers exams in the following fields of study: Austrian economics, constitutional and institutional economics, industrial organization, international trade and finance, law and economics, monetary theory, public choice, and public finance. The department also offers a focus in experimental economics, the application of the laboratory method to test the validity of various economic theories and new market mechanisms. Students should consult the director of the doctoral program and director of the Interdisciplinary Center for Economic Science for program details.

A new joint JD/PhD program with Mason's School of Law is now available. Please contact the department chair for details or go to 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, Klappert, Lathbury, Lowry, Nadeau, Pankey
Associate professors: Albanese, Amiri, Anderson, Atkinson, Burr, Clark, Foreman, Fuchs, Gallehr, Holisky, Jones, Kaplan (chair), Kaufmann, Keaney, Katebirch, Matz, Mobley, Rutledge, Tichy, Trafton, Weinberger, Yadav, Yocom
Assistant professors: Eisner, Harvey, Hawk, Reid, Roan, Sample, Shatika, Zawacki
Term assistant professors: Berg, DeNys, King, Koch, Matthews, Michals, Miller, Nanian, Samuelien, Saunders, Scott, Taciuch, Thompson, Williams, Young
Term instructors: Beach, Raffel, Sclaro
Adjunct assistant professors: DeFazio, Dreisonstok, Fowler, Guss, 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, and LING 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
In addition to university-wide general education requirements and college-level requirements for the BA degree in CHSS, English majors must complete 30 credits (nine courses) in English beyond ENGL 302 with a minimum GPA of 2.00. Students must achieve a GPA of 2.00 in the courses counting toward the English major. The 30 credits are distributed as follows:

- 6 credits of ENGL 325 Dimensions of Writing and Literature, with a minimum grade of C (2.00)
- 12 credits in one of the following concentrations (see the English Department for requirements for each concentration): American literature; creative writing; cultural studies; drama; fiction; film and media studies; folklore, mythology, and literature; linguistics; medieval and renaissance literature; modern British literature; nonfiction writing and editing; poetry; world literature
- 12 credits of core courses, distributed as follows:
  - 3 credits in literature before 1800 (may simultaneously satisfy a concentration), satisfied by 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
  - 3 credits in literature before 1915 (may simultaneously satisfy a concentration), satisfied by courses listed above; by ENGL 368, 370, 406, 407, 423, 425, 436, 452, and 453; and by special topics courses as approved by the department
  - 3 credits in minority, folkloric, or popular literary and cultural traditions (may simultaneously satisfy a concentration), satisfied by ENGL 333, 334, 349, 350, 368, 369, 370, 371, 372, 439, 491, 492, and 493, and by special topics courses as approved by the department

Students should consult an English Department advisor to learn about 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:

- One introductory course in literary criticism, as appropriate for the student’s focus: ENGL 325, FREN 381, or SPAN 311
- CL 300 Introduction to Comparative Literature (if offered) or an approved alternative
- Two courses in English or American literature
- 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
- 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, 437, and 493; various 300-level CLAS courses; FRLN 330 courses; and appropriately selected special topics courses in ENGL, FREN, GERM, RUSS, SPAN, or other language.)
- CL 514 Theories of Comparative Literature

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 and submit the work from both courses for consideration.
- 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, submitting only the honors thesis for consideration.
- 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, submitting only the honors thesis for consideration.
- 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, submitting only the honors thesis for consideration.

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 and the 3-credit college level requirement in literature. To receive the minor, students must satisfactorily complete 18 credits above ENGL 302 (6 credits), three courses in a concentration listed under the English major or three courses that satisfy the core requirements for the major (9 credits), and an elective (3 credits).

The minor must be approved by the English Department undergraduate advisor before graduation. 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 in the minor complete 18 credits of course work distributed as follows:

- Five required courses (15 credits)
  - LING 322 English Grammar
  - LING 326 General Linguistics
  - LING 521 Applied Linguistics: Teaching English as a Second Language
  - LING 523 Descriptive Aspects of English Phonetics and Phonology
  - LING 582 Second Language Acquisition
- One elective course (3 credits) chosen from the following:
  - ANTH 114 Introduction to Cultural Anthropology
  - COMM 305 Foundations of Intercultural Communication
  - ENGL 327 Introduction to Cultural Studies
  - LING 485 Semantics and Pragmatics
  - LING 486 Syntax I
  - LING 490 Generative Phonology
  - LING 499 Independent Study
  - LING 525 Practicum in ESL
  - 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.

**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 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.

**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.

**Accelerated Master’s Program in Linguistics**

Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain both a BA and an
MA in English: 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 (including an optional track in cultural studies), professional writing and editing, 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 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 the teaching of English as a second language (TESL, 18 credits), a certificate in professional writing and editing (18 credits), and courses as part of the PhD in education.

English, MA

Admission 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 literature, professional writing and editing, 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 editing 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 must successfully complete 30 credits in graduate English courses. One of the concentrations described below must be completed. 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 Literature
• ENGL 701, usually in the first semester of study
• 3 credits in critical theory chosen from ENGL 514, 551, 675, 676, or 705
• 24 credits of literature
• A maximum of 6 credits outside the department with permission of the graduate director
• Thesis optional: 6 credits of ENGL 799 and thesis may substitute for 6 credits of literature
• Foreign language proficiency as described in degree requirements above

Track in Cultural Studies
English students planning to apply to the PhD in Cultural Studies Program should pursue the literature concentration of the MA in English and make the following modifications to the above requirements:
• 3 credits in ENGL 676 (fulfills theory requirement)
• 6 credits from the following list (substitutes for 6 credits of literature):
  - ENGL 551, 555, 665, 670, 675, 685 (may be repeated once with permission), 705 (may be repeated once with permission), or 740 (may be repeated once with permission)
• 3 credits of CULT 802 (May not be taken before ENGL 676; completion of at least 24 credits of the degree required.)

Concentration in Professional Writing and Editing
• 3 credits in ENGL 501 Introduction to Professional Writing and Editing (usually in the first semester of study)
• 3 credits in research methodology, either ENGL 506 or ENGL 701
• 12 credits in professional courses and nonfiction writing 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 799 Thesis
• Foreign language proficiency as described in the degree requirements above

Concentration in the Teaching of Writing and Literature
• ENGL 701 (usually in the first semester of study)
• 6 credits in writing courses
• 6 credits of literature
• 3 credits in linguistics
• 3 credits in the teaching of writing and 3 credits in the teaching of literature
• 3 credits in composition theory: either ENGL 697 or an appropriate section of ENGL 611
• 3 credits of electives from literature or writing (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 in the degree requirements above

Concentration in Linguistics
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).
Creative Writing, MFA

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 must successfully complete 48 graduate credits, distributed as follows:

- 12 credits in literature
- 12 to 18 credits of writing seminars in one genre, including Form of Poetry, Form of Fiction, or Forms of Nonfiction, and at least 3 credits of Advanced Workshop (ENGL 750, 751, or 752)
- 3 to 9 credits in other genres
- 6 credits in thesis (Thesis credits may be taken in the summer term only with permission of the thesis committee)
- Up to 9 credits of electives chosen in consultation with the writing program faculty
- ENGL 699 Workshop in English (1 credit)
- For MFA students in the nonfiction concentration, 3 credits of ENGL 506 (Students should enroll in ENGL 506 the first semester it is offered after they enter the program).

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 18 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 Teaching English as a Second Language

The Teaching English as a Second Language (TESL) certificate prepares students to teach nonnative 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.

Admission 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 must complete six courses distributed as follows, earning a grade of 3.00 or better in each:

- ENGL 520, 521, 522, 523, 525, and 582

Certificate in Professional 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**

Certificate candidates must complete 18 credits of English graduate courses, earning a grade of B or better in each, distributed as follows:

- One course in editing or publications writing: ENGL 503 or 505
- One course in writing in organizational settings: ENGL 506 or 612
- One course in nonfiction writing: ENGL 565, 611, 613, or 616
- One course in nonfiction literature (Each year, the English Department designates sections that fulfill this requirement from among ENGL 513, 660, and 685.)
- One course in research: ENGL 506 or 701
- One elective chosen from any of the courses listed in the above bullets

Students must have a minimum GPA of 3.00 in course work presented on the certificate application.

**Global Affairs**

Phone: 703-993-9185
Web: globalaffairs.gmu.edu

**Administration**

Bockman, Christensen, Dudley, Jones, Lukacs, Mandaville, Paczynska, Robers, Smith, Sussan, Vallas, 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, students majoring in global affairs must complete 36 credits distributed as follows.

  - Six required 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 intermediate-level proficiency (Intermediate-level proficiency is demonstrated by completing a course in a foreign language course numbered 210 or achieving a satisfactory score on an approved proficiency test. After demonstrating intermediate-level proficiency in one foreign language, global affairs majors must complete either 9 credits beyond 210 conducted in that foreign language or 9 credits conducted in any foreign language.)

  Students must have a minimum grade of C (2.00) 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 2.00 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.

- **Approved 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**
  BIOL 301, 371; EVPP 110, 336, 377; GEOG 303, 311; GEOL 309; TOUR 312, 340

  **Global Communications and Technology**

  **Global Economy and Management**
  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**
  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  
ADJ 405; ANTH 365, 488; ECON 321; GEOG 304, 318, 414, 446, 448; HIST 366; NCLC 304, 424; SOCI 307, 308, 315, 401, 475; WMST 100

International Development  
ANTH 331, 333; ECON 360, 361, 362; GEOG 303; GOVT 434, 445, 446; HSCI 150; HEAL 350; NCLC 401; PHIL 429; SOCI 350, 351, 475; TOUR 340

World Arts  
ARTH 203, 362, 380, 382, 383, 384, 385, 394; AVT 372; CHIN 311, 320; CL 300, 514; DANC 391, 418 (1–3 credits); ENGL 334, 349, 350, 380, 439; FREN 325, 378, 451, 452, 470; FRLN 330; GERM 325, 340, 451; JAPA 320; RUSS 325, 340, 451; JAPA 320; SPAN 321, 325; THR 359

By World Region  
Africa  
ARTH 380; FREN 451; GOVT 430; HIST 261, 262, 335, 336, 466, 565

Asia  
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  
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  
ANTH 302, 385; ECON 361; GEOG 316; GOVT 331; HIST 271, 272, 364, 365, 525

Middle East and North Africa  
ARTH 319, 320; FREN 453; GEOG 325; GOVT 332; HIST 282, 461, 465, 585; RELI 211

North America  
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  
GEOG 330; GOVT 338, 340, 447; HIST 329; RUSS 325, 327, 354, 470

Individualized Concentration  
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. To receive a minor in global affairs, students must complete 15 credits of course work: GLOA 101 or SOCI 120, CULT 320, ECON 385, GOVT 322 and CONF 340 or EVPP 337. For policies governing all minors, see the Academic Policies chapter of this catalog.

Higher Education  
Phone: 703-993-2310  
Web: highered.gmu.edu

Faculty  
Czarda, Gentemann, Kidd, Kuhta, Lucas (interim director), Lyne, J. Muir, S. Muir, O’Connor, Rossell

Course Work  
This program offers all course work designated CTCH in the Course Descriptions chapter of this catalog.

GRADUATE PROGRAMS  
■ Community College Teaching, MAIS  
See the Interdisciplinary Studies (MAIS) chapter for information. The concentration qualifies students to teach entry-level courses in growing fields at the community college.

■ Higher Education, MAIS  
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 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.

Admission  
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 in a knowledge area offered by the participating departments and schools, and submit a writing sample appropriate to the knowledge area, three letters of recommendation, and a résumé. While GRE or GMAT
scores are not required, they represent valuable support for admission decisions.

Degree Requirements
Students must complete a minimum of 60 credits beyond the master’s degree, distributed as follows:
- 24 credits in a knowledge area
- 18 credits in the education core: CTCH 601, 602, 603, 604, and 605; 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 the dissertation is submitted to and accepted by University Libraries. Unless defending in the summer, students do not need to be registered during the summer sessions.

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 a minimum of 18 credits of core requirements, including CTCH 601 and 602 and 3 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 200 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 program director; any modifications require the student to file a revised program of study.

Candidate 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
After students complete all course work and internships, pass candidacy exams, and have an appointed dissertation committee and a signed proposal, they are, with the recommendation of the committee, advanced to candidacy by the dean.

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. This research can be theoretical in nature, focusing on pedagogy, the knowledge area, or a combination of both. Students who focus their dissertation in the knowledge area must include at least a chapter that shows how results of the dissertation research may be applied to undergraduate education. Dissertations may also 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 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 Community College Education
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.

Admission Requirements
Admission requirements for the certificate are the same as for the doctoral program. Applicants may hold a master’s degree or be completing a master’s degree, and do not need to specify a knowledge area in their goals statement.

Certificate Requirements
Students must complete 18 credits distributed as follows.

- 12 credits of CTC 601, 602, 603, 604
- 3 credits of an elective, chosen in consultation with an advisor and with approval of the program director
- 3 credits of internship CTC 885

History and Art History
Phone: 703-993-1250
Web: historyarthistory.gmu.edu

Faculty
Fried Professor: Rosenzweig (history)
Mathy Professor: Mattusch (art history)
Robinson Professors: Bakhash, Wilkins (history)
Professors: J. R. Censer (dean), J. T. Censer, Holt, Horton, Levine, Petrik, Stairs (provost), Stewart, Wade, Zagarri (history); ffolliott (art history)
Associate professors: Carton, Copelman, Deshmukh (chair), Hamdani, Karush, Landsberg, Lytton, O’Malley, Platt, Smith (history); Butler, DeCaroli (director), Todd (art history)
Assistant professors: Barnes, Bottoms, Bristol, Chang, D. Cohen, M. Cohen, Collins, Hamner, Hawkes, Kelly, Lair, Manuel-Scott, Schrag, Scully, Verhoeven (history); Greet (art history)
Term faculty: Greenberg, Leon, McCord, Oren, Scheinfeldt, Schram (history); Gregg, Richardson (art history)
Postdoctoral teaching fellows: Gayne, Lipp, Olsen, Romaniello, Rushford, Specter, Szeleny

Course Work
This department offers all course work designated HIST and ARTH in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

History, BA
In addition to satisfying university general education requirements and requirements for the BA degree in CHSS, candidates for a degree in history 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:

- 6 credits of U.S. history
- 6 credits of European history (3 credits fulfilled by the university-wide requirement HIST 100)
- 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.)
- 3 credits of HIST 300 Introduction to Historical Method, with a minimum grade of C (2.00)
- 3 credits of HIST 499 Senior Seminar in History (fulfills university synthesis requirement)
- 12 credits of history electives (at the 300 or 400 levels if necessary to complete the 18-credit, upper-division 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
To receive the minor, students must complete 18 credits in history, including 12 credits at the 300 and 400 levels, and 9 credits concentrated in a region or topic related, if possible, to the student’s major, with a minimum 2.00 GPA. The program must be approved by the undergraduate director before graduation. A GPA in history courses of at least 2.00 is required.

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 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.

■ 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.

In addition to satisfying university-wide general education requirements and requirements for a BA degree in CHSS, students must complete 33 to 34 credits with a minimum GPA of 2.00. These requirements include 30 credits of ARTH and 3 to 4 credits of studio art (AVT), distributed as follows:
• 3–6 credits in ARTH at the 100 or 200 level, including 3 credits from ARTH 200, 201, 203, or 204
• 3 credits of ARTH 394 (fulfills university synthesis requirement)
• 15–18 additional credits of ARTH at the 300 level
• 6 credits of ARTH at the 400 level or above, including 3 credits from ARTH 400, 420, 430, 440, 460, 471, 472, or 482
• 3–4 credits in AVT: 103, 104, 392 or others with permission of the department

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 33–34 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 requires 18 credits with a minimum GPA of 2.00 and covers a broad spectrum of periods, cultures, and themes, with an emphasis on historical context. Requirements for the minor are as follows:
• 3–6 credits of 100- or 200-level art history courses
• 12–15 credits of 300- or 400-level art history courses

ARTH 394 is not required for the minor but is strongly encouraged.

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 four 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
Within the first three concentrations listed below, students must specialize in American history, modern European history, or world history. Requirements for all concentrations include the following:
• Minimum of 30 credits (36 credits in the teaching concentration) with a GPA of at least 3.00
• HIST 610 The Study and Writing of History (3 credits), taken within the first 9 credits
• Except in the teaching concentration, a comprehensive readings course (HIST 790, 791, or 792) designed by the student and a professor and taken during the last semester of course work. (The course is used to round out general historical knowledge and prepare students for the comprehensive exam.)
• 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.)
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 Themes in U.S. History I, II, and 605, 606 Themes in European History I, II). If required as foundational, these credits cannot be applied toward the 30 credits required for the degree (36 credits in the concentration in teaching).
If foundation courses are not required at admission, students in the concentrations in enrichment (Track III) and teaching (Track IV) may apply one of the themes courses toward their degree. Students in the other concentrations may not apply these courses toward their degree.

Concentration in Predoctoral History, or Predoctoral History with a Cultural History Emphasis
This concentration is for students planning to continue into doctoral studies. In addition to HIST 610, it requires the following:
• 15 credits in the area of specialization (American history, modern European history, or world history), including a research seminar and the comprehensive readings course. The comprehensive readings course for students in this concentration generally requires reading beyond what is required in the other concentrations.
• 6 credits of electives
• 6 credits in HIST 799 Thesis or 3 credits in HIST 798 Directed Research and Writing in History (HIST 798 requires the completion of a major paper that is a substantial and original contribution to historical knowledge on the model of an article in a scholarly journal. If the major paper option is chosen, students must complete an additional 3 credits in the major field.)
• Reading proficiency in a modern foreign language, as demonstrated by course work or an exam
The cultural history 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 directly. In addition to HIST 610, the cultural history emphasis requires the following:
• 15 credits in the area of specialization (American history, modern European history, or world history), including a research seminar (The comprehensive readings course for students in the cultural history emphasis generally requires additional reading similar to that in the predoctoral concentration.)
• CULT 802 Histories of Cultural Studies
• Course in approaches to cultural history
• 3 credits in HIST 798 Directed Research and Writing in History on a topic in cultural history
• One additional course from outside the area of specialization, containing a significant cultural history component as defined by the instructor
• Reading proficiency in a modern foreign language, as demonstrated by course work or examination

Concentration in Applied History
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. In addition to HIST 610, this concentration requires the following:
• 15 credits in the area of specialization (American history, modern European history, or world history), including a research seminar and the comprehensive readings course
• 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

Concentration in Applied History with New Media and Information Technology Emphasis
In addition to HIST 610, this concentration requires the following:
• 15 credits in the area of specialization. (American history, modern European history, or world history), including a research seminar and the comprehensive readings course
• 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

Concentration in Enrichment
This concentration is for students who want to study history for intellectual self-fulfillment or for vocational reasons. It allows more flexibility in the selection of courses, and does not require a foreign language. In addition to HIST 610, this concentration requires the following:
• 15 credits in an area of specialization (American history, modern European history, or comparative world history), including a research seminar and the comprehensive readings course
• 12 credits of electives
Six credits of thesis work are optional. If a thesis is elected, 3 credits in the major and 3 credits in electives are assigned to it.
Concentration in Teaching
This concentration is intended for students already licensed for teaching or seeking licensure. Unlike the other three concentrations, it requires a minimum of 36 credits and does not include the comprehensive readings course. Although it includes course work in history and education, completion of this concentration alone is not sufficient to qualify for licensure. That 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. In addition to the general MA in history requirements, this concentration requires the following:

- 24 credits in history, including 3 credits in HIST 610 The Study and Writing of History; at least 3 credits each from U.S., European, and non-Western history course offerings; and one research seminar
- 12 credits in graduate education courses, including EDCI 567

Art History, MA
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 preprofessional 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.

Admission
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:

- Resume 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
- 30 credits of course work distributed as follows:
  - ARTH 600 (3 credits), an introductory seminar
  - 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:
    - 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
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/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.

Admission 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 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.

- 6 core courses: (21 credits) distributed as follows:
  HIST 610 The Study and Writing of History (3 credits)
  HIST 696 Clio Wired: An Introduction to History and New Media (3 credits)
  HIST 697 Creating History in New Media (3 credits)
  HIST 711/731/751 Research Seminar in U.S. History/ European History/ Comparative World History (3 credits)
  HIST 810 History Doctoral Colloquium (1 credit per semester for 6 credits)
  HIST 811 Doctoral Research Seminar (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).

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, Heclo, Hodges, M. Holt, Jacobs, Jann, Johnsen-Neshati, Jones, Karush, Koch, Kulesza, Leeman, Maloney, Mandaville, Mandes, Mattusch, McFerson, Metcalf, L. Miller, Nadeau, Nichols, J. Paden, Palkovich, Ramos-Pellicia, Roan, Roman-Mendoza, Reid, Rutledge, Sachs, Sample, Samuelian, Seligmann, Shutika, V. Smith, C. Snyder, Stearns, Taciuch, Tangney, Taylor, Todd, Trevil, 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
This program provides highly qualified students with an integrated foundation for future studies. It consists of a challenging interdisciplinary curriculum that satisfies university-wide general education requirements for graduation and prepares students for their majors. Although administered by CHSS, the program is open to students from all undergraduate schools and colleges. Courses are intended for students who are willing to cross traditional disciplinary boundaries and make connections that transcend the limits of conventional subjects. Through intensive discussion in small classes led by outstanding faculty members, students learn to probe the foundations of knowledge; develop new skills in addressing complex issues; and think independently, imaginatively, and ethically. The program 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 with the faculty and a commitment to lifelong learning.

Admission
Admission is limited and competitive. Applicants are evaluated on the strength of their entire academic record, including the rigor of the high school curriculum, GPA, and standardized test scores. There is no separate application process. Admission is by invitation only.

Requirements
Not a major in itself, the honors program fulfills a core of general education requirements for every major. To receive honors recognition on their transcript, students must earn a minimum GPA of 3.00 in those 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
M. Eugenia (“Jenny”) Verdaguer, Director

Bachelor of Individualized 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 accumulated at least 30 college-level credits, 15 of which must have been earned through conventional classroom instruction.

Application and Acceptance

After obtaining admission to the university, students interested in the program must attend a BIS information session and submit a separate application to the BIS Program. The BIS application is available online at the program web site. Admission is selective and based on a minimum GPA of 2.50 on previous course work.

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 in Educational Psychology

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 apprehend and internalize knowledge. Students in this concentration take a classroom-based synthesis course instead of developing a senior capstone project.

Eligibility Requirements

Admission to this concentration requires a separate application to the program. In preparation for this program of study, students must meet a prerequisite of 6 credits in PSYC (including PSYC 100).

Concentration Requirements

In addition to the university requirements for BIS students given above, students receiving this concentration must complete:

- 4 credits of BIS course work: UNIV 300 (1 credit) and BIS 490 (classroom-based synthesis course)
- 30 credits of interdisciplinary course work, including EDUC 301, EDUC 302, EDUC 422 or 472, EDUT 411, EDUT 413 or 414, PSYC 211, PSYC 313, PSYC 309 or 317, PSYC 314 or NCLC 312 and PSYC 321 or 325.

BIS in Early Childhood Education Studies

This concentration offers students holding a Northern Virginia Community College (NVCC) 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.

Eligibility 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 receiving this concentration must complete the following:

- 7 credits of BIS course work: BIS 390, BIS 490, and BIS 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, EDUC 413 or 414, EDUC 423 or 424
• 15 credits leading to a minor in business: MSOM 300, 301, 303, 304, 305

Note that students in this concentration fulfill all university general education requirements and not the more flexible version outlined above. Instead of a minor in business, students may opt to pursue an appropriate alternative minor with prior written approval of the BIS director. In pursuing another minor, students may need to complete other requirements that would have been satisfied through the specific minor in management.

Students who transfer out of the BIS in early childhood education concentration will need to fulfill additional general education and possibly college level requirements and will lose transfer credit brought in under this program.

BIS Individualized Concentrations

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 receiving an individualized concentration complete
• 10 credits of BIS course work: BIS 300, BIS 390, BIS 490, and BIS 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.
• 24–26 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.

1. 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).

2. 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 example, if 45 credits are accepted by ACE-approved training, a maximum of 15 credits can be accepted for the exam.

3. Experiential learning demonstrated by portfolios subject to approval by the program director and the dean (30 maximum credits)

4. 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.

Accelerated Master’s Program in TCOM

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. For policies governing all minors, see the Academic Policies chapter of the catalog.
African American Studies

Faculty
Brightey, Carbonneau, Carton, Cherubin, Clark, Dennis, Faunroy, Fuchs, Haley, Horton, Johnson, Lepore, Levine, Manuel-Scott, Miller, Mobbey, Paden, Richards Jordan, Smith, Stewart, Trafon, Travis (director), Weatherspoon, Wilkins

Course Work
The African American Studies Program offers all course work designated AFAM in the Course Descriptions chapter of this catalog.

African American studies is an interdisciplinary field that examines the cultural, historical, economic, and political dimensions and experiences of people of African descent in America, the Caribbean, Africa, and around the world. It introduces students to methodologies for examining the complex dynamics of race, class, gender, and ethnicity in America and enables them to develop critical and analytical approaches to address contemporary issues in African American life and culture.

Requirements
The interdisciplinary minor in African American studies requires a minimum of 21 credits of related course work with a minimum GPA of 2.00 distributed as follows:

- Four required courses
  AFAM 200 Introduction to African American Studies
  AFAM 499 Independent Study
  One of the following:
  ENGL 368 Beginnings of African American Literature through 1865
  ENGL 370 African American Literature: Reconstruction to 1903
  ENGL 371 African American Literature through 1946
  ENGL 372 Contemporary African American Literature
  HIST 335 The African American Experience in the United States: African Background to 1885
  or
  HIST 336 The African American Experience in the United States: Reconstruction to the Present

- Three elective courses chosen from
  AFAM 490 Internship
  DANC 118 World Dance
  FREN 451 Sub-Saharan African Literature
  FREN 454 Caribbean Literature in French
  GEOG 325 Geography of North Africa and the Middle East
  GOVT 464 Issues in Public Policy and Administration
  HIST 130 History of the Modern Global System
  HIST 261 Survey of African Civilization to the 1900s
  HIST 262 Africa Since 1800: Legacies of Colonialism and Liberation
  HIST 340 History of American Racial Thought
  HIST 418 Ethnic Groups in America
  HIST 466 Origins of Conflict in Southern Africa
  SOCI 308 Sociology of Race Relations and Minorities
  SOCI 413 Seminar in Social Issues
  SOCI 523 Racial and Ethnic Relations: American and Selected Global Perspectives
  UNIV 190 Echoes of Slavery
  UNIV 290 The Quest for Racial Justice
  Other electives may be approved in advance by the director.

Ancient Mediterranean Art and Archaeology

Faculty
Butler (coordinator), Cherubin, Lytton, Mattusch, Winkler

Course Work
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.

Requirements
Students in this minor 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 CLAS 150, 160; or 3 credits of course work in ancient literature chosen from ARTH 102; CLAS 250, 260; RELI 211
- 6–9 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)
- 3–6 credits of practicum: a museum course (ARTH 394/395); 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)

Asia-Pacific Studies

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.

Requirements
Students must complete a minimum of 21 credits distributed as follows.

- Three required courses (9 credits):
  GOVT 333 Government and Politics of Asia
  HIST 251 and 252 Survey of East Asian History
  other

Other electives may be approved in advance by the director.
**Film and Media Studies**

**Phone:** 703-993-2768

**Faculty**

Christensen, Fuchs (director), T. Gibson, A. Landsberg, Lont, Ricouart, Roan, Sample, Scarlata, 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.

**Requirements**

Students must complete 18 credits distributed as follows.

- **Two required courses (6 credits):**
  - ENGL 332 Introduction to Film (offered every semester, including summer)
  - COMM 380 Media Criticism (offered every semester)

- **Four electives (12 credits), chosen from:**
  - ANTH 306 Peoples and Cultures of Island Asia
  - ANTH 311 Peoples and Cultures of Mainland Southeast Asia
  - ARTH 320 Art of the Islamic World
  - ARTH 382 Arts of India
  - ARTH 383 Arts of Southeast Asia
  - ARTH 384 Arts of China
  - ARTH 385 Arts of Japan
  - GOVT 433 Political Economy of East Asia
  - GOVT 444 Issues in International Studies (if topic is on Asia)
  - GOVT 490 Seminar (if topic is on Asia)
  - HIST 353 History of Traditional China
  - HIST 354 Modern China
  - HIST 356 Modern Japan
  - RELI 314 Chinese Philosophies and Religious Traditions
  - RELI 315 The Buddhist Tradition
  - RELI 337 Mysticism: East and West
  - RELI 376 Special Topics in Religious Thought (if topic is on Asia)

Other electives are possible, including approved study abroad or internships with prior approval of the coordinator. Language courses in Chinese or Japanese are strongly recommended.

**Folklore and Mythology**

**Phone:** 703-993-1172

**Faculty**

Burns, Decaroli, ffolliott, Fuchs, Johnsen-Neshati, Mattusch (co-coordinator), 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.

**Requirements**

Students must complete 6 courses (18 credits) with a minimum GPA of 2.00 chosen from three groupings given below. If any 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 Symbols and Stories in Art
  - CLAS 250 Classical Mythology
  - RELI 100 The Human Religious Experience

- **Four electives (12 credits) chosen from:**
  - COMM 302 Foundations of Mass Communication
  - COMM 350 Mass Communication and Public Policy
  - COMM 355 Video I: Principles and Practices
  - COMM 358 Video II: Producing and Directing (prerequisite: COMM 355)
  - COMM 360 Video II: Video Editing (prerequisite: COMM 355)
  - COMM 365 Women and Media
  - COMM 366 Visual Communications
  - COMM 452 Media Production Practicum (prerequisite: COMM 355)
  - COMM 456 Comparative Mass Media
  - ENGL 327 Introduction to Cultural Studies*
  - ENGL 331 Introduction to Documentary
  - ENGL 334 Literary Approaches to Popular Culture*
  - ENGL 338 Cultural Constructions of Sexuality*
  - ENGL 421 Topics in Film History**
  - ENGL 422 Topics in Film Theory**
  - ENGL 490 Special Topics in Film**
  - ENGL 493 Special Topics in Popular Literature*
  - ENGL 499 Independent Study*
  - FREN 470 Topics in French Cinema***
  - JAPA 320 Japanese Cinema
  - RUSS 470 Topics in (Post) Soviet Film

* Requires prior written approval of FAMS coordinator
** May be repeated if topic is different
*** With permission of instructor and approval of FAMS coordinator
Four or five courses from Group 2 (12–15 credits):
ANTH 418 Women’s Life History
ANTH 427 Historic Cemetery Survey
ANTH 450 Qualitative Methods in Sociocultural Research (note ANTH prerequisites)
ARTH 319 Art and Archaeology of the Ancient Near East
ARTH 321 Greek Art and Archaeology
ARTH 322 Roman Art and Archaeology
ARTH 382 Arts of India
ARTH 384 Arts of China
ARTH 385 Arts of Japan
CLAS 340 Greek and Roman Epic
CLAS 350 Greek and Roman Tragedy
ENGL 311 Writing Ethnography
ENGL 333 Folklore of the Americas
ENGL 337 Special Topics in Myth and Literature
ENGL 491 Special Topics in Folklore
ENGL 498 Internship: Special Topics: Folklore
ENGL 591 Special Topics in Folklore
RELI 351 Religions of the Ancient Near East
RELI 401 Death and the Afterlife in World Religions
RELI 408 Ritual and Drama in Global Regions

Up to one course from Group 3 (0–3 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.

Global Systems
Phone: 703-993-1400

Faculty
Harbour (coordinator)

Requirements
The program 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.

• 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 Law and Justice around the World
GEOG 101 Major World Regions
GEOG 301 Political Geography
GEOG 303 Conservation of Resources and Environment
GEOG 304 Geography of Population

GEOG 305 Economic Geography
GOVT 132 Introduction to International Politics
GOVT 348 Competencies for the Global Arena
GOVT 349 Issues in the Analysis of Global Systems
GOVT 444 Issues in International Studies

Field B: Economics, anthropology, marketing, history, and sociology
ANTH 300 Civilizations
ANTH 312 Comparative Political Systems
ANTH 331 Refuges
ANTH 333 Humanitarian Action
ANTH 375 Anthropological Perspectives on History
ECON 360 Economics of Developing Areas
ECON 361 Economic Development of Latin America
ECON 380 Economics in Transition
ECON 390 International Economics
HIST 125 Introduction to World History
HIST 130 History of the Modern Global System
HIST 387 Topics in Global History
MKTG 407 International Business
SOCI 332 Sociology of Urban Communities

Field C: Environmental science, global health, systems engineering, urban and suburban studies, civil and infrastructure engineering
BIOI 307 Ecology
BIOI 377 Applied Ecology
CEIE 100 Environmental Engineering around the World
CEIE 450 Environmental Engineering Systems
CEIE 455 Introduction to Environmental Engineering
CEIE 456 Environmental Law
EVSC 206 Environmental Science II
GCH 543 Global Health: Trends and Policy
SYST 201 Discrete Dynamic Systems Modeling
USST 301 Urban Growth in a Shrinking World

Field D: Modes of communication
COMM 305 Foundations of Intercultural Communication
COMM 456 Comparative Mass Media
COMM 656 Global Communication
DANC 118 World Dance
MUSI 431 Music History in Society
THR 359 World Stages

Islamic Studies
Phone: 703-993-1261

Core Faculty
Amireh, Dakake, Hamdani (coordinator), Mandaville

Affiliated Faculty
Bakhash, Butler, DeCaroli, Hilmi, Katz, Lukaecs, 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.

Requirements
Students complete 21 credits distributed as follows:

• Three core courses (9 credits):
GOVT 345 Political Islam
HIST 281 Survey of Middle Eastern History
RELI 272 Islamic Religious Life
• Three elective courses (9 credits) chosen from:
  ANTH 309 Peoples and Cultures of India
  ANTH 311 Peoples and Cultures of Mainland Southeast Asia
  ARTH 320 Art of the Islamic World
  ARTH 382 Arts of India
  FREN 453 Francophone Literature from North Africa
  GEOG 325 Geography of North Africa and the Middle East
  GEOG 330 Geography of Soviet Succession States
  GOVT 328 Non-Western Political Theory
  GOVT 332 Government and Politics of the Middle East and North Africa
  HIST 282 Survey of Middle Eastern History
  HIST 462 Women in Islamic Society
  HIST 465 Middle East in the 20th Century
  RELI 374 Islamic Thought
  RELI 375 Qur’an and Hadith
• One course (3 credits) in a foreign language of any country with a significant Muslim population, such as Arabic. (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 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.

■ Certificate in Islamic Studies
The certificate is for those seeking academic or professional enhancement through basic knowledge about Islam. A bachelor’s degree in any field is a prerequisite. The certificate requires a minimum of 9 required credits and 9 elective credits. Electives may include language credits. Credits taken for the minor cannot be applied toward the certificate.

■ Latin American Studies
See the Latin American Studies section of this chapter for a description of the minor.

■ Linguistics
Faculty
Chamberlain, Goldin, Holisky, Jones, Leeman, Levine, 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.

Requirements
Students 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

■ Multimedia
Faculty
Cambridge, Chung, Forche, Higgins, Lont, Martin, O’Connor, L. Smith (co-coordinator), Weinberger, White, Windmueller

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.

Requirements
Students complete 18 to 20 credits distributed as follows:
• 9–10 credits of core courses:
  AVT 104 Studio Fundamentals I (4 credits)
  COMM 157 Video Workshop
  And one of the following:
  AVT 180 or CAS 101 Computers in the Creative Arts (3 credits)
  NCLC 249 Internet Literacy (4 credits)
• 8–9 credits of electives with no more than 6 elective credits in any one college or department:
  AVT 280 Digital Arts I (4 credits)
  AVT 381 Digital Arts II (4 credits)
  COMM 355 Video I: Principles and Practices (3 credits)
  NCLC 345 Introduction to Multimedia (5 credits)
  NCLC 445 Multimedia Design (5 credits)
  ENGL 497 Special Topics in Creative Writing: Hypertext Poetry and Web Publishing (3 credits)

■ The New Europe
Coordinator
Desmond Dinan, School of Public Policy

Students receiving this minor must complete a minimum of 18 credits, distributed as follows. 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.
• One required course (3 credits):
  GOVT 334 Government and Politics of Europe or GOVT 444 Issues in International Studies (with prior approval of the coordinator)
• Five electives (15 credits), at least one from each field:
  **Field A: History, geography, and politics**
  GEOG 320 Geography of Europe
  GOVT 334 Government and Politics of Europe (if not taken as the required course)
  GOVT 337 Ethnic Politics in Western Europe and North America
  GOVT 338 Government and Politics of Russia and Central Eurasia
  HIST 314 History of Germany
  HIST 322 Modern Britain
  HIST 329 Modern Russia and the Soviet Union
  RUSS 354 Contemporary Post-Soviet Life

  **Field B: Language, literature, and the arts**
  ARTH 362 Twentieth-Century European Art
  FREN 441 Twentieth-Century Prose Fiction
  FREN 442 Twentieth-Century Drama and Poetry
  FREN 470 Topics in French Cinema
  FREN 580 Contemporary French Society and Culture
  GERM 451 Modern Literature: 1925 to the Present
  GERM 580 Contemporary Germany
  PHIL 336 Contemporary Continental Thought: Existentialism
  SPAN 484 Literature of Spain II
  SPAN 580 Contemporary Hispanic Institutions

### Nonprofit Studies

**Faculty**
Benjamin, Sacco, Smith (coordinator), Toepker

NCC and the Department of Public and International Affairs coordinate the minor in nonprofit studies.

The interdisciplinary minor in nonprofit studies provides basic skills and knowledge of nonprofit organization resource development, activities coordination, governance relations, and services that enable one to effectively perform the duties of an entry-level nonprofit organization administrator. On completion of the minor, students know the public-serving responsibilities, basic fund-raising techniques, resource management tools, nonprofit financial accounting skills, and performance requirements of a private, nonprofit, charitable organization professional.

**Requirements**

Students must complete 15 credits, distributed as follows.

- Three required courses (12 credits):
  - GOVT 358 Nonprofit Financial Planning and Accounting (4 credits)
  - NCLC 331 The Nonprofit Sector (4 credits)
  - NCLC 431 Principles of Fund Raising and Resource Development (4 credits)

- One elective (3 credits), chosen from the following:
  - GOVT 351 Administration in the Political System
  - GOVT 359 Computers in Public Management
  - MSOM 301 Managing People and Organizations
  - MSOM 303 Marketing in a Digital World
  - SOCI 492 Complex and Alternative Organizations
  - SOCW 352 Social Policy and Social Justice II

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.

### Experiential Learning

Students must complete 135 contact hours in research on and service to nonprofit organizations in operational procedures, financial accounting, and resource development. These hours are divided into three 45-contact-hour experiential credit units that are included in the three required courses. Students sign an agreement with a nonprofit organization that describes the learning objectives, tasks to be undertaken, outcomes of the experience, and some of the specific benefits that will accrue from the work.

For policies governing all minors, see the Academic Policies chapter of this catalog.

### Political Philosophy

**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; develop a deeper philosophical perspective on political institutions; and lay the foundation for further graduate study in philosophy, government, or policy studies.

**Requirements**

Students must complete 15 credits, distributed as follows.

- Two core courses (6 credits) selected from the following:
  - PHIL/GOVT 323, Classical Western Political Theory
  - PHIL/GOVT 324, Modern Western Political Theory
  - PHIL/GOVT 327, Contemporary Western Political Theory

- Three elective courses (9 credits) chosen from the following:
  - PHIL/GOVT 323, 324, or 327 (if not used to fulfill the core requirement)
  - PHIL/GOVT 427 Feminist Political Thought
  - PHIL 325 Karl Marx’s Social and Political Thought
  - PHIL 326 Justice, Law, and the Modern State
  - PHIL 429 International Ethics
  - GOVT 328 Non-Western Political Theory
  - GOVT 329 Issues in Political Theories and Values
  - GOVT 420 American Political Thought
  - GOVT 421 Contemporary Political Ideologies
  - GOVT 428 Advanced Issues in Democratic Theory
  - GOVT 448 Ethics and International Politics

Special topics courses and independent studies courses, when relevant, may be used to fulfill elective credits with prior approval of the coordinator.

### Science and Society

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.

Requirements
To receive this minor, students complete a minimum of 18 credits distributed as follows.

- 2 credits of CHSS 200
- 5 courses (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 Environmental Economics
EVPP 110 Ecosphere: Environmental Science
(GEOG 303 Conservation of Resources and Environment
NCLC 319 An Endangered Earth
PHIL 343 Introduction to Environmental Ethics

Science, Society, and Ethnography
ANTH 135 Human Evolution, Biology, and Culture
(ANTH 365 Race and Racism
ENGL 311 Writing Ethnography
GEOG 304 Geography of Population
HIST 418 Ethnic Groups in America

Science, Society, and Faith
ANTH 135 Human Evolution, Biology, and Culture
(ANTH 496 On Evolution
PHIL 378 Reason, Science, and Faith in the Modern Age
RELI 100 Human Religious Experience

Science, Society, and Humankind
ANTH 120 Introduction to Archaeology
(BJOL 313 Human Genetics for the Social Sciences
ENGL 492 Science Fiction
NCLC 300 Utopia
PHIL 111 Individual and Society

Science, Society, and Healing
HSCI 150 Global Issues in Health, Nutrition, and Culture
NCLC 378 Medicine, Justice, and Public Policy
PHL 309 Medicine and Human Values
RELI 341 Global Perspectives on Spirituality and Healing
SOCI 390 Sociology of Health, Illness, and Disability

Urban and Suburban Studies
Faculty
Clapsaddle, Clark, Dumont, Gifford, Hackler (coordinator), K. Haynes, Horton, Hysom, Mattusch, Rosenzweig, Samara, Schintler, Schrag, Sockett, Stough, Todd, Travis, Verheyen, Wong

Course Work
The program offers all course work designated USST in the Course Descriptions chapter of this catalog.

Requirements
The interdisciplinary minor requires a minimum of 18 credits of course work:

- Three core courses
- Three electives 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.

Women’s Studies
See the Women’s Studies section of this chapter for a description of the minor.

Interdisciplinary Studies
Web: mais.gmu.edu

Executive Committee
Addleson, Burns (Director), Jordan, Lont, Kidd, Martin, Rodgers, Salmon, Seligmann, Simmons, 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 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, psychology, Spanish, or TESL)
• Folklore
• Higher education (administration or student affairs)
• Religion, culture, and values
• Video-based production
• Women’s 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 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 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).

Students admitted before fall 2004 are encouraged but not required to take MAIS 797 Proposal.

Concentration in Community College Teaching (communication, English, information systems, mathematics, psychology, 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, computer science, English, 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.

Degree Requirements
Students must complete 36 credits of course work, distributed as follows:
• College teaching course requirements (12 credits)
  Four required courses:
  • CTCH 601 The Community College
  • CTCH 602 College Teaching
  • CTCH 603 Teaching with Technology
  • CTCH 885 Internship in College Teaching

• Administration
• Knowledge area course requirements (21 credits):
  Communication: 12 credits of core courses, including
  the following:
  • COMM 602 Theories and Research of Mass Communication
  • COMM 634 Theories of Interpersonal Communication
  • COMM 635 Organizational Communication
  • COMM 650 Intercultural Communication

• English: 12 credits of core courses, including
  • English courses chosen in consultation with a faculty advisor
  • Additional courses in English chosen in consultation with faculty advisor.

• Mathematics: 12 credits of core courses, including
  • Additional courses in mathematics and related disciplines (including statistics) chosen in consultation with a faculty advisor.

• Psychology: 12 credits of core courses, including
  • Additional courses in psychology chosen in consultation with a faculty advisor.

Additional courses in mathematics and related disciplines (including statistics) chosen in consultation with a faculty advisor.
Spanish: SPAN 502 Hispanic Sociolinguistics  
SPAN 505 Applied Spanish Stylistics  
SPAN 510 Introduction to the Graduate Study of Literature in Spanish  
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.

Teaching English as a Second Language (TESL):  
LING 520 Descriptive Linguistics  
LING 521 Applied Linguistics: Teaching English as a Second Language  
LING 522 Modern English Grammar  
LING 523 Descriptive Aspects of English Phonetics and Phonology  
LING 525 Practicum in ESL  
LING 582 Second Language Acquisition  
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**  
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.

**Degree 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 must successfully complete 36 credits of graduate course work, including the following (at least 6 credits must be taken in courses outside the Department of English):

- 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.

- 3–6 credits of electives (approved by advisor)  
- 1 credit of MAIS 797 Proposal  
- 2–5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

**MAIS Concentration in Higher Education**  
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.

**Degree Requirements**  
- 12 credits of core courses, including the following: CTCH 621 Higher Education in the United States or CTCH 601 The Community College  
Remaining courses chosen in consultation with advisor

- 3 credits of research methodology  
- 3 credits of specialization: CTCH 622 Organization and Administration in Higher Education or CTCH 644 Student Services in Higher Education  
- 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 Project or 5 credits of MAIS 799 Thesis

**MAIS Individualized Concentration**  
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.

**Degree 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 must successfully complete 36 credits of graduate course work, including the following:

- 12–18 credits in a single discipline (Individualized plan must include a minimum of 12 and a maximum of 18 credits in one concentration.)
- 9–18 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
- 2–5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

**MAIS Concentration in Religion, Culture, and Values**

**Degree Requirements**

This concentration is designed for students interested in the development and interaction of major religious traditions, which throughout the world continue to influence human self-awareness, identity, culture, and values. The two core courses introduce students to the study of religion as a unique and rigorous intellectual discipline. Students will learn to critically evaluate a variety of perspectives on religion. Furthermore, they will gain a clear understanding of the dimension of the sacred in all aspects of human life, including those commonly designated “secular.” Students will discover how religious perceptions of the sacred respond to an evolving world and how such perceptions relate and influence cultures, institutions, and values. The effects of historical crises and the forces of change on religions, including contemporary religious pluralism and interreligious dialogue, will also be examined. Students will gain a deeper knowledge of specific traditions and a more profound understanding of values and worldviews from the viewpoint of cultural diversity and religious pluralism.

MAIS is interdisciplinary in focus, and students in the concentration will be able to take courses in and create specializations that include courses from such disciplines as anthropology, communication, conflict analysis, English, government, history, philosophy, public policy, sociology, and women's studies. In the four suggested areas of specialization, for example, students could link their religion courses to disciplines that have special relevance to the concentration's topics.

Students complete their work in this concentration by designing theses or projects that build on all they have learned. A project might focus on an aspect of religious communication in the media, for example, or create a comparative religious database for reporters and commentators. A thesis might address such topics as the possibility of resolving divisive ethical issues by setting them within a comparative religious context or the effects of globalization on national and ethnic forms of traditional religious expression.

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.

- Two core courses (6 credits): RELI 630 Approaches to the Study of Religion
  RELI 631 Sacred as Secular in Modern Spirituality
- Two or three additional courses in religious studies (6–9 credits):
  RELI 591 Special Topics in Religious Studies (may be repeated for credit)
  RELI 633 Ethical Perspectives of World Religions
  RELI 634 Christianity and the Cultures of Rome
  RELI 641 Drama in the World’s Religions
  RELI 642 Sacred Language, Scripture, and Culture
- One course in research methodology (3 credits) chosen from:
  HIST 610 The Study and Writing of History
  SOCI 634 Qualitative Research Methods
- Three courses in specialization (6–9 credits; see below)
- One to four courses of electives (3–12 credits)
- 1 credit of MAIS 797 Proposal
- 2–5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

**Specializations**

6–9 credits required from lists below; should include 3 credits of religion

- Religion, Culture, and Communication
  COMM 605 Intercultural Communication
  COMM 656 Global Communication
- Religious Traditions and Conflict Analysis and Resolution
  CONF 695 Special Topics (if appropriate)
  CONF 702 Peace Studies
  CONF 722 Conflict and Religion
  CONF 725 Conflict and Spirituality
- Religion, Culture, and Ethics
  RELI 633 Ethical Perspectives of World Religions
  PHIL 640 The History of Ethical Theory
  PHIL 643 Environmental Ethics
- Religion, Values, and International Politics
  GOVT 540 International Politics
  GOVT 741 Advanced Seminar in International Politics
  (if appropriate)

Other specializations may be developed with approval of the graduate coordinator.

**Electives**

These courses 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 specializations or courses from other disciplines (below) may be included in the religion, culture, and values concentration. With prior approval, students may take courses through the consortium and use them as electives or for their specialization to round out their program.

- Anthropology:
  ANTH 535 Anthropology and the Human Condition
  ANTH 615 Ritual and Power in Social Life
  ANTH 684 Readings in Cultural Anthropology
- Communication:
  COMM 605 Intercultural Communication
  COMM 656 Global Communication
• Conflict Analysis and Resolution:
  CONF 695 Special Topics in Conflict Analysis and
  Resolution (if appropriate)
  CONF 702 Peace Studies
  CONF 722 Conflict and Religion
  CONF 725 Conflict and Spirituality
• Education:
  EDUC 537 Foundations of Multicultural Education
• English:
  ENGL 591 Special Topics in Folkultural Education
• Government and International Politics:
  GOVT 540 International Politics
  GOVT 741 Advanced Seminar in International Politics
  (if appropriate)
• History:
  HIST 510 Approaches to Modern World History
• Philosophy
  PHIL 604 Augustine and Aquinas
  PHIL 617 Movements and Issues in the History of
  Political Philosophy
  PHIL 640 The History of Ethical Theory
  PHIL 643 Environmental Ethics
• Sociology:
  SOCI 611 Classical Sociological Theory
  SOCI 612 Contemporary Sociological Theory
  SOCI 614 Sociology of Culture
• Women’s Studies:
  WMST 640 Women and Global Issues

Concentration in Video-Based Production

The concentration emphasizes video production that encom-
passes various components, such as videoconferencing, multi-
media, 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, videocon-
ferencing, 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 applica-
tions, 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.

Degree Requirements
• Six required core courses:
  COMM 590 Video Production
  COMM 655 Theories of Visual Communication in
  Telecommunications
  or ENGL 670 Visual Culture: Theories and Histories
  COMM 590 Script Writing
  or EDIT 704 Instructional Technology Foundations
  and Theories of Learning
  COMM 697 Independent Production
  EDIT 611 Innovations in Distance Learning
  or EDIT 750 Emerging Educational Technologies
  COMM 694 Communication Internship
• 9–12 credits of electives chosen from COMM 554, 590,
  602, 636, 656, or 696; EDIT 571, 572, 575, 771, 772;
  AVT 676, HIST 697
• 1 credit of MAIS 797 Proposal
• 2–5 credits of MAIS 798 Project or 5 credits of MAIS 799
  Thesis

MAIS Concentration in Women’s Studies

This concentration is for students who wish to explore
gender roles and women’s issues from a variety of discipli-
ary perspectives. The program combines graduate courses
in women’s studies with courses in a discipline of interest,
such as history, English, sociology, communication, health,
education, or public policy. Expertise in the study of gender
is increasingly applicable in a variety of professional and
academic settings.

Degree Requirements
Students complete 36 credits of core courses and specialized
courses, selected in consultation with an advisor, distributed
as follows:
• 6 credits of core courses:
  WMST 630 Feminist Theory across Disciplines
  WMST 640 Women and Global Issues
• 12 credits in a disciplinary concentration, selected in
  consultation with advisor, including 3 credits in a course
cross-listed with WMST
• 9–12 credits of electives in courses cross-listed with WMST
  that are not part of the disciplinary concentration
• 3 credits of research methods, selected in consultation with
  advisor
• 1 credit of MAIS 797 Proposal
• 2–5 credits of MAIS 798 Project or 5 credits of MAIS 799
  Thesis, including presentation of final work to WMST
  community

MAIS Concentration in Zoo and
Aquarium Leadership

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 tech-
nology, and group interaction, as well as advance necessary
skills in leadership and fiscal and personnel management.

This degree offers three specializations within the concen-
tration (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.
Degree Requirements
Students must successfully complete 36 credits of graduate course work, including the following:

- 12 credits of core courses:
  - PUAD 505 Introduction to Management of Nonprofits
  - NCLC 520 Conservation Education
  - NCLC 510 Institutional Record Keeping
  - NCLC 511 Managing for Success Career Development
- 9 credits of cognate courses, determined by field of specialization and chosen in consultation with advisor (must have approval of Zoo and Aquarium Leadership [ZAL] faculty coordinator)
- 9–12 credits of electives, approved by advisory committee and selected in consultation with faculty advisor (Admitted students who wish to take a course at another accredited institution must receive prior approval from the advisor, the MAIS program director, and the dean.)
- 1 credit of MAIS 797 Proposal
- 2–5 credits of MAIS 798 Project or 5 credits of MAIS 799 Thesis

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), Karush (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
In addition to satisfying Mason's general education requirements and requirements for the BA degree in CHSS, students must complete 31 credits in Latin American studies with a minimum GPA of 2.00 in courses counting toward the major. The 31 credits are to be distributed as follows.

- 1 credit of LAS 100 Introduction to LAS (a weekly lecture series in which students are introduced to the faculty and the various disciplines that compose Latin American studies)
- 3 credits of HIST 271 Latin American History to 1810
- 3 credits of HIST 272 Latin American History from 1810 to the Present
- 6 credits of social science courses related to Latin America chosen from:
  - GOVT 331 Government and Politics of Latin America
  - ANTH 302 Peoples and Cultures of Latin America
  - ECON 361 Economic Development of Latin America
  - GEOG 316 Geography of Latin America
- 3 credits of humanities courses related to Latin America chosen from:
  - ENGL 333 Folklife of the Americas
  - SPAN 322 Introduction to Latin American Culture
  - SPAN 325 Major Hispanic Writers
- 3 credits of LAS 499 Latin American Studies Research Seminar (3 credit synthesis, capstone class)
- 12 credits of electives in Latin American studies. Students may satisfy this 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 must complete a minimum of 18 credits distributed as follows.

- 3 credits in one of the following courses:
  - HIST 271 Introduction to Colonial Latin American History
  - HIST 272 Introduction to Modern Latin American History
  - GOVT 331 Government and Politics of Latin America
- 15 additional credits in Latin American studies in at least three departments. Students may fulfill this 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 in Latin American studies. These credits may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Modern and Classical Languages

Phone: 703-993-1220
Web: mcl.gmu.edu

Faculty

Professors: Francescato, Gilbert, Ricourat, Winkler
Associate professors: Berroa, Chamberlain (chair), Christensen, Goldin (associate chair), Levine, Rabin, Roman-Mendoza
Assistant professors: Carreño-Rodriguez, Leeman, Ramos-Pellicia, Sanusi, Vivancos-Perez, Zhang
Term assistant professors: Daniels, Descalzo de Blas, Fyfe, Pankova, So
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, and SPAN 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 or above. Students in language concentrations may fulfill this requirement by successfully completing FREN 352 or SPAN 452.
Concentration in French
In addition to satisfying the university-wide general education requirements and requirements for a BA degree in CHSS, candidates 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 Reading and Writing Skills Development

• Two courses (6 credits) in literature and civilization chosen from the following:
  FREN 340 Francophone Identities
  FREN 370 French Civilization, Culture, and Literature: Middle Ages to 1789
  FREN 371 French Civilization, Culture, and Literature: 1789 to the present

• Three electives (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
In addition to satisfying the university-wide general education requirements and requirements for a BA degree in CHSS, candidates must complete a minimum of 33 credits in Spanish courses at the 300-level and above, each with a minimum grade of 2.00.

• SPAN 301 Grammar and Syntax
• SPAN 302 Reading and Writing Skills
• SPAN 390 Introduction to Hispanic Literary Analysis (prerequisite: SPAN 302)
• SPAN 452 Advanced Written Spanish (prerequisite: SPAN 302)
• SPAN 461 or 466 Spanish or Latin American Civilization and Culture (prerequisite: SPAN 452)
• The following three courses (prerequisites: SPAN 390 and 452):
  SPAN 483 and 484 The Literature of Spain I and II
  SPAN 488 The Literature of Spanish America
• Two or more electives that may include other SPAN courses not specifically required or not chosen to fulfill a requirement; courses transferred from other universities; courses taken on overseas study programs; special topics courses; independent studies and internships; and 500-level courses with permission of the professor (No more than 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
• Two courses in English or American literature
• Three courses designated as comparative or world literature by the Comparative Literature Committee (These courses include CLAS 390; ENGL 431, 436, 437; and appropriate special topics courses designated CLAS, FREN, GERM, RUSS, and SPAN.)
• CL 300 Introduction to Comparative Literature
• One course in literary criticism, as appropriate for the student’s focus: ENGL 494 or 551, FREN 381, or SPAN 390
• CL 514 Theories of Comparative Literature

Students should consult with their advisor to design a program of study focusing on a specific genre, period, issue, or other cross-cultural topic.

For more information, contact the Modern and Classical Languages Department or the English Department.

Teacher Licensure
Students who wish to become teachers should consult the teacher licensure office 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.

Minor 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.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for Chinese Minor

• Three of the following (9 credits):
  CHIN 300 Reading Development
  CHIN 301 Advanced Grammar and Syntax
  CHIN 305 Chinese for the Business World
  CHIN 480 Fourth-Year Chinese I
  CHIN 481 Fourth-Year Chinese II

• One of the following (3 credits):
  CHIN 318 Introduction to Classical Chinese
  CHIN 355 Readings in Chinese Poetry and Poetics
  CHIN 365 Readings in Post-Mao Fiction

• One additional Chinese course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  CHIN 310 Survey of Traditional Chinese Literature
  CHIN 311 Modern Chinese Literature in Translation
  CHIN 320 Contemporary Chinese Film
  ARTH 384 Arts of China
  HIST 353 History of Traditional China
  HIST 354 Modern China
  HIST 355 Mao’s China and After
  HIST 387 Women and Family in Chinese History
  RELI 314 Chinese Philosophy and Religious Traditions

Minor in Italian
Prerequisite: Completion of an intermediate (202 or 209) course in Italian, or equivalent placement test score.

A minor in Italian consists of 18 credits above the intermediate level in Italian. Students must achieve a minimum grade of 2.00 in each course applied to the minor.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for Italian Minor

• Two courses in Italian literature and civilization (6 credits)
  ITAL 395 Survey of Italian Literature
  ITAL 452 Chicco Amore: An Italian Case Study

• One additional Italian course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  ITAL 310 Italian Film
  ITAL 320 The Italian Renaissance
  ITAL 321 The Italian Baroque
  ITAL 355 Readings in Italian Poetry
  ARTH 384 Arts of Italy
  MUSI 302 Italian Music
  HIST 353 History of Traditional Italy
  HIST 354 Modern Italy
  HIST 355 Italy’s Rise to Power
  HIST 387 Women and Family in Italian History

Minor in Russian
Prerequisite: Completion of an intermediate (202 or 209) course in Russian, or equivalent placement test score.

A minor in Russian consists of 18 credits above the intermediate level in Russian. Students must achieve a minimum grade of 2.00 in each course applied to the minor.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for Russian Minor

• Two courses in Russian literature or civilization (6 credits)
  RUSS 391 Russian Literature and Culture
  RUSS 491 Russian Literature and Culture

• One additional Russian course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  RUSS 303 Modern Russian Literature
  RUSS 324 Russian Literature and Society
  RUSS 325 Modern Russian Civilization
  ARTH 384 Arts of Russia
  MUSI 302 Russian Music
  HIST 353 History of Traditional Russia
  HIST 354 Modern Russia
  HIST 355 Russia’s Rise to Power

Minor in German
Prerequisite: Completion of an intermediate (202 or 209) course in German, or equivalent placement test score.

A minor in German consists of 18 credits above the intermediate level in German. Students must achieve a minimum grade of 2.00 in each course applied to the minor.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for German Minor

• Two courses in German literature or civilization (6 credits)
  GERMAN 390 German Literature and Culture
  GERMAN 490 German Literature and Culture

• One additional German course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  GERMAN 303 Modern German Literature
  GERMAN 324 German Literature and Society
  GERMAN 325 Modern German Civilization
  MUSI 302 German Music
  HIST 353 History of Traditional Germany
  HIST 354 Modern Germany
  HIST 355 Germany’s Rise to Power

Minor in French
Prerequisite: Completion of an intermediate (202 or 209) course in French, or equivalent placement test score.

A minor in French consists of 18 credits above the intermediate level in French. Students must achieve a minimum grade of 2.00 in each course applied to the minor.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for French Minor

• Two courses in French literature or civilization (6 credits)
  FREN 390 French Literature and Culture
  FREN 490 French Literature and Culture

• One additional French course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  FREN 303 Modern French Literature
  FREN 324 French Literature and Society
  FREN 325 Modern French Civilization
  MUSI 302 French Music
  HIST 353 History of Traditional France
  HIST 354 Modern France
  HIST 355 France’s Rise to Power

Minor in Spanish
Prerequisite: Completion of an intermediate (202 or 209) course in Spanish, or equivalent placement test score.

A minor in Spanish consists of 18 credits above the intermediate level in Spanish. Students must achieve a minimum grade of 2.00 in each course applied to the minor.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for Spanish Minor

• Two courses in Spanish literature or civilization (6 credits)
  SPAN 390 Spanish Literature and Culture
  SPAN 490 Spanish Literature and Culture

• One additional Spanish course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  SPAN 303 Modern Spanish Literature
  SPAN 324 Spanish Literature and Society
  SPAN 325 Modern Spanish Civilization
  MUSI 302 Spanish Music
  HIST 353 History of Traditional Spain
  HIST 354 Modern Spain
  HIST 355 Spain’s Rise to Power

Minor in Arabic
Prerequisite: Completion of an intermediate (202 or 209) course in Arabic, or equivalent placement test score.

A minor in Arabic consists of 18 credits above the intermediate level in Arabic. Students must achieve a minimum grade of 2.00 in each course applied to the minor.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Requirements for Arabic Minor

• Two courses in Arabic literature or civilization (6 credits)
  ARAB 390 Arabic Literature and Culture
  ARAB 490 Arabic Literature and Culture

• One additional Arabic course (3 credits) chosen from either of the above groups

• One of the following (3 credits):
  ARAB 303 Modern Arabic Literature
  ARAB 324 Arabic Literature and Society
  ARAB 325 Modern Arabic Civilization
  MUSI 302 Arabic Music
  HIST 353 History of Traditional Arabic
  HIST 354 Modern Arabic
  HIST 355 Arabic’s Rise to Power

Requirements for French Minor

- One advanced language course (6 credits)
  FREN 309 Reading and Writing Skills Development
- Two courses (6 credits) in literature and civilization chosen from the following:
  FREN 340 Francophone Identities
  FREN 370 French Civilization, Culture, and Literature: Middle Ages to 1789
  FREN 371 French Civilization, Culture, and Literature: 1789 to the Present
- Three electives (9 credits) in FREN at the 300 level or above

Requirements for German Minor

- Three of the following (9 credits):
  GERM 310 Conversation and Composition
  GERM 316 German for the Business World
  GERM 318 Translation of Texts
  GERM 415 Advanced Grammar and Style
  GERM 418 Advanced Composition
- One of the following (3 credits):
  Genre courses at the 300 level
  Period courses at the 400 level
- One of the following (3 credits):
  GERM 301 Culture and Civilization
  GERM 340 Survey of German Literature

- One German elective at the 300 level or above (3 credits)

Requirements for Latin Minor

- 18 credits from the following:
  LATN 351 Roman Prose Literature
  LATN 352 Roman Poetry
  LATN 451, 452 Studies in Roman Literature
- Courses vary in content and may be repeated for credit.

Requirements for Russian Minor

- Three of the following (9 credits):
  RUSS 302 Russian Conversation and Composition
  or RUSS 303 Russian Advanced Conversation
  RUSS 380 Advanced Russian I
  RUSS 381 Advanced Russian II
- One of the following (3 credits):
  RUSS 310 Readings in Russian Literature
  RUSS 311 Contemporary Russian Short Fiction
- One of the following (3 credits):
  RUSS 353 Russian Civilization
  RUSS 354 Contemporary Post-Soviet Life
- One Russian elective at the 300 level or above (3 credits; course must be conducted in Russian)

Requirements for Spanish Minor

- Two required courses (9 credits):
  SPAN 301 Grammar and Syntax
  SPAN 302 Reading and Writing Spanish (6 credits)
- Two elective courses (6 credits) chosen from:
  SPAN 390 Introduction to Hispanic Literary Analysis
  SPAN 452 Advanced Written Spanish
  SPAN 461 Spanish Civilization and Culture
  SPAN 466 Latin American Civilization and Culture
  SPAN 483, 484 The Literature of Spain I, II
  SPAN 488 The Literature of Spanish America
- One Spanish elective at the 300-level or above (3 credits)

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.

The minor in classical studies consists of the following 18 credits, each with a minimum grade of 2.00:

- 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 or classical philosophy, and religious studies
- 6 credits of approved electives from classical art history, classics, classical history, classical philosophy, and religious studies

GRADUATE PROGRAMS

Foreign Languages, MA

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.

Admission 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 36 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

Students must complete 30 credits, with at least 18 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, and at least 6 credits of French electives in literature.
or language. The remaining 12 credits are electives, of which up to 6 may be used for directed reading and research (798) and thesis (799).

**Concentration in Spanish**
Students must complete 30 credits, distributed as follows:
- 9 credits of core courses:
  - SPAN 502 Hispanic Sociolinguistics (3 credits)
  - SPAN 505 Applied Spanish Stylistics (3 credits)
  - SPAN 510 Introduction to the Graduate Study of Literature in Spanish (3 credits)
- 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 selected from the following:
  - 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 electives selected from the following:
  - 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 course 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 French and Spanish**
The concentration requires 42 credits, including 18 credits in French distributed according to the requirements for the concentration in French, and 18 credits in Spanish distributed according to the requirements for the concentration in Spanish. The remaining 6 credits are electives, which may be used for directed reading and research (798) and thesis (799).

**Concentration in Spanish/ Bilingual-Multicultural Education**
The concentration requires 36 credits, including 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. The remaining 12 credits are electives, 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, DeNys, Eckenwiler, Froman, Holman, Kinnaman (chair), Paden, S. M. Skousgaard

**Adjuncts:** D. Gregory, Oberoi, Sojka

**Course Work**
This department offers all course work designated PHIL in the Course Descriptions chapter of this catalog.

**UNDERGRADUATE PROGRAMS**

- **Philosophy, BA**
The degree program in philosophy covers the major issues and areas in philosophy and serves the needs of students with various interests and career goals. Major emphases are available for 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.

In addition to university-wide general education requirements and requirements for a BA degree in CHSS, philosophy majors 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.

- Logic (at least 3 credits): PHIL 175 or 367
- History of philosophy (at least 12 credits)
  - Required: PHIL 301, 303, and 332 and either PHIL 336 or 337
- Theories of value (at least 3 credits):
  - PHIL 311 Philosophy of Law
  - PHIL 323 Classical Western Political Theory
  - PHIL 324 Modern Western Political Theory
  - PHIL 325 Karl Marx’s Social and Political Thought
  - PHIL 326 Liberty, Equality, and Community
  - PHIL 327 Contemporary Western Political Theory
  - PHIL 338 Woman: The Philosophical Questions
  - PHIL 355 Contemporary Ethical Theory
  - PHIL 356 Philosophy of Art
  - PHIL 470 Seminar: Philosophical Examination of Social Issues and the Law

- Reality, knowledge, and science (at least 3 credits)
  - PHIL 312 Philosophy of Technology
  - PHIL 337 Twentieth-Century Continental Thought:
    - Phenomenology
  - PHIL 340 Hermeneutic Philosophy
  - PHIL 357 Philosophy of the Social Sciences
  - PHIL 371 Philosophy of Natural Sciences
  - PHIL 373 Theory of Knowledge
  - PHIL 374 Philosophy of Mind
  - PHIL 375 Metaphysics
  - PHIL 377 Darwin: Biology and Beyond
  - PHIL 378 Reason, Science, and Faith in the Modern Age

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 two requirements above.
• Philosophy electives
Students may choose a concentration in philosophy and law. The following philosophy courses fulfill the general education syntheses requirement: PHIL 309, 377, and 378. Students may choose a concentration in philosophy and law. See department for details.

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.

Minor in Philosophy
The minor is organized according to 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 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 must be distributed as follows:
- Logic: 3 credits chosen from PHIL 173, 180, or 376
- History of philosophy: 6 credits: PHIL 301 and 303
- Electives in philosophy: 9 credits of which at least 6 must be at the 300 level or above

Emphasis in history of philosophy
This emphasis requires at least 3 additional credits in the history of philosophy, plus 6 credits of electives. At least 3 credits in history of philosophy should be taken from PHIL 302, 325, 332, 335, 336, or 337.

Emphasis in reality, knowledge, and science
This emphasis requires at least 6 credits in courses in reality, knowledge, and science, plus 3 credits of electives (see list of courses under the major).

Emphasis in social and political philosophy
This emphasis requires at least 9 credits chosen from PHIL 311, 312, 323, 324, 325, 326, 327, 338, or 470.

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 emphasis requirements.

The department offers a minor in philosophy and law and coordinates the interdisciplinary minor in political philosophy. See the Interdisciplinary Minors section in this chapter for a description.

GRADUATE PROGRAM

哲学, MA
The department offers a master’s degree in traditional and contemporary philosophy. The degree is designed for students who intend to go on to a doctorate in philosophy and those who seek the master’s as a terminal degree to further their professional expertise. Students may pursue interests in the history of philosophy, ethics, metaphysics, epistemology, contemporary continental thought, contemporary analytic philosophy, and philosophy of science. The department offers a concentration in professional ethics for those master’s students interested in combining the study of ethics in a variety of career settings, as well as a graduate certificate in professional ethics.

Admission 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 not in a designated concentration must successfully complete 30 credits, which may optionally 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.

• 12 credits of required course work distributed as follows:
  - 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)
• 18 credits of electives, including 3 to 6 credits of project or thesis

Concentration in Philosophy and Cultural Theory
In addition to fulfilling the 12 credits of required course work specified above, students in this concentration take CULT 802 Histories of Cultural Studies and 3 additional 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.

Concentration in Professional Ethics
Students in the concentration in professional ethics must complete 30 credits distributed as follows:

• 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.)
• 3 credits in professional ethics: PHIL 641
• 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.)
• 9–12 credits of electives
• 3–6 credits of project or thesis
Certificate in Professional Ethics

Admission Requirements
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 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.
- 3 credits in the history of ethical theory: PHIL 640
- 3 credits in professional ethics: PHIL 641
- 6 credits in ethics chosen from PHIL 642, 643, or 644
- 3 credits of an elective (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), Denham, Klimoski, Lehman (director, Developmental/Biopsychology/School Programs), Maddux (director, Clinical Program), Mandes, Naglieri, Parasuraman (director, Human Factors/Applied Cognition Program), Pasnak, Riskind, Rojahn (director, Center for Cognitive Development), R. Smith, Tangney, Tetrick (director, Industrial/Organizational Program), Zaccaro

Research professors: Butler, Olds

Associate professors: Bitter, Blackwell, Buffardi, Cortina, Flinn, Greenwood, Kello, Kozhevnikov, Peterson, Sanford (associate chair for undergraduate studies), Short (associate chair for graduate studies), Winsler

Research associate professor: Bachus

Assistant professors: Cattaneo, Kashdan, Kaplan, King, McKnight, Mohr, Monk, Perez-Edgar, Rowe, Thompson, Warren

Term associate professors: Chrosniak, Wanschura, Wasserman

Research assistant professors: Bassett, Fu, McDonald, Stuewig, Tran

Term assistant professors: Hurley, Meier, Spasojevic, Zapata

Affiliates: Eby, Hunt, Trafton

Adjuncts: Anderson, Battaglia, Benedi, Curtin, Dechman, Hawley, Hirsch, Kippley, Levitas, Mayfield, Paolitto, 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

In addition to university-wide general education requirements and requirements for the BA degree in CHSS, psychology majors must complete the following course work with a minimum GPA of 2.00.
- 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 322 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

In addition to satisfying the university-wide general education requirements for a BS degree, candidates must complete the following with a minimum GPA of 2.00:
- 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 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 103, 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 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 receiving a BS in neuroscience must complete the following course work:

• 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
• Two foundation courses 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 hour): PSYC 373
• 12 credits of electives in foundation areas (see advisor for list)
• 12 credits of neuroscience electives (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 in the minor complete 18 credits of course work in psychology distributed as follows:

• 3 credits of PSYC 100 Basic Concepts in Psychology
• 9 credits (three courses) 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 (No more than 3 credits may be 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.

For policies governing all minors, see the Academic Policies chapter of this catalog.

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.

■ Accelerated Master’s Program in Psychology (concentration in biopsychology)
Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain both bachelor’s and master’s degrees in psychology 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. Upon 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.

The industrial/organizational concentration trains students in the conduct and application of psychological research in work settings. Expertise can be developed in a variety of areas, including personnel selection, training, leadership, motivation, and human performance assessment.

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-time practicum before completing the degree.

The school psychology concentration prepares students for endorsement as fully certified school psychologists in Virginia and most other states. It is approved by the Virginia Department of Education and National Association of School Psychologists.

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.

The biopsychology concentration emphasizes training in the neurobiological bases of behavior. Students are prepared for doctoral work or employment in government or industry research laboratories.

The clinical psychology concentration trains students to have flexibility to fill the evolving functions of clinical psychologists, including research, direct provision of clinical services, supervision, program development and evaluation, and consultation.

Admission 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. All 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.

Concentration in Industrial/Organizational Psychology
Students must complete 32 graduate credits, including the following:

- 3 credits of core: PSYC 667, 701, or 703
- 8 credits of quantitative and research methods: PSYC 611, 612
- 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

Concentration in Human Factors/Applied Cognition
Students must complete 32 graduate credits, including the following:

- 3 credits of core: PSYC 701, 759, 766, or 768
- 8 credits of quantitative and research methods: PSYC 611, 612
- 6 credits of specialized content: PSYC 530, 645
- 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
Certificates are available in aviation psychology, usability, or cognitive neuroscience. 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 psychology 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 concentration 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 Psychology**
  - 9 credits of required core courses:
    - PSYC 530 Cognitive Engineering
    - PSYC 645 Human Factors Methods (Task Analysis/Verbal Protocol Analysis)
    - PSYC 734 Seminar in Human Factors (aviation-related topics as approved for this certificate by the program director)
  - 6 credits of electives chosen from the following:
    - PSYC 768 Seminar in Cognition
    - PSYC 766 Seminar in Perception
    - SYST 560 Introduction to Air Traffic Control
    - SYST 671 Judgment and Choice Processing and Decision Making
    - PSYC 597 Directed Readings/Research (when topic is approved for this certificate)

- **Certificate in Usability**
  - 9 credits of required core courses
    - PSYC 530 Cognitive Engineering
    - PSYC 645 Human Factors Methods (Task Analysis/Verbal Protocol Analysis)
    - PSYC 737 Psychology of Human-Technology Interaction
  - 6 credits of electives chosen from the following:
    - PSYC 734 Seminar in Human Factors (when topic is approved for this certificate)
    - PSYC 737 Psychology of Human-Technology Interaction
    - PSYC 597 Directed Readings/Research (when topic is approved for this certificate)
    - PSYC 768 Seminar in Cognition
    - PSYC 766 Seminar in Perception
    - PSYC 654 Naturalistic Methods in Psychology
    - EDIT 526 Web Accessibility
    - EDIT 571 Tools for Visual/Graphic Design
    - EDIT 705 Instructional Design
    - EDIT 773 Human Computer Interface Design for Teaching and Learning

- **Certificate in Cognitive Neuroscience**
  - 9 credits of required core courses:
    - PSYC 530 Cognitive Engineering
    - PSYC 768 Seminar in Cognition (when topic is cognitive neuroscience)
  - One of the following:
    - PSYC 527 Introduction to Neurobiology
    - PSYC 531 Mammalian Neurobiology
    - PSYC 556 Chemistry and the Brain
    - PSYC 558 Neuronal Bases of Learning and Memory
    - PSYC 559 Behavioral Chemistry
  - 6 credits of electives chosen from the following:
    - PSYC 702 Biological Bases of Behavior
    - PSYC 768 Seminar in Cognition (when topic is approved for this certificate)
    - PSYC 766 Seminar in Perception (when topic is approved for this certificate)
    - PSYC 597 Directed Readings/Research (when topic is approved for this certificate)

- **Concentration in School Psychology: Master’s Degree and Certificate of Advanced Graduate Studies**
  - The master's degree concentration and the certificate make up a two-level degree program to prepare graduates for professional certification in school psychology. The program is approved by School Psychology Training Programs by the National Association of School Psychologists. Students completing the program will be eligible for licensure in Virginia and other states as a school psychologist. (Students seeking licensure for independent practice as a school psychologist must meet the educational, residency, and exam requirements of the Commonwealth of Virginia Board of Psychology.)
  - 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. All students entering the master's program are expected to complete the certificate.
  - 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 below. They must complete all requirements of the master's in school psychology that they have not previously taken.
  - Students must receive a B or better in the course work below.
  - Course work must be completed before the internship. School psychology students are required to enroll full time.
  - To receive the master's degree with a concentration in school psychology, students must complete 41 credits: EDCD 603; EDSE 628 or 629; EDUC 537; PSYC 669 or 704 or 506; PSYC 611 and 612; PSYC 617, 619, 671, 673, 709, 710, 750.
  - To receive the certificate, students must complete 19 credits: EDCD 609; PSYC 722, 750, 790, 792; and PSYC 712 or 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 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 Applied Developmental Psychology
Students must complete 32 graduate credits, including the following:
- 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 electives (content course, practicum, or directed reading and research)

Concentration in Biopsychology
Students must complete 32 graduate 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 electives chosen from:
  - BIOL 583 General Biochemistry
  - PSYC 561 Behavioral Biology of Substance Abuse
  - PSYC 702 Biological Bases of Behavior
  - PSYC 704 Life-Span Development
- 6 credits of thesis: PSYC 798, 799 (A thesis is usually required, but 6 credits of practicum [PSYC 792] may serve as a substitute if approved by the advisor and program coordinator.)

Concentration in Clinical Psychology
Students who have been admitted to the doctoral program with a concentration in clinical psychology are awarded the MA in psychology on completion of the 32 hours of course work designated below. Students must also be in good standing in the program, as determined by the director of clinical training.

The MA concentration in clinical psychology is not a terminal degree and is awarded only to students admitted to the clinical doctoral concentration.

Psychological Assessment I (PSYC 810) .........................4
Psychological Assessment II (PSYC 811) ..........................4
Scientific Foundations of Clinical Psychology I (PSYC 822) .................................................................3
Scientific Foundations of Clinical Psychology II (PSYC 823) .................................................................3
Advanced Statistics I (PSYC 611) .................................4
Advanced Statistics II (PSYC 612) .................................4
Practicum in Clinical Psychology (PSYC 881) .................3
Seminar in Professional Psychology (PSYC 890) ..........1
Two of the following .....................................................6
  - 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)

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 provisional qualifier. Programs may add other conditions to provisional admission. Individualized study work does not count toward the 12 credits.

■ Neuroscience, PhD
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
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.

The concentrations in industrial/organizational psychology and human factors/applied cognition, grouped under the applied experimental program, are focused on educating psychologists in the use of psychological knowledge and methods employed in such settings as industry, government, consulting organizations, and research and development organizations. Students develop skills in human-computer interaction design, cognitive ergonomics, training, personnel selection, and organizational psychology.

The clinical psychology concentration is committed to the scientist-practitioner model. The program aims to train students to have the flexibility to fill the evolving functions of clinical psychologists, including research, direct provision of clinical services, supervision, program development and evaluation, and consultation.

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. 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 biopsychology concentration offers a broad program with faculty expertise in comparative neuroanatomy, cognition, substance abuse, and learning and memory. The department has facilities for animal research, access to the Shared Research Instrumentation Facility, and links to the Krasnow Institute for Cognitive Study. The program prepares students for careers in a university, college, or research setting.

Admission
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.

Documents
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.

Requirements
In addition to fulfilling admission requirements, applicants are expected to have the following:
• 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 applicants 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 Credits
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.

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. Students who successfully complete the comprehensive exams are advanced to candidacy.

Concentration in Applied Developmental Psychology

Students must complete the following course work:

- 64 credits of required courses
  - 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 electives:

- 0–6 credits of Practicum (792)
- 0–8 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

Students 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 electives with approval of advisor

- 2 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

The clinical psychology doctoral program Mason is committed to is the scientist-practitioner model as defined by the American Psychological Association, which has awarded the program full accreditation.

The program’s goal is to train clinical psychologists who are capable of integrating research and applied clinical activities. Students are provided rigorous training in scientific methods and clinical interventions, with an emphasis on those that are empirically based. This training encourages students to be integrative and innovative while guided by the principles of science.

The program also strives to train students who have the flexibility to fill the evolving roles and functions of clinical psychologists, including research, direct provision of clinical services, supervision, program development and evaluation, consultation, and teaching.

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 influence of social and cultural factors on the individual and the influence of the individual on the community. Faculty members believe that in all their activities, clinical psychologists have a responsibility to have a positive effect on their communities.

The program is strongly committed to cultural diversity in admissions, exposing students to issues regarding diversity, and providing students opportunities to work with diverse populations.

Students who are primarily interested in traditional private practice may be a better fit with other programs.

Program Requirements

- 72 credits of course work, as designated below
- 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

Required courses

- 3 credits of biological bases of behavior (PSYC 558, 559, or 702)
- 3 credits of developmental bases of behavior (PSYC 666, 669, or 704)
- 3 credits of PSYC 833 Social and Cognitive Foundations of Clinical Psychology
- 3 credits of PSYC 830 History, Systems, and Theories of Personality and Psychotherapy
- 4 credits of PSYC 611 Advanced Statistics I
- 4 credits of PSYC 612 Advanced Statistics II
- 4 credits of PSYC 810 Psychological Assessment I
- 4 credits of PSYC 811 Psychological Assessment II
- 3 credits of PSYC 822 Scientific Foundations of Clinical Psychology I
- 3 credits of PSYC 823 Scientific Foundations of Clinical Psychology II
- 3 credits of PSYC 831 Social-Cognitive Interventions in Clinical Psychology
3 credits of PSYC 840 Community Psychology I
3 credits of PSYC 841 Community Psychology II
7 credits of PSYC 881 Practicum in Clinical Psychology
1 credit of PSYC 890 Seminar in Professional Psychology
9 credits of electives (must be approved by advisor)
12 credits of dissertation (998 and 999; at least three credits of each)

**Concentration in Human Factors/ Applied Cognition**
Students must complete 72 graduate credits distributed as follows:
- 3 credits of cognitive core: PSYC 701, 759, 766, or 768
- 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)
- 8 credits of quantitative and research methods: PSYC 611 and 612
- 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)
- 9 credits of advanced statistics or qualitative methods
- 6 credits of specialized content: PSYC 530 and 645
- 9 credits of additional specialized content to include PSYC 734, 737, 766, or 768
- 3 credits of PSYC 890 Special Topics in Professional Issues
- 12 credits of dissertation: PSYC 998 and 999

**Concentration in Industrial/ Organizational Psychology**
Students must complete 72 graduate credits distributed as follows:
- 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)
- 8 credits of quantitative and research methods: PSYC 611 and 612
- 9 credits of advanced quantitative and research methods: PSYC 557, 754, and 756
- 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
- 3 credits of special topics in professional issues: PSYC 890
- 9 credits of electives (can be outside the department with advisor approval)
- 6 credits of practicum: PSYC 730
- 12 credits of dissertation: PSYC 998 and 999

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**Public and International Affairs**

**Phone:** 703-993-1400

**Web:** pia.gmu.edu

**Faculty**

Robinson Professors: Heleo, Paden
Emeritus Faculty: Brown, Clark, Early, Gortner, Hart-Nibbrig, Knight, White

**Professors:** Cioffi-Revilla, Conant, Conlan, Druckman, Dudley, Katz, Posner, Regan, Sockett, Wan, Wilsford

**Associate professors:** Hackler, Harbour, Lukacs, Mahler, Mandaville, McFerson, Nguyen, Sacco, Snyder, Toepfer, Travis

**Assistant professors:** Balint, Benjamin, Brigety, Burt, Dueck, Koblentz, McDonald, McGlinchey, Miller, Tsvetovat

**Term assistant professors:** Burroughs, Bushée, Feit, Robbins, Walker

**Adjuncts:** Becelia, Butler, Combs, Day, Dinella, Edner, Fant, Froehlich, Ghosh, Hall, Hauss, Heniff, Long, Maslyn, Raffety, Sauer, Shafroth, Shiraev, Stahl, Swanson, Tadie, Taylor, Tibbets, Vence, Willett

**Affiliate faculty:** Casamayou, Connolly, Rossell, 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.

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**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 majoring in government and international politics must complete the following. With careful planning, some courses required for the major may also fulfill college or university general education requirements. See an advisor before registering.

- 16 credits in core requirements: GOVT 101, 103, 132, 133, 300 (fulfills the university social science, global understanding, and information technology and information technology ethics requirements)
- 24 credits in advanced government field courses. At least 3 credits must be taken from each of the fields listed below:
  - American politics: GOVT 301–319, 400–419
  - International and comparative politics: GOVT 330–349, 430–449
  - Public administration and policy: GOVT 350–369, 430–469

  With permission of an advisor, 9 credits of GOVT 480 and 496 may be substituted for upper-division GOVT field courses. Only 3 credits of GOVT 480 and 6 credits of GOVT 496 may be substituted for major requirements.

- 3 credits of GOVT 490, 491 (fulfills the university synthesis requirement). GOVT 490 may not be applied to a field requirement or concentration.
Students may choose to concentrate in one of the four fields listed above by completing five courses (15 credits) in one field. Students must still complete 3 credits in each of the other three fields. Only courses passed with a grade of C (2.00) or better may be used to fulfill major requirements.

**Public Administration, BS**

In addition to satisfying university-wide general education requirements for the BS, students majoring in public administration must complete the following. With careful planning, some courses required for the major may also fulfill university or college general education requirements. See an advisor before registering.

- 19 credits of core requirements: GOVT 101, 103, 132 or 133, 300, 304, 351 (fulfills 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 320 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 from the following: DESC 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 Option A, or up to 12 credits in Option B

**Option A**

Information technology: GOVT 359, 459; any CS, INFS, IT, or MIS course; STAT 362; SOCI 405

**Option B**

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/STAT 250; 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 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.

**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. 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 must complete 18 credits of government courses, including GOVT 103 Introduction to American Government and five additional courses chosen from the following:

- Any GOVT 301–309 political institutions
- Any GOVT 310–319 political behavior
- GOVT 344 American Foreign Policy
- 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 must complete 18 credits of government courses, including GOVT 132 or 133 Introduction to International/Comparative Politics, and five additional courses chosen from the following:

- GOVT 103 Introduction to American Government
- 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 must complete 18 credits of government courses, including GOVT 103 Introduction to American Government and GOVT 301 Public Law and Judicial Process, and four additional courses from the following:

- GOVT 307 Legislative Behavior
- GOVT 414 Politics of Race, Gender, and Age
- GOVT 420 American Political Thought
- GOVT 422 Constitutional Interpretation
GOVT 423 Civil Rights and Liberties
GOVT 424 Constitutional Law and Procedural Rights
GOVT 446 International Law
GOVT 452 Administrative Law and Procedures
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. A minor in public policy and management requires 18 credits of government courses, including GOVT 103 Introduction to American Government, GOVT 351 Introduction to Public Administration, and four additional courses from the following:

- 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

■ 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.

■ Accelerated Master’s Program in Public Administration
Highly qualified undergraduates may apply to the accelerated master’s degree program and obtain both BA 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
The MS in biodefense provides students with a background in the foundation of science and technology of biodefense and the specialized areas of threat assessment, nonproliferation, and medical and public health preparedness.

Admission 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 (may be waived if applicant holds an advanced degree)

Degree Requirements
Students must successfully complete 30 credits distributed as follows. Students may do an optional thesis or project with approval of the program director or complete the degree with additional electives.

- 4 core courses (12 credits): BIOD 604, 605, 607, PUAD 631
- 3 credits of colloquium BIOD 702
- 9–15 credits of BIOD electives
- Optional 3–6 credits of thesis (BIOD 799) or 1–3 credits of project (BIOD 798)

The thesis option involves original research and independent acquisition and interpretation of data. Students pursuing the thesis option must defend their thesis and present their results in a public seminar. The project option may be employment-related research, a comprehensive report resulting from an internship, or a publication-quality professional paper. Students pursuing the project option must successfully complete written and oral comprehensive exams. See the Academic Policies chapter of the catalog for policies governing all master’s theses.

■ Biodefense, PhD
The doctoral program in biodefense integrates knowledge of potential pathogenic agents used in biological warfare with 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.

Admission 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
- Scores from GRE taken within five years prior to date of application (may be waived if applicant holds an advanced degree)

**Degree Requirements**

Students must successfully complete a minimum of 72 graduate credits. In addition to core courses and a colloquium, students develop a program of study in consultation with a faculty advisor. Following completion of all required coursework, students pass a doctoral candidacy exam, are advanced to candidacy by the dean, and complete a dissertation. The dissertation consists of an original and independent research project in biodefense and demonstrates mastery of the subject matter, as well as required methodologies.

- Four core courses (12 credits): BIOD 604, 605, 607, PUAD 631
- 3 credits of colloquium BIOD 702
- Elective course work chosen in consultation with an advisor to build area of expertise, prepare student for doctoral exams, and lead to dissertation research
- 12–24 credits of dissertation proposal and research: BIOD 998, 999

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 upon approval of the dissertation committee and the dean. The dissertation format must be reviewed and approved by the dissertation/thesis service coordinator in University Libraries. See the Academic Policies chapter of the catalog for policies governing all doctoral degrees and dissertations.

**Reduction of Credit**

For students entering the doctoral program with a master’s degree or other graduate credit, the number of required credits may be reduced by a maximum of 30 credits with the approval of the director of the program and the dean.

**Political Science, MA**

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 politics, or international relations and 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 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 and Admission**

Admission is in the fall and spring. Late applications are considered on a space-available basis. In addition to university graduate admissions requirements, applicants to the master’s in political science should submit three letters of recommendation, preferably from recent professors; GRE scores; résumé listing employment and volunteer work; and a statement of interests and career goals. A writing sample is strongly recommended.

**Program Requirements**

Students complete 36 credits distributed as follows.

- 12 credits of core courses: GOVT 510, 540, 500, 520
- 9–15 credits in a specialization in American government, or international politics and comparative government: 6 credits of seminars, and 3–9 credits of electives
- 3 credits of course work beyond GOVT 500 in quantitative or qualitative research methods chosen from GOVT 715, PUAD 612, or other courses approved by the program coordinator in this or other departments
- 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 read and approve the thesis if this option is selected. Arrangements for any of these options should be made with the advisor.
- Remaining credits from additional courses with an internship or in the specialization, including 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. Courses in other departments that complement an American specialization include HIST 628 Immigration and Ethnicity in the United States or ECON 828 Constitutional Economics. Courses that complement an international and comparative specialization include GEOG 581 World Food and Population or PUBP 550 Peace Operations.

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**

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.

Admission 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.

Program Requirements
The degree requires 72 credits of course work divided among foundation 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 three major fields: American politics and government, international relations and comparative politics, or public administration.

The course work is distributed as follows:
• Foundation courses: 12 credits in American politics, international relations and comparative politics, political theory, and research methods
• Major field courses: at least 18 credits of advanced courses in one field, including two field seminars. For American politics, select two field seminars from GOVT 605, 703, or 706; for international relations and comparative politics, the field seminars include GOVT 631 and 641; for public administration, the field seminars include GOVT 650 and GOVT 755.
• Minor field courses: at least 12 credits of advanced course work in a second field to be designed by the student and with written approval of student’s advisor on the education plan
• Advanced methodology courses: at least 6 credits in addition to GOVT 500 Research Methods in Political Science. Must include GOVT 715, and one other course in quantitative or qualitative methods. The last of the three methodology courses should be tailored to the student’s dissertation research needs.
• Opportunity for experience in government and politics: Up to 6 credits (20 hours per week in the field for one semester or 10 hours per week for two semesters). Students will produce an academic paper at the conclusion of the experience discussing the implications of their observations for research in the field and how scholarship in the field might be applied to an issue faced by the organization.

Altogether, up to 12 credits may be taken in other departments to fulfill minority portions of any of the requirements, including the methodology requirement.
• Dissertation proposal: 3–6 credits
• Dissertation: 15 credits

Students must demonstrate proficiency in the statistical, mathematical, and computational techniques used for political science research or in one foreign language at an advanced level of reading and comprehension. Proficiency will be determined by satisfactory course work in methods or exam at the time of the qualifying exam for language proficiency.

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 master’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
After students have completed their course work and demonstrated proficiency in either quantitative methods or a foreign language, they take a written qualifying exam. Upon successful completion, the student is advanced to candidacy and may select a dissertation committee. The chair and one member must be from the Department of Public and International Affairs, and one member must be from the graduate faculty from outside the department. The student must offer a successful public defense of the dissertation proposal before registering for 999 dissertation credits.

Public Administration, MPA
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.

Admission 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 Admission 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 courses (18 credits) of core courses
  - PUAD 502 Introduction to Public Administration
  - PUAD 611 Problem Solving and Data
  - PUAD 620 Organizational Theory
  - PUAD 640 Public Policy Process
  - PUAD 700 Ethics and Public Administration
  - PUAD 703 Third-Party Governance
- One additional methods course (3 credits) chosen from:
  - PUAD 612 Problem Solving and Data II
  - PUAD 613 Economic Analysis for Public Administration
  - PUAD 741 Policy Analysis
  - PUAD 742 Program Evaluation
- One course (3 credits) in accounting, budgeting, and financial management chosen from:
  - PUAD 660 Accounting and Finance
  - PUAD 662 National Budgeting
  - PUAD 663 State and Local Budgeting
  - PUAD 664 Nonprofit Financial Management
- Four courses (12 credits) of electives

Students may take their elective courses within one of the concentrations listed below. Alternatively, 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
- Four courses (12 credits) chosen from the following:
  - PUAD 730, 781; CONF 501; JLCP 509, 510, 691, 740, 741, 742, 743, 749, 781; SOCI 607, 608, 609

Concentration in Emergency Management and Homeland Security
- Four courses (12 credits) chosen from the following:
  - PUAD 630, 631, 632, 633, 634, 635, 727, 731, 738; COMM 637; PUBP 742, 754, 758

Concentration in Environmental Science and Public Policy
- One required course (3 credits)
  - PUAD 642
- Three elective courses (9 credits) chosen from the following:
  - Electives for students with a previous major in science:
    - PUAD 730, 741, 749, 758; BIOL 607, 641; EVPP 675
  - Additional electives for students who desire more science (in place of BIOL 607):
    - BIOL 546, 547, 550
  - Electives for students with little or no science background:
    - PUAD 730, 741, 749, 758; BIOL 607; BIOL 670 or PRLS 501 (to be taken after BIOL 607)

It is recommended that students complete an undergraduate introductory biology sequence (BIOL 102, 103 or BIOL 211, 212), even though the courses in these sequences cannot be applied to the graduate degree.

Concentration in Human Resources Management
- One required course (3 credits)
  - PUAD 670
- Three elective courses (9 credits) chosen from the following:
  - PUAD 652, 671, 729, 730; PSYC 631, 635, 638, 639, 640, 667

Concentration in International Management
- One required course (3 credits)
  - PUAD 504
- Three elective courses (9 credits) chosen from the following:
  - PUAD 634, 636, 730, 738, 739; GOVT 540, 631
  - CONF and ITRN courses with written prior approval of an advisor.

Concentration in Nonprofit Management
- Two required courses (6 credits)
  - PUAD 505 and 659
- Two elective courses (2 credits) chosen from the following:
Concentration in Policy Studies
• Four courses (12 credits) chosen from the following:
  PUAD 615, 622, 661, 663, 680, 727, 730, 741, 742, 749, 750, 781; GOVT 520, 605, 703

Concentration in Public Management
• Four courses (12 credits) chosen from the following:
  PUAD 615, 622, 623, 660, 661, 662, 663, 664, 670, 680, 720, 729, 730, 731, 742, 750, 781

Concentration in Public and Nonprofit Finance
• Four courses (12 credits) chosen from the following:
  PUAD 660, 661, 662, 663, 664, 729, 730, 769

Concentration in State and Local Government
• Four courses (12 credits) chosen from the following:
  PUAD 505, 615, 623, 630, 651, 660, 661, 662, 663, 680, 729, 730, 750, 759, 781

Concentration in Third-Party Governance
• Four courses (12 credits) chosen from the following:
  PUAD 613, 622, 623, 635, 636, 659, 750

Certificate Programs
The department offers four graduate certificates. Applications for admission are made through the Office of Graduate Admissions. Admission requirements for the certificate programs are the same as for the MP A Program.

To receive a certificate, students must complete five courses (15 credits).

■ Certificate in Administration of Justice
• Three required courses (9 credits)
  PUAD 502; JLCP 509, 691
• Two JLCP electives (6 credits)

■ Certificate in Association Management
• Three required courses (9 credits)
  PUAD 659, 664, 657
• Two electives (6 credits) in the nonprofit area

■ Certificate in Emergency Management and Homeland Security
• Three required courses (9 credits)
  PUAD 630 Emergency Planning and Preparedness
  PUAD 631 Disaster Response Operations and Recovery
  PUAD 632 Homeland Security: Terrorism, Threat, and Vulnerability Analysis
• Two emergency management and homeland security electives (6 credits)

■ Certificate in Nonprofit Management
This certificate is offered in class or online.
• Three required courses (9 credits)
  PUAD 505, 664, 659
• Two electives (6 credits) in the nonprofit area

Religious Studies
Phone: 703-993-1290
Web: religious.gmu.edu

Faculty
Associate professors: Burns, M. Dakake, M. Farina, Nguyen, Ro (chair), Shiner
Adjuncts: Ben-Gideon, Catlett, D. Dakake, D. Glazer, Hebbar, Hostetter, Mairena

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.

The credits are distributed as follows:
• 6 credits of introduction to the main world religions:
  RELI 211 Religions of the Near (Middle) East
  RELI 212 Religions of the Orient
• 3 credits in a writing-intensive seminar taken during the senior year (RELI 420)
• 6 credits in courses emphasizing comparative or methodological aspects of the study of religion, including:
  ANTH 313 Anthropological Perspectives on Religion
  PHIL 313 Philosophy of Religion
  RELI 337 Mysticism: East and West
  RELI 341 Global Perspectives on Spirituality and Healing
  RELI 490 Comparative Study of Religions
  SOCI 385 Sociology of Religion

When the subject matter is appropriate, with the approval of the undergraduate coordinator, RELI 376 may be used to fulfill the comparative or methodological requirement.

• A minimum of 12 credits in 300- or 400-level RELI courses 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 must complete 15 credits distributed as follows:
- Three core courses (9 credits):
  - RELI 370 Judaism: Life and Thought
  - RELI 371 Classic Jewish Text
  - HIST 388/SOC 450 The Holocaust: The Construction of Social History through Survivor Testimonies or HIST 461 Arab-Israeli Conflict
- Two elective courses (6 credits) chosen from:
  - HEBR 150 Introduction to Biblical Hebrew
  - HIST 465 The Middle East in the 20th Century
  - RELI 211 Religions of the Near East
  - RELI 352 Judaism from Exile to Talmud
  - RELI 372 American Judaism
  - RELI 373 Varieties of Jewish Expression

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.

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. The minor consists of 18 credits, at least 9 of which must be in 300- and 400-level courses. Three credits must be taken from one of the following: RELI 100 The Human Religious Experience, RELI 211 Religions of the Near (Middle) East, or RELI 212 Religions of the Orient. Students must earn a minimum grade of 2.00 in each course applied to the 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), Wade (History and Art History)

Approved Courses
Department of Modern and Classical Languages:
- RUSS 101, 102, 109, 201, 202, 209 (subject to language proficiency exam), 302, 303, 310, 311, 325, 326, 327, 353, 354, 380, 381, 401, 407, 410, 470, 480, 481, 490, 491

Department of Geography and Earth Science:
- GEOG 330

Department of History and Art History:
- HIST 328, 392, 426

UNDERGRADUATE PROGRAM

Russian Studies, BA

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.

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
- 6 credits of RUSS 380 and 381
- 3 credits of RUSS 480 or 481 (preferably both)
- 6 credits of Russian literature (may simultaneously satisfy university general education literature requirement)
- 9 credits of additional upper-level courses bearing the RUSS course code, two of which must be selected from the following: 302, 303, 310, 311, 401, 410, and 480 or 481 (whichever is not taken to fulfill the third requirement above)
- 3 credits of RUSS 353 or HIST 328 (RUSS 353 may simultaneously satisfy the college-level non-Western culture requirement, and the university-wide synthesis requirement; HIST 328 may simultaneously satisfy either the college-level non-Western culture requirement or the university-wide global understanding requirement)
- 3 credits of RUSS 354 or HIST 329 (may satisfy either the college-level non-Western culture requirement or the university-wide global understanding requirement)
- 3 credits of GEOG 330 or GOVT 338 (may satisfy the college level social science requirement)

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.

Approved Courses
Department of Modern and Classical Languages:
- RUSS 101, 102, 109, 201, 202, 209 (subject to language proficiency exam), 302, 303, 310, 311, 325, 326, 327, 353, 354, 380, 381, 401, 407, 410, 470, 480, 481, 490, 491

Department of Geography and Earth Science:
- GEOG 330

Department of History and Art History:
- HIST 328, 392, 426
Department of Public and International Affairs:
GOVT 338, 447
Cognate courses: ANTH 114; ARTH 360, 362; ECON 380; GEOG 103; GOVT 132; THR 351, 352

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
Robinson Professors: Dumont (anthropology), Weitzman (sociology)
Emeritus faculty: Black, Golomb (anthropology); Tavani (sociology)
Professors: Gusterson, Lancaster, Seligmann, Williams (anthropology); Dennis, Scimecca, Vallas (chair) (sociology)
Associate professors: Haines, Palkovich, Sneed, Trencher (anthropology); Best, Guagnano, Hanrahan, Jacobs, Rader, Rosenblum (sociology)
Assistant professors: Benitez (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, Dolphins, 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
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. In addition to satisfying university-wide general education requirements and requirements for the BA degree in CHSS, students majoring in anthropology must complete the following 36 credits with a minimum GPA of 2.00:

• 9 credits of four-field requirement:
  Archaeology: ANTH 120 or ANTH 420
  Biological anthropology: ANTH 135 or ANTH 365
  Linguistic anthropology: ANTH 380

• 18 credits of 300- and 400-level electives
  SOCI 311 and 313 may be applied toward the 18-credit elective requirement. LING 326 General Linguistics may substitute for ANTH 380. 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 492h (for those focusing on sociocultural anthropology) or ANTH 420h (for those interested in archaeology or biological anthropology). All honors candidates will undertake additional research leading to the completion of an honors thesis in ANTH 499h. For more information, contact the anthropology coordinator at 703-993-1334.

Minor in Anthropology
Students must complete 21 credits in anthropology with a minimum GPA of 2.00. All emphases require ANTH 114, 120, 135, or 332; and 430, 450 or 410. See an advisor in the department for more information.

For policies governing all minors, see Minors under the Undergraduate Academic Program section in the Academic Policies chapter of this catalog.

The Department of Sociology and Anthropology coordinates the concentration in anthropology within the master of arts degree in individualized studies (MAIS).

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...
Global Sociology

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 must complete SOCI 320 and choose 9 credits from SOCI 307, 308, 332, 326, 340, 341 (depending on topic), 523, and ANTH 332.

Inequality and Social Change

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, counter-organizations, 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 must complete SOCI 355 and choose 9 credits from SOCI 300, 308, 310, 315, 332, 340, 360, 390, 395 (depending on topic), 450, and 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

To receive a minor, students must complete 21 credits in sociology courses with a minimum GPA of 2.00, including SOCI 101 and 311, each with a minimum grade of 2.00. 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.

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.
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. Admitted students are able to use up to 6 graduate credits in partial fulfillment of requirements for the undergraduate degree. On completion and conferment 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.

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

Anthropology, MA

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. Course work progresses from core courses to more advanced courses and culminates in a thesis.

Assistantships

The Department of Sociology and Anthropology offers a limited number of merit-based graduate assistantships.

Nondegree Status

Students with a 3.00 or above who do not wish to pursue a degree or who have not supplied all required documents to be considered for admission may enroll as nondegree students. Nondegree students may later apply for admission to the degree program, and up to 9 credits earned in nondegree status may be applied to the master’s degree, subject to the approval of the program director and the dean.

Admission Requirements

In addition to meeting general admissions requirements for graduate study, applicants must submit:

- Three letters of recommendation from faculty members or others who can evaluate the applicant’s academic accomplishment (If possible, at least one letter should be from an academic setting.)
- A 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:

- Five required core courses (15 credits): ANTH 535, 536, 635, 650, 750
- Three to five elective courses (9–15 credits) chosen from advanced courses in anthropology. Up to 6 credits may be from other programs, subject to the approval of the director.
- 6–12 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

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. If possible, at least one should be from an academic setting.
- A written statement (approximately 600 words) explaining the student’s interest in sociology
- An undergraduate GPA of 3.00

Nondegree Status

Students who do not wish to pursue a degree or have not supplied all required documents to be considered for admission may enroll as nondegree students. These students may later apply for admission to the degree program. With approval and subject to university policy, a maximum of 12 graduate credits earned prior to enrollment as a degree-seeking student may be applied to a master’s degree.

Degree Requirements

Students are required to complete 33 credits distributed as follows:

- 6 credits of social theory (SOCI 611 and 612)
- 9 credits of research methods and statistics, including SOCI 530 and SOCI 531
- 3–6 credits of master’s thesis (SOCI 799)
- Elective credits

Emphasis in General Sociology

Additional sociology electives
Emphasis in Sex and Gender
9 credits in sex and gender (SOCl 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 (SOCl 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 Sociology of Culture; 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 Histories of Cultural Studies I.

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.

Financial Aid
The Department of Sociology and Anthropology offers a limited number of graduate assistantships. For more information, call 703-993-1440.

Women’s Studies
Phone: 703-993-2896
Web: wmst.gmu.edu

Faculty
Amireh, Baker, Beach, Bergoffen, Best, Borkman, Bridge, Bullard, Burr, Carbonneau, Cattaneo, Censer, Cheldelin, Cherubin, Christensen, Cohen, Constantine, Copelman, Davidson, Davis, Deshmukh, Dunne, Eby, Feit, ffolliot, Fischer, Friedley, Fuchs, Fyfe, Gilbert, Gould, Gring-Pemble, Hamdani, Hanrahan (director), Harvey, Hodges, Horton, Irvine, Jadallah, Johnsen-Neshati, Jordan, Kaplan, Karametou, Kirkland, Koch, Lont, Mann, Masters, Michals, Misencik, Mobley, Muir, Oates, Palkovich, Pascarel, Pawloski, Rabin, Regan, Ricouart, Rosenblum, Rosenzweig, Samuelian, Sandole-Staroste, Scott, Seligmann, Shogan, Snyder, Stearns, Tichy, Todd, Tolchin, Travis, Vivancos Perez, Weitzman, Yocom, Zawacki

Course Work
Women’s studies offers all course work designated WMST in the Course Descriptions chapter of this catalog. By choosing to pursue work in women’s studies, students at all levels engage in an interdisciplinary exploration of women’s roles in social, political, and economic life; women’s 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 women’s and men’s lives; and the ways in which gender stereotypes influence men’s and women’s ideas of themselves and expectations of each other. Students in many courses have the opportunity to investigate these issues in a cross-cultural perspective and examine the effect of globalization on women’s lives around the world.

UNDERGRADUATE PROGRAM

Minor in Women’s Studies
Women’s Studies is an interdisciplinary program open to the entire undergraduate student body.

Requirements
Students in this minor complete 21 credits with a minimum GPA of 2.00, distributed as follows:

- Two required courses (6 credits):
  - WMST 200 Introduction to Women’s Studies
  - WMST 330 Feminist Theories across the Disciplines
- At least one course (3 credits) selected from WMST courses:
  - WMST 301 Sex and Gender in Contemporary Society
  - WMST 302 Cultural Constructions of Sexualities
  - WMST 303 Psychology of Women
  - WMST 304 Women and Media
  - WMST 305 Women and Literature
  - WMST 306 Topics in Communication and Gender
  - WMST 400 Internship in WMST
- Four courses (12 credits) selected from courses in women’s studies, courses cross-listed with women’s studies, or course offerings in other departments approved by the director. No more than 6 credits may be taken in any one department.

GRADUATE PROGRAM

Certificate in Women’s 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 in accordance with university policy.

Requirements
Students must complete 15 graduate credits, distributed as follows, and a capstone portfolio.

- Two required courses (6 credits)
  - WMST 630 Feminist Theories across the Disciplines
  - WMST 640 Women and Global Issues
- 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, courses in the women’s studies program, and in appropriate directed readings or independent study courses. Recently WMST 600 courses have included:
Global Representations of Women
Gender and Sexuality in Early America
Civil Rights and Citizenship
Bodies in Question
19th-Century American Women
Seminar in Child and Family Welfare
Conflict and Gender
Women and the Law

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 women’s 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’s Studies Research and Resource Center where it will be presented, displayed, and archived.

See MAIS section of this chapter for MAIS concentration in Women’s 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.

Two degree programs are housed in NCC: bachelor of arts in integrative studies and bachelor of science in integrative studies.

Administration
Nance Lucas, associate dean
Kelly Dunne, director of academic affairs
Sarah Sweetman, director of student services

Faculty
Professors: Oates, O’Connor
Associate professors: Eby, Gabel, Garner, Gring-Pemble, Lucas, Muir, Smith, T. Wood
Assistant professors: Cambridge, Wingfield
Term assistant professors: Scott, Szulczewski
Term instructor: Smith
Adjunct faculty: Andrews, Bernard, Fuertes, Holder, Johnson, Orrell, Petro, Raffel, Ryan, Schedler, Sepehrrad, Underwood, Uy-Tioco, West

Centers
Center for Field Studies
Greg Justice, program manager
Center for Leadership and Community Engagement
Heather Hare, associate director

Course Work
NCC offers all course work designated NCLC in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Integrative Studies, BA, BS
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. Although there are many possibilities, the following are some examples of the programs of study that have been created: preprofessional (medicine, law, education), conservation studies, child and family studies, organizational administration, and leadership studies.

In the first year, students take four highly focused, interdisciplinary courses (8 credits), 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. Preprofessional majors follow a program of study best suited to their particular goals. 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 objectives, and the likelihood the student will benefit from the curriculum.

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
Curriculum Requirements

The curriculum has four major components. Division I is the first year of common courses, experiences, and integrated learning; it is also known as the “First-Year Experience.” 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). A student may join learning communities or take courses in other academic units in the university any time after the First-Year Experience.

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: a four-unit, common curriculum. Each learning community (NCLC 110, 120, 130, 140) is six or seven weeks long and separated by two-week intersims 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 intersims 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 present a portfolio of their work, as well as a culminating college senior exposition. This is done through NCLC 491 Senior Capstone, which students are required to take the semester prior to graduation.

Division IV, experiential learning requirement: A minimum of 12 credits of experiential learning (including internships) are required toward fulfilling 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 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.

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 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 times 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.

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 Leadership Theory and Practice (4 credits)
  NCLC 375 Special Topics: Ethics and Leadership (3 credits)
  NCLC 435 Leadership in a Changing Environment (4 credits)

• One course (1–3 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 of the minor for courses to apply to this requirement.
  COMM 349 Student Leadership Seminar (1 credit)
  NCLC 195 Alternative Spring Break (1 credit)

• One or more elective courses (3–4 credits) chosen from the experiential learning options above or from the following. Courses are 3 credits unless otherwise specified.
  AVT 309/NCLC 346 Art as Social Action (4 credits)
  AVT 370 Entrepreneurship in the Arts (4 credits)
  CONF 300 Conflict Resolution Techniques and Practice
  CVPA 305 Seminar in Arts Management
  DESC 456 Quality Management
  EDUC 303 Politics of American Education
  EVPP 361 Environmental Politics
  FNAN 401 Advanced Financial Management
  GOVT 430 Comparative Political Leadership
  HEAL 323 Program Leadership and Evaluation
  HSCI/NURS 436 Leadership and Management in Healthcare
  IT 304 IT in the Global Economy
  MGMT 413 Organizational Development and Management Consulting
  MIS 435 Knowledge Management
  MKTG 471 Marketing Management
  MLSC 300 Applied Leadership I (1 credit)
  MLSC 400 Leadership Management, MLSC 401 Leadership and Ethics
  MSOM 301 Managing People and Organizations,
  MSOM 302 Managing Information in a Global Environment, MSOM 305 Managing in a Global Economy, MSOM 306 Managing Projects and Operations (3 credits)
  PRLS 316 Outdoor Education and Leadership
  PSYC 231 Social Psychology
  PSYC 333 Industrial and Organizational Psychology
  SOCI 307 Social Movements and Political Protest
  TOUR 330 Resort Management

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.

■ Interdisciplinary Minor in Nonprofit Studies
NCC and the Department of Public and International Affairs coordinate the minor in nonprofit studies. See the Interdisciplinary Minors section of this chapter for a description.
The Volgenau School of Information Technology and Engineering

Phone: 703-993-1505
Web: volgenau.gmu.edu

Administrative Units
Department of Applied Information Technology
Department of Civil, Environmental, and Infrastructure Engineering
Department of Electrical and Computer Engineering
Department of Information and Software Engineering
Department of Mathematics
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. Eight bachelor’s degree programs are offered: applied computer science, electronics and communications engineering, civil and infrastructure engineering, computer engineering, computer science, electrical engineering, information technology, and systems engineering. Minors in information technology, computer science, software engineering, and data analysis are also available.

Twelve master’s degree programs are available: civil and infrastructure engineering, computer engineering, computer science, e-commerce, electrical engineering, information security and assurance, information systems, operations research, software engineering, statistical science, systems engineering, and telecommunications. Four doctoral programs are offered: a cross-disciplinary program in information technology and more focused programs in computer science, electrical and computer engineering, 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; 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
Terri Mancini, Director, Sponsored Research Administration
Melinda Barnhart, Director, Finance and Personnel
Nicole Sealey, Manager, Graduate Admissions
Jonathan Goldman, Director, Computing Resources
Jennifer Lamb, Director of Development

Bachelor of Science
The Volgenau School offers eight programs in its academic units. Policies regarding admission and degree requirements are provided in the department sections that follow.

<table>
<thead>
<tr>
<th>BS Degree</th>
<th>Department</th>
</tr>
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<tbody>
<tr>
<td>Applied computer science</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Civil and infrastructure</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>Electrical engineering</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>Electronics and communications engineering</td>
<td>Electrical and Computer Engineering</td>
</tr>
</tbody>
</table>

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 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/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, IT 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 departmental 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, information technology, 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 departmental 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 E. 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 fine arts. Whenever there is uncertainty, students must consult with an academic advisor in their departments. 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

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>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 and assurance</td>
<td>Information and Software Engineering</td>
</tr>
</tbody>
</table>


Doctor of Philosophy
The Volgenau School offers PhDs in computer science, electrical and computer engineering, information technology, 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.

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 information technology.

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 of the credits must be in courses numbered 700 or higher, and these 12 credits cannot include directed-reading, 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 possible.

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 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 accepted as a candidate 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 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. After successfully completing this requirement, students are formally accepted as a candidate for the engineer degree.

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 information technology. This document must meet format guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects. If the candidate successfully defends the project, the supervisory committee recommends that the final form of the project be completed and the 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 will be 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, 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.

Applied Information Technology

Phone: 703-993-3565
Web: ait.gmu.edu

Faculty

Professors: Gantz (chair), Jajodia
Associate Professors: Caraballo, Marchant, Snow (associate chair)
Assistant Professors: Aksoy, Bruno, Rytkova
Instructors: d’Alessandro, Islam, Lyons, Quinn, Sanghera
Adjunct professors: Berkebile, Capanera, Curtis, Enochson, Falcone, Fayyaz, Flagel, Fox, Ghosh, Guessford, Halijur, Kahrl, Lazarevich, Lord, McKelvey, Montana, Moody, Musca, Nguyen, Phung, Reo, Santucci, Schorling, Song, Truong, Vito, Wong, Zabin

Information Technology, BS

The BS in information technology prepares students to apply information technology 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 information technology, including the opportunity to learn appropriate conceptual and computational tools essential for a successful career
- A broad background across fundamental areas of information technology 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 information technology 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 information technology areas
- Appreciation for the global influence of information technology on society and an understanding of the ethical and social responsibilities of information technology professionals...
The BS in information technology aims to meet the existing and emerging needs of the information technology industry by educating new information technology workers in current principles and practices in information technology and its applications. Graduates are versed in the technical aspects of information technology, but their role in the modern enterprise will focus on the use and management of information technology resources rather than on the development of leading-edge intellectual property. Graduates fill jobs that focus on the application of information technology 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 information technology 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 semesters with an average of 15 credits each semester, as shown in the sample schedule below. It is also possible for students to complete the degree on a part-time basis. The 120-credit degree requirement consists of Mason general education requirements, information technology foundation and core courses, and courses required for the chosen information technology concentration area. 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
Students must complete requirements for at least one of the following four concentration areas: information security, networking and telecommunications, database technology and programming, and web development and multimedia. Students must select four courses from their area of concentration and a fifth course from any of the chosen concentration. An up-to-date list of courses associated with the concentrations is available in the department.

Foundation, Core, Concentration Requirements
In addition to Mason general education requirements, including humanities and social sciences as well as mathematics and basic sciences, the BS in information technology requires information technology foundation, core, and concentration courses as described below. The information technology major also requires a 7-credit capstone design project to be completed over two consecutive semesters.

Foundation courses
IT 101 Introduction to Information Technology .........................3
IT 103 Introduction to Computing ...........................................3
IT 108 Programming Fundamentals .......................................3
IT 212 Computer Hardware Fundamentals ............................3
IT 250/STAT 250 Introductory Statistics I ............................3

Core courses
IT 207 Applied IT Programming ...........................................3
IT 213 Multimedia and Computer Graphics .........................3
IT 214 Database Fundamentals ............................................3

Credits

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
IT 250/STAT 250 Introductory Statistics I ..............................3
Non-lab natural science .......................................................3
Literature .............................................................................3
Total ..................................................................................15

Third Semester
IT 207 Applied IT Programming
or IT 208 Program Design and Data Structures .................3
IT 212 Computer Hardware Fundamentals .........................3
IT 214 Database Fundamentals ............................................3
Natural science with lab ......................................................4
Social/behavioral science ...................................................3
Total ..................................................................................16

Two-semester sequence of approved capstone design courses
IT 492 Senior Design Project I .................................................3
IT 493 Senior Design Project II
or IT 468 Cyber Security Capstone ......................................4

Information technology concentration courses
Students choose one of four concentrations: information security, networking and telecommunications, database technology and programming, or web development and multimedia. To fulfill the requirements for a concentration, students must earn 15 credits made up of four courses from their chosen concentration and a fifth course chosen from any of the four concentrations. A list of the courses in each concentration may be obtained from the department.

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 IT/STAT 250 Introductory Statistics I (3 of these credits apply toward general education requirements).
Fourth Semester
IT 213 Multimedia and Computer Graphics.........................3
IT 223 Information Security Fundamentals........................3
MATH 112 Discrete Math for BTIS.................................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 IT 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
or IT 468 Cyber Security Capstone ................................4
IT concentration course..............................................3
IT concentration course..............................................3
Elective....................................................................3
Total ........................................................................13

Writing-Intensive Requirement
The university writing-intensive requirement is satisfied by
IT 492.

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 information technology foundation, core,
capstone, and concentration courses.

BS in Information Technology/
Accelerated MS in Information
Security and Assurance
See the Information and Software Engineering Department
section.

BS in Information Technology/
Accelerated MS in Information
Systems
See the Information and Software Engineering Department
section.

BS in Information Technology/
Accelerated MS in Software
Engineering
See the Information and Software Engineering Department
section.

BS in Information Technology/
Accelerated MS in
Telecommunications (TCOM)
See the Telecommunications MS section.

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 information technology knowledge,
and skills to improve their attractiveness to employers in the
high-technology community. The information technology cer-
tificate 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
information technology advisor.

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 information technology knowledge. It is also necessary to
give students the necessary skills to improve their attractive-
ness 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 information technology
minor should obtain a list of approved electives from IT.

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
Civil, Environmental, and Infrastructure Engineering

Phone: 703-993-1675
Web: www.civil.gmu.edu

Faculty
Professors: Arciszewski, Bronzini (chair), Houck
Associate professors: deMonsabert, Flannery, Venigalla
Assistant professors: Casey, Urgessa
Adjunct professors: Binning, Chase, Chipley, Choudhury, Furey, Freas, Gagne, Goode, Hartmann, Harrop-Williams, Kirby, Liner, Matusik, Miller, Shacochis, Taori, Ward, Zobel

Introduction
The Civil, Environmental, and Infrastructure Engineering (CEIE) Department administers two degree programs: a BS and an MS in civil and infrastructure engineering. These degree programs complement the study of civil and environmental engineering with advances in 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, MD 21202-4012; 410-347-7700.

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 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; stormwater management; public utilities; energy supply and distribution; telecommunications; buildings, facilities, and structures; and solid waste management.

Course Work
The department offers courses designated CEIE in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAM

Civil and Infrastructure Engineering, BS
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 junior engineers 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 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 information technology 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 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, 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

| First Semester | 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 I 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
Literature ........................................................................ 3
Total .................................................................................. 13

Fourth Semester
CEIE 250 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 Engineers and Scientists I ......................................................... 3
Total .................................................................................. 15

Fifth Semester
CEIE 301 Engineering 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
Global understanding ...................................................... 3
Arts ..................................................................................... 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 Resources Engineering ......................... 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 elective credits, 3 credits of a CEIE transportation technical 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 if 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 may apply to have the BS degree conferred during the semester in which they expect to complete the BS requirements. The master’s degree is granted upon completion of MS requirements.

GRADUATE PROGRAMS

Civil and Infrastructure Engineering, MS
The MS program educates students in the theory and practice of civil, environmental, and infrastructure engineering. Information technology 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 and 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 information technology 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 and security engineering
- Land development engineering
- 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 Civil Infrastructure and Security Engineering
This program is appropriate for civil infrastructure (such as transportation, water and wastewater, and utilities) owners 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 information technology with a systems approach to analyze the complexity of and interaction among various infrastructure components and their performance. Currently, the most important challenge of 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:
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.
■ MS in Civil and Infrastructure Engineering
To earn the MS degree with a specialization in infrastructure management, students complete an additional 12 credits of course work, a 3-credit project, and a minimum of 10 graduate seminars approved by the CEIE Department for the degree program.

■ Certificate in 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 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.

■ PhD Study in Civil, Environmental, and Infrastructure Engineering
Doctoral study in civil, environmental, and infrastructure engineering 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.

Computer Science
Phone: 703-993-1530
Web: cs.gmu.edu

Faculty
Professors: DeJong, Hamburger (emeritus), Menasce, Pullen, Rine (emeritus), Sood, Tecuci, Wechsler
Assistant professors: Aydin, S. Chen, Lien, Ly, Zhong
Instructors: Maddox, Nordstrom
Adjunct professors: Ahmed, Baldo, Clausen, Geldon, Tompkins

Introduction
Computer science is the discipline concerned with the design, implementation, and maintenance of computer systems used in almost all other professions. Computer scientists must be well-grounded in the technologies needed for the acquisition, representation, storage, transmission, transformation, and use of information in digital form, and capable of working closely with members of other professions associated with computing.

Course Work
The Computer Science Department offers all courses designated CS in the Course Descriptions chapter of this catalog as well as some of the IT courses.

UNDERGRADUATE PROGRAMS
■ Computer Science, BS
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, MD 21202-4012.

For the BS degree, students must complete 120 credits, including the university general education requirements and all of the following:
• Computer science core (33 credits): CS 101, 105, 112, 211, 306, 310, 330, 365, 367, 421, and 483; and ECE 303. 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 MATH 481 and STAT 344. MATH 105 and 108 cannot be counted toward this degree.
• Computer science-related courses: 6 credits chosen from STAT 354; or 335, 441, 442; ECE 280, 431, 442, 447, 450, 511; SWE 432; SYST 371, 470; PHIL 371, 376; and any MATH or CS course numbered above 300 (except MATH 351). Students must 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: Computer science students in either course must make a technical presentation. The course fulfills the general education requirement in oral communication for Volgenau School students.
• 3 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 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 ..............................................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 ........................................................................3
Social and behavioral science ........................................3
Total ...........................................................................14

Third Semester
ECE 303 Digital Design and Hardware/Software Integration ..................................................4
MATH 213 Analytic Geometry and Calculus III ..............3
Natural science course ..................................................4
Social and behavioral science ........................................3
General elective ..........................................................3
Total ...........................................................................16

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 ...........................................................................18

Fifth Semester
CS 330 Formal Methods and Models ...............................3
CS 365 Computer Systems Architecture .........................3
ENGL 302 Advanced Composition ..................................3
MATH 203 Matrix Algebra .............................................3
Global understanding ....................................................3
Total ...........................................................................15

Sixth Semester
CS 367 Computer Systems and Programming ..................3
CS 421 Introduction to Software Engineering .................3
STAT 344 Probability and Statistics for Engineers and Scientists I ..................................................3
Natural science course ..................................................4
Humanities ..................................................................3
Total ...........................................................................17

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 ...........................................................................15

Eighth Semester
CS 306 (Synthesis) .......................................................3
Senior computer science course ..................................3
Senior computer science course ..................................3
Computer-science related elective .................................3
General elective ..........................................................2
Total ...........................................................................16

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 (IB) 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. Computer science majors may not use more than one course with grade C- or lower toward departmental requirements.

Cooperative Education
Students may participate in the Mason cooperative education program or a work-study program in the Washington, D.C., area.

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. The Applied Computer Science (ACS) degree program is not accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

In addition to university general education requirements, including 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, 112, 211, 105; MATH 113, 114, 203, 125

ACS core (22 credits):
ECE 303; CS 310, 330, 365, 367, 421, 483

One CS course numbered above 400
At least 36 additional credits to meet course requirements of one of the concentrations.
These credits include STAT 344 Statistics and Probability or a course in statistics relevant to the concentration. Current concentrations are biology and geography.

Concentrations
Biology
Foundation (24 credits): BIOL 213, 303, 304, and 305/6; CHEM 211, 212
Core: BIOL 311, 312, 385, 482, 580
One BIOL course numbered above 300

Geography
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 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 304 Plant Biology .........................................4
- CHEM 212 General Chemistry II .............................4
- CS 330 Formal Methods and Models .......................3
- Western civilization ............................................3

**Third Semester**
- BIOL 305/6 Biology of Micro-Organisms ..................4
- CS 365 Computer Systems Architecture ..................3
- CS 367 Computer Systems and Programming ............3
- MATH 203 Matrix Algebra ....................................3
- Literature ..........................................................3

**Fourth Semester**
- BIOL 310 Genetics ...............................................4
- BIOL 482 Introduction to Molecular Biology ............3
- CS 421 Introduction to Software Engineering ..........3
- ENGL 302 Advanced Composition .........................3
- Arts .....................................................................3

**Fifth Semester**
- BIOL 385 Biotechnology and Genetic Engineering ....3
- CS 312 Biostatistics (or STAT 344) .........................3
- CS 483 Analysis of Algorithms ..............................3
- Social science ....................................................3

**Sixth Semester**
- BIOL 303 Animal Biology ......................................4
- CS 211 Object-Oriented Programming ....................3
- MATH 125 Discrete Mathematics ..........................3
- Western civilization ............................................3

**Seventh Semester**
- BIOL 350 Computer Applications in the Life Sciences 3
- BIOL Senior .........................................................3
- CS Senior ..........................................................3
- Synthesis ..........................................................3
- Elective .............................................................1

**Eighth Semester**
- BIOL 580 Computer Applications in the Life Sciences 3
- BIOL Senior .........................................................3
- Synthesis ..........................................................3
- Elective .............................................................3

### Geography Concentration

**First Semester**
- CS 101 Preview of Computer Science ....................2
- CS 112 Introduction to Programming .....................4
- ENGL 101 Composition .........................................4
- GEOG 102 Physical Geography ............................3
- MATH 113 Analytic Geometry and Calculus I ............4

**Second Semester**
- COMM 100 Oral Communications ..........................3
- CS 105 Computer Ethics and Society .....................1
- CS 211 Object-Oriented Programming ....................3
- GEOG 103 Human Geography ................................3
- MATH 114 Analytic Geometry and Calculus II ..........4

**Third Semester**
- CS 310 Data Structures ........................................3
- ECE 303 Digital Logic ...........................................4
- GEOG 101 Major World Regions ..........................3
- MATH 125 Discrete Mathematics ..........................3
- Western civilization ............................................3

**Fourth Semester**
- CS 330 Formal Methods and Models ......................3
- GEOG 110 Maps and Mapping ..............................3
- GEOG 311 Introduction to Geographic Information Systems ..3
- MATH 203 Matrix Algebra ....................................3
- Arts .................................................................3

**Fifth Semester**
- CS 365 Computer Systems Architecture ..................3
- CS 367 Computer Systems and Programming ............3
- GEOG 300 Quantitative Methods for Geographical Analysis ..3
- GEOG 412 Aerial Photography Interpretation ..........3
- Natural science ....................................................3

**Sixth Semester**
- CS 421 Introduction to Software Engineering ............3
- GEOG 310 Introduction to Digital Cartography ..........3
- GEOG 416 Satellite Image Analysis .........................3
- STAT 344 Introduction to Statistics .......................3
- Literature ..........................................................3

**Seventh Semester**
- CS 483 Analysis of Algorithms ..............................3
- ENGL 302 Advanced Composition ..........................3
- GEOG 411 Advanced Digital Cartography .................3
- GEOG Senior .....................................................3
- Elective .............................................................3

**Eighth Semester**
- CS Senior ..........................................................3
- GEOG 463 Applied Geographic Information Systems ....3
- Synthesis ..........................................................3
- Electives ............................................................4

### BS/Accelerated MS in Computer Science

This program is for those interested in immediately continuing 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 the following courses: 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 may apply to have the BS degree conferred during the semester in which they expect to complete BS requirements. At the completion of the MS requirements, a master’s degree is granted.

Postbachelor Certificate in Computer Science
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 303

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
CS 583; and two of CS 540, 571, and 580

GRADUATE PROGRAMS
In addition to offering the MS and PhD in computer science, the department participates in the PhD in Information Technology Program.

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 theoretical computer science; systems, networks, and information security and assurance; programming languages and software engineering; artificial intelligence and databases; and visual computing. Graduate classes are divided into basic graduate 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 365). 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 mathematics 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 (at least 15 credits) must qualify as “advanced” by having suitable graduate courses as prerequisites.
- Advanced classes have to be taken from three different areas. The list of preapproved classes and the areas they belong to is maintained on the Computer Science Department web site.
- At least six classes, including two advanced classes, must be designated CS.
- At least eight classes have to be taken from the list of preapproved classes. Up to two computer science-related classes, which 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. Thesis must meet relevant university requirements.

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

CERTIFICATES
Certificates in biometrics, computer games technologies, computer networking, intelligent agents, database management, data mining, information security and assurance, and software engineering are available. Course work toward these certificates can be used for credit toward the MS or PhD in computer science or information technology; however, the certificates also may be pursued concurrently with any of the graduate degree programs in the Volgenau School.

Certificate in Biometrics
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 both physical and cyberspace. In particular, biometrics aid 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 (6 credits) and three choice courses (9 credits). Projects (3 credits) can substitute for one of the choice courses. One of the three choice courses can be taken from another department, with advisor’s approval, provided that it belongs to the certificate’s area.

Courses:
- BINF 739 Signal and Image Processing for Bioinformatics
- CS 580 Introduction to Artificial Intelligence
- CS 652 Computer Graphics
- CS 673 Multimedia Computing and Systems
- CS 682 Computer Vision
- CS 686 Image Processing
- CS 688/IT 688 Pattern Recognition (required course)
- CS 750 Theory and Applications of Data Mining
- CS 774 Computational Vision
- CS 775 Advanced Pattern Recognition
- CS 777 Human-Computer Interaction
- CS 778 Biometrics (required course)
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 in 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 Computer Science Department approval:

Required of all students (12 credits):
- CS652 Computer Graphics
- CS662 Computer Graphics Game Technologies
- CS758 Networked Virtual Environments
- CS777 Human Computer Interaction

Plus one of the following:
- AVT616 Networked Art Practice
- AVT676 Sound and Music for Video and Animation
- AVT686 Three-Dimensional Video Art
- AVT688 Digital Animation
- CS633 Computational Geometry
- CS635 Multimedia Computing and Systems
- CS686 Image Processing and Applications
- CS687 Advanced Artificial Intelligence
- CS752 Interactive Graphics Software

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 in 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 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

One of the four courses can be taken from another MS or PhD program in the Volgenau School with advisor approval, provided it belongs to the certificate area.

Computer Science, PhD

Research in computer science at Mason is performed in the Department of Computer Science and the Department of Information and Software Engineering. The PhD program is administered jointly by these two departments. The 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 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 nine areas: algorithms, operating systems, networks, compilers and languages, software construction, software 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 only once in the next semester. A student who fails to pass the four exams in two consecutive semesters is dismissed from the program. Each student must attempt a set of four 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 following the 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.
Course Requirements
The course requirement for the degree is 72 credits. Of these, at most 30 credits 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), CS 800 Computer Science Colloquium (2), CS 990 Dissertation Topic Presentation (1), CS 998 Doctoral Dissertation Proposal (12), and CS 999 Doctoral Dissertation (12). 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 or the Information and Software Engineering Department. Committee membership must transcend a single department, and it is recommended that the committee include a member outside these two departments. The chair of the dissertation committee, who is also 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 the 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 the state of the art 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. Upon 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 and the dissertation committee members 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 associate dean 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 Mason’s graduate faculty 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.

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, Pachowicz, Paris, W. Sutton, Wage
Assistant professors: Barnes, Hwang, Kaps, Nelson, Peixoto
Adjunct professors: Bales, Beatty, Grondin, Guharay, Holdener, Lazarevich, Mital, Rader, Shackelford, Storey, Watson, West

Course Work
The Electrical and Computer Engineering (ECE) Department offers all courses designated ECE in the Course Descriptions chapter of this catalog. The department also offers most of the courses designated TCOM and some of the IT and ENGR courses.

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 or 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 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, which 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 functionality from the system and architecture level down to the gate level, and can 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, MD 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 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, computer engineering majors are eligible to apply through the Electrical and Computer Engineering 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 Electronic 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 are not declared majors are also invited to obtain advising at the Electrical and Computer Engineering 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, 367, 471
- **Technical elective lab (1 credit)**
- **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)
- **Fine 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/humanities course work, which is normally satisfied by the 24 credits of university general education social science/humanities courses listed above. Technical electives and technical elective lab 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 table presents a sample schedule that undergraduate computer engineering majors would pursue to obtain a bachelor’s degree.

#### First Semester

- **CS 112 Computer Science I** ........................................ 4
- **ECON 103 Contemporary Microeconomic Principles** .... 3
- **ENGL 101 Composition** ........................................... 3
- **ENGR 107 Engineering Fundamentals** ......................... 2
- **MATH 113 Analytic Geometry and Calculus I** .............. 4

**Total** ........................................................................ 16

#### Second Semester

- **CS 211 Computer Science II** ........................................ 3
- **MATH 114 Analytic Geometry and Calculus II** ............. 4
- **MATH 125 Discrete Mathematics I** ............................. 3
- **PHYS 160 University Physics I** ................................. 3
- **PHYS 161 University Physics I Laboratory** ................. 1

**Total** ........................................................................ 14

#### Third Semester

- **ECE 201 Introduction to Signal Processing** ................. 3
- **MATH 203 Matrix Algebra** ......................................... 3
- **MATH 213 Analytic Geometry and Calculus III** ........... 3
- **PHYS 260 University Physics II** ................................. 3
- **PHYS 261 University Physics II Laboratory** ................. 1
- **Literature** ................................................................ 3

**Total** ........................................................................ 16

#### Fourth Semester

- **ECE 220 Signals and Systems I** .................................... 3
- **ECE 280 Electric Circuit Analysis** .............................. 5
- **ECE 331 Digital System Design** ................................. 3
- **ECE 332 Digital Electronics and Logic Design Lab** ...... 1
- **MATH 214 Elementary Differential Equations** .......... 3

**Total** ........................................................................ 15
Electrical and Computer Engineering 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 Electronic Engineers, and Rockwell International.

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 Electrical and Computer Engineering 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 Electronic Engineers, and Rockwell International.

Concentrations
Computer engineering, communications and signal processing, control systems, and electronics concentrations are available within the electrical engineering baccalaureate program. Completion of specific senior-level courses leads to one of these designations on the student’s transcript on graduation. Students interested in bioengineering are advised to seek out courses available in this area and work closely with their advisor to include these courses in their electrical engineering program.

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 are not declared majors 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
<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 113 Analytic Geometry and Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 107 Introduction to Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CS 112 Computer Science I</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 101 Composition</td>
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</tr>
<tr>
<td>ECON 103 Contemporary Microeconomic Principles</td>
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<thead>
<tr>
<th>Second Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 114 Analytic Geometry and Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>ECE 101 Information Technology for Electrical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 160 University Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 161 University Physics I Laboratory</td>
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</tr>
<tr>
<td>CS 222 Computer Programming for Engineers</td>
<td>3</td>
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<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Third Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 213 Analytic Geometry and Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>MATH 203 Matrix Algebra</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 260 University Physics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 261 University Physics II Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 201 Introduction to Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
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<td>Total</td>
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<table>
<thead>
<tr>
<th>Fourth Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 214 Elementary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 262 University Physics III</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 263 University Physics III Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 280 Electric Circuit Analysis</td>
<td>5</td>
</tr>
<tr>
<td>ECE 220 Signals and Systems I</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Fifth Semester</th>
<th>Credits</th>
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</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>STAT 346 Probability for Engineers</td>
<td>3</td>
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<tr>
<td>Arts</td>
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<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Sixth Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMM 100 Oral Communication</td>
<td>3</td>
</tr>
<tr>
<td>ECE 421 Classical Systems and Control Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECE 433 Linear Electronics II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 445 Computer Organization</td>
<td>3</td>
</tr>
<tr>
<td>ECE 460 Communication and Information Theory</td>
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<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Seventh Semester</th>
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<tbody>
<tr>
<td>ECE 405 Electromagnetic Theory</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>Advanced engineering lab</td>
<td>1</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
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<tr>
<td>Global understanding</td>
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<table>
<thead>
<tr>
<th>Eighth Semester</th>
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<tbody>
<tr>
<td>ECE 493 Senior Advanced Design Project II</td>
<td>2</td>
</tr>
<tr>
<td>HIST 100 History of Western Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Advanced engineering lab</td>
<td>1</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

**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 Senior Advanced Design Project I and II. Faculty provide feedback on student writing. Drafts and revisions are required.

### Electronics and Communications Engineering, BS

The bachelor's program in electronics and communications engineering will be offered 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

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>ECON 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><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>ECE 101 Information Technology for Electrical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ECE 201 Introduction to Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 160 University Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 161 University Physics I Laboratory</td>
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<tr>
<td><strong>Total</strong></td>
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### Third Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<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 II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 260 University Physics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 261 University Physics II Laboratory</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
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### Fourth Semester

<table>
<thead>
<tr>
<th>Course</th>
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<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>
</tr>
<tr>
<td>PHYS 262 University Physics III</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 263 University Physics III Laboratory</td>
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<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
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### Fifth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<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>
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<tr>
<td><strong>Total</strong></td>
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### Sixth Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>COMM 100 Oral Communication</td>
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<td>ECE 431 Digital Circuit Design</td>
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<td>ECE 433 Linear Electronics II</td>
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<tr>
<td>ECE 460 Communication and Information Theory</td>
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</tr>
<tr>
<td>IT 471 Applications of Digital Technologies</td>
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### Seventh Semester

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ENGL 302 Advanced Composition (for natural sciences)</td>
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</tr>
<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>Arts</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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### 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</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></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 provides 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 or MS in Computer Engineering. 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.
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 VLSI 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 ite.gmu.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 that will be 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 enable students who are employed full time to enroll in the programs. 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 strictly 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.

Electrical Engineering, MS
The electrical engineering program offers the following emphases: 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. Students interested in bioengineering may add courses and consider research projects in this area following guidance from their advisors.
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 (800–900 level).

- Maximum of 6 credits of non-ECE courses, subject to prior departmental 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 departmental approval, in addition to the 6 credits of non-ECE courses.

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 development. 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 to 900 level)

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 concentration 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.

Common Degree Requirements

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 ECE and the Computer Science Department, 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 at most one course with a grade of C may be applied toward the certificate. The certificate courses comprise two required foundation courses and three elective courses.

Foundation Courses:
- 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:
- After completing the foundation courses, students choose elective courses 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 665 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 non-degree) 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 at most one course with a grade of C may be applied toward the certificate. The certificate courses comprise two foundation courses taken by all students and three elective courses.

Foundation Courses:
- ECE 528 Introduction to Random Processes in Electrical and Computer Engineering
- ECE 667 Optical Fiber Communications
- ECE 646 Cryptography and Computer Network Security
- ECE 654 Introduction to Computer Networks
- ECE 655 Introduction to Network Security
- OR 635 Discrete System Simulation
- OR 643 Network Modeling
- OR 647 Queuing Theory

Elective Courses:
- After completing the foundation courses, students choose elective courses 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 665 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
Elective Courses:
After completing the two foundation courses, students choose elective courses by taking three courses from the following list:

- ECE 537: Introduction to Digital Image Processing
- ECE 621: System Identification
- ECE 630: Statistical Communication Theory
- ECE 635: Adaptive Signal Processing
- ECE 638: Fast Algorithms and Architectures for Digital Signal Processing or IT 838: Signal Processing Algorithms and Architectures
- ECE 644: Architectures and Algorithms for Image Processing
- ECE 722: IT 841 Kalman Filtering with Applications
- ECE 728: Random Processes in Electrical and Computer Engineering II
- ECE 734/IT 830: Detection and Estimation Theory
- ECE 735: Data Compression or IT 832: Speech and Image Coding
- ECE 738: Advanced Digital Signal Processing
- ECE 751/IT 886: Information Theory
- ECE 752/IT 885: Spectral Estimation
- ECE 754/IT 837: Optimum Array Processing I
- ECE 755/IT 937: Optimum Array Processing II
- STAT 652/CSI 672: Statistical Inference
- STAT 658/CSI 687: Time Series Analysis and Forecasting
- STAT 662: Multivariate Statistical Methods
- IT 841/ECE 722: Kalman Filtering with Applications
- IT 844/ECE 749/CS 775: Advanced Pattern Recognition
- IT 885/ECE 752: Spectral Estimation
- IT 886/ECE 751: Information Theory
- IT 937/ECE 755: Optimum Array Processing II
- IT 978/CSI 978: Statistical Analysis of Signals

Certificate in VLSI Design/Manufacturing
This certificate’s primary purpose is to provide a well-targeted graduate continuing education opportunity for people working in Northern Virginia’s semiconductor and intellectual property industry. This certificate is intended for students who want to advance their knowledge of very large-scale integration (VLSI) design or manufacturing, but who do not necessarily wish to complete requirements for the MS in electrical engineering or computer engineering. The course work is designed so that graduate students can reach a demonstrated level of competence in VLSI design or VLSI manufacturing. Course work toward the graduate certificate may be used for credit toward the MS in electrical engineering or computer engineering. 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 BS degree in scientific and engineering disciplines, and hold graduate student status (degree or nondegree) in the Volgenau School. Students with nonscientific and noneengineering 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 elective courses. 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 concentrations, VLSI design or VLSI manufacturing, by taking four courses in that concentration, one of which will be the core course in that area.

Foundation Course:
ECE 684: MOS Device Electronics

VLSI Design Concentration
Core Course:
ECE 586: Digital Integrated Circuits

Electives:
- 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 Concentration
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; 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, 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 departmental doctoral committee, which makes a recommendation to the department chair.

Advisor and Dissertation Director
Each student, on admission to the program, is assigned a faculty member as advisor. On passing the qualifying exam, the advisor is either 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 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 electronics, and computer science 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 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
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.

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 departmental 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 library 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.

Information and Software Engineering

Phone: 703-993-1640
Web: ise.gmu.edu

Faculty

Professors: Gomaa (chair), Barbara, Kerschberg, Motro, Offutt, Sibley
Associate professors: Ammann, Brodsky, Wijesekera
Assistant professors: Domeniconi, Jiang, Lin, Malek, Sousa, Stravrou, Wang
Adjunct professors: Armour, Doughty, Duan, El-Ansary, Gravatt, Hwang, Joseph, Martin, Mastiysowski, Melo, Mills, Nidiffer, Oberland, Pettit, Schneider, Sharif, Singhal, Smeltzer, Smith, Tudor, Wang, Webber, Wu

Course Work

The Department of Information and Software Engineering (ISE) offers courses designated INFS, ISA, and SWE in the Course Descriptions chapter of this catalog. Although there is no undergraduate degree program in ISE, courses are offered as electives in other programs. Students also may elect an information systems engineering (including a minor in software engineering) emphasis in the systems engineering degree program. Programs offered are a BS in computer science/accelerated MS in information systems; BS in computer science/accelerated MS in software engineering; BS in computer science/accelerated MS in information security and assurance; BS in information technology/accelerated MS in information systems; BS in information technology/accelerated MS in software engineering; MS in information systems; MS in software engineering; MS in software engineering: MS in information security and assurance; PhD study in information security and assurance; PhD study in information systems; and PhD study in software engineering. See below for the descriptions.

UNDERGRADUATE PROGRAMS

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 CS 211, 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.

GRADUATE PROGRAMS

■ 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 and 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. Note: Students who complete CS 571 will be waived from INFS 601.

Degree Conferral

Students may apply to have the BS in computer science degree conferred during the semester in which they expect to complete the 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 Program

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 and those for the MS in Software Engineering Program, with a 6-credit 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 may apply to have the BS degree conferred during the semester in which they expect to complete requirements. At the completion of 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 continuing 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 credits 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 and 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. Note: Students who complete CS 571 will be waived from INFS 601.

Degree Conferral
Students may apply to have the BS degree conferred during the semester in which they expect to complete BS degree requirements. At the completion of MS in information security and assurance requirements, a master’s degree will be 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 earned 90 undergraduate credits with an overall GPA of at least 3.30. In addition, students must have completed INFS 515 and 590 with a 3.00 or better. Criteria for admission are identical to criteria for admission to the MS in Information Technology 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 may apply to have the BS degree conferred during the semester in which they expect to complete those 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 590 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 program, with 6 credits overlapping.

Degree Conferral
Students may apply to have the BS degree conferred during the semester in which they expect to complete those requirements. At the completion of MS requirements, a master’s degree is granted.

■ Information Systems, MS
This professional degree program focuses on the technical, managerial, and policy issues associated with designing,
building, and maintaining information systems in organizations. Data, information, and knowledge are crucial to the modern enterprise, and the MS in information systems (MSIS) addresses both the theoretical and engineering aspects of specifying, designing, implementing, and managing large-scale information systems.

The goals of the MSIS are to provide a high-quality program that allows students with diverse baccalaureate and professional backgrounds to obtain the MS degree; provide a technical body of knowledge that will allow students to analyze, design, deploy, maintain, and manage information systems in large organizations, such as industry, government, and nonprofits; and provide a course of study that allows professionals to pursue a technical or managerial approach to information systems.

The career paths open to graduates include technical and management positions. Technical positions include systems analyst, data administrator, information architect, database administrator, systems architect, decision analyst, data warehouse administrator, database programmer, web-based information systems designer and programmer, information engineer, and knowledge engineer. Management positions include chief information officer, chief knowledge officer, and knowledge engineer. Management positions include chief information officer, chief knowledge officer, chief privacy officer, project manager, and webmaster.

All classes are scheduled in the late afternoon and early evening to accommodate employed students.

**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 590 Program Design and Data Structures
- SWE 510 Object-Oriented Programming in Java

When applying to the MSIS Program, applicants are asked to complete a departmental 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 foundations of SWE 510 and INFS 501, 515, and 590. The exams are given before classes begin in January and August, and can only be taken once. Registration is not required; students need only to be present at the date, time, and location specified, and bring some form of picture identification. Detailed information is available on the ISE web page. Students failing any 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 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 ISE 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; has a graduate degree in science or engineering from a U.S. university; or has been admitted as a nondegree student and meets all of 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 has a B or better 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 departmental 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**

ISE 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 ISE web page.

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 to confer with 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 Data Communications and Distributed Processing
- 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 emphasis areas.

**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. Listed below are the emphasis areas and the suggested courses:

**Database Management**
- INFS 623 Classical and Web Information Retrieval
- INFS 740 Database Programming for the Web
- INFS 760 Advanced Database Management
- INFS 796 Directed Readings in Information Technology
- ISA 765 Database and Distributed Systems Security

**Data Mining and Data Warehousing**
- CS 782 Machine Learning
- INFS 623 Classical and Web Information Retrieval
- INFS 755 Data Mining
- INFS 785 Data Mining for Homeland Security
- INFS 795 Special Topics in Data Mining Applications
- INFS 796 Directed Readings in Information Technology

**Electronic Commerce**
- INFS 640 Introduction to Electronic Commerce
- INFS 770 Knowledge Management for E-Business
- INFS 790 Information Systems Policy and Administration
- INFS 796 Directed Readings in Information Technology
- 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

**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 Introduction to Data Mining
- INFS 770 Knowledge Management for E-Business
- INFS 790 Information Systems Policy and Administration
- INFS 796 Directed Readings in Information Technology

**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 also be obtained by following the instructions outlined for each one: database management, data mining, information engineering, electronic commerce, information security and assurance, software engineering, and web-based software engineering.

### Software Engineering, MS

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 regularly to stay abreast of the latest developments in information technology. The program introduced a major revision in 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 590 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 departmental 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: SWE 510 and INFS 501, 515, and 590. The exams are given before classes begin in January and August and can only be taken once. Registration is not required; students need only to be present at the date, time, and location specified and bring some form of picture identification. Detailed information is available on the ISE 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 departmental 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 ISE 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 of 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
ISE 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 ISE 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 Specification
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 defined by ISE:

Software Design
SWE 626 Software Project Laboratory
SWE 632 User Interface Design and Development
SWE 721 Reusable 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

With permission from the advisor, a student may choose not to take an emphasis.

Elective courses (9 credits)
Students may select the remaining courses from the list of approved courses, including other emphasis areas, available from ISE and at ise.gmu.edu. Students may choose other graduate electives with the consent of their faculty adviser.

In addition, students may choose between the professional option, consisting of three electives, and the research option, consisting of one elective and a 6-credit thesis, which is primarily intended for students planning to pursue a PhD with a concentration in software engineering.
Information Security and Assurance, MS

This program prepares graduates to fill the need for information security and assurance professionals to work in a wide variety of capacities to protect the information systems of different types of organizations and support the nation’s information infrastructure.

The MS degree provides general and technical knowledge and the skills to understand the relationship between information security and advanced information systems technology. It also provides a theoretical understanding of the science and methodologies for ensuring the secrecy and integrity of data, and the availability and legitimate use of data and information systems.

Students develop core competencies in database and information systems, operating systems and networks, and software development. They focus on the technical and management aspects of information security, examining 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 are actively recruited by federal, state, and local governments, and the private sector. Typical employers include Internet-based companies, software companies, banks and insurance companies, and other organizations that depend heavily on the use of information technology.

All classes are scheduled 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:

- INF 501 Discrete and Logical Structures for Information Systems
- INF 515 Computer Organization
- INF 590 Program Design and Data Structures
- SWE 510 Object-Oriented Programming in Java

Prospective students are asked to complete a departmental self-evaluation form, indicating whether previously taken courses may satisfy these foundation requirements. Upon 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 that they have the requisite knowledge for those foundations of INF 501, 515, and 590. The exams are given before classes begin in January and August and can only be taken once. Registration is not required; students need only to be present at the date, time, and location specified with some form of picture identification. Detailed information is available on the ISE web page. 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:

- Submit a departmental self-evaluation form that is essential for evaluating foundation requirements by the department faculty. This form may be obtained from the department office.

Advising

ISE holds orientation meetings each 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 ISE home page.

The department also provides advising 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 serves as a planning guide for the student.

Degree Requirements

Completion of the degree program requires a minimum of 30 approved graduate credits (10 courses). To provide a common background in the fundamentals of information systems, the following two courses are required of all students:

- CS 571 Operating Systems
- CS 555 Computer Communications and Networking

To provide the fundamentals of information systems security and assurance, the following two courses are required of all students:

- ISA 562 Information Security Theory and Practice
- ISA 656 Network Security

Security Electives

To provide breadth and depth of knowledge in information security and assurance, the degree program requires four electives to be taken from ISA 564 and courses at the ISA 600 and 700 level, including ISA 697, ISA 702, ISA 707, and ISA 798.

The remaining two courses may be chosen from any combination of (1) courses at the ISA 600 and 700 level, including ISA 697, 702, 707, and 798, (2) courses at the CS 500, 600 and 700 level, and (3) a list of preapproved qualified electives available from the department office. A thesis option is available whereby a student may elect to complete a thesis for up to 6 elective credits.
Postbaccalaureate 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 a career in information systems, software engineering, information security and assurance, or a related discipline.

Admission Requirements

The admission requirement for the postbaccalaureate certificate in information systems is a four-year bachelor's degree with the GPA of 3.00 or higher. Also, admission to the master's program in information systems (MSIS) allows automatic admission to the certificate program.

Application forms may be obtained by contacting the Department of Information and Software Engineering, Science and Technology II, Room 330, 703-993-1640.

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:

- 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 590 Program Design and Data Structures
  - SWE 510 Object-Oriented Programming in Java
- Take any one course from the INFS, SWE, or ISA programs that does 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 ISE. 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 590 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 ISE 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 in information systems and information technology 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:

- INFS 614 Database Management
- INFS 760 Advanced Database Management

Three of the following:

- INFS 623 Classical and Web Information Retrieval
- INFS 740 Database Programming for the Web
- INFS 755 Data 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 ISE, Science and Technology II, Room 330, 703-993-1640.

Certificate in Data Mining

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 ISE. This form provides summary information concerning an applicant's 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
- CS 750 Theory and Applications of Data Mining

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

- INFS 760 Advanced Database Management
- IT 864 Scientific and Statistical Databases
- ISA 765 Database and Distributed Systems Security

Group II

- INFS 795 Special Topics in Data Mining Applications
- INFS 797 Advanced Topics in Database Management
- ISA 765 Database and Distributed Systems Security

Group III

- STAT 344 Probability and Statistics for Engineers and Scientists
- CS 310 Computer Science III
- CS 750 Theory and Applications of Data Mining

IT 844 Pattern Recognition

For more information, contact ISE, Science and Technology II, Room 330, 703-993-1640.
Group II
IT 871 Statistical Data Mining
IT 875/CIS 703 Scientific and Statistical Visualization
STAT 663/CSI 773 Statistical Graphics and Data Exploration
STAT 753 Computer Intrusion Detection

Group III
INFS 735 Data Warehousing and Mining
INFS 795 Data Mining Applications

Group IV
SYS/STAT 664 Bayesian Inference and Decision Analysis

Certificate in E-Commerce
The Internet significantly affects the way people interact with each other, government, and business. This graduate certificate program is for people who are interested in the use of web- and 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 effect of e-commerce is also being felt across international boundaries where it affects the management and administration of international business. The goal of the certificate program in e-commerce is to study the concepts, tools, policies, and underlying technology that enable web- and 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 590 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. This form provides summary information concerning an applicant's 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 Graduate Admissions Office of the Volgenau School. Students enrolled in a Mason graduate degree program should apply to ISE 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 concentrations, but students may 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 755 Data Mining
INFS 760 Advanced Database Management

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 U.S. Health Care Systems*
HAP 714 Tele-Health Applications
HAP 740 Management of Health Information Systems

*Course may be waived by 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 e-commerce should contact ISE for special instructions. For more information, contact ISE, Science and Technology II, Room 330, 703-993-1640.

Certificate in Information 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 ISE. This form provides summary 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 590 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 Graduate Admissions Office of the Volgenau School. Students enrolled in a Mason graduate degree program should apply to ISE for admission to 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:

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 concentrations, but students may mix and match elective courses subject to satisfying course prerequisites):
Four required courses:
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:
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 INFS 622 and SWE 620; only 3 credits will be awarded. For more information, contact ISE, Science and Technology II, Room 330, 703-993-1640.

Certificate in Information 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 ISE. This form provides summary information concerning the applicant’s 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 590 Program Design and Data Structures
SWE 510 Object-Oriented Programming in Java

Students must also possess the equivalent knowledge of CS 571 and CS 555, or the prerequisite courses required for the selected electives. Students not enrolled in a graduate degree program at Mason should apply for the certificate program through the Graduate Admissions Office of the Volgenau School. 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.

Two required courses:
ISA 562 Information Security Theory and Practice
ISA 656 Network Security

Three additional courses:
Three electives to be taken from ISA 564 and courses at the ISA 600 and 700 level, excluding ISA 697, 796, 797, and 798.

Certificate in Software Engineering
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 ISE. This form provides summary information concerning the applicant’s 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 from Mason: INFS 501 Discrete and Logical Structures for Information Systems, SWE 510 Object-Oriented Programming in Java, INFS 515 Computer Organization, and INFS 590 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 Graduate Admissions Office of the Volgenau School. 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.

Three required courses:
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 (subject to satisfying 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 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 INFS 622 and SWE 620; only 3 credits will be awarded.

Computer science master’s students who wish to obtain the certificate in software engineering should contact ISE for special instructions. For more information, contact the department in Science and Technology II, Room 330, 703-993-1640.

**Certificate in Web-Based Software Engineering**

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 ISE. The form provides information concerning an applicant’s 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 590 Program Design and Data Structures.

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 contact ISE 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:**

- 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:**

- 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:**

- 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, contact ISE, Science and Technology II, Room 330, 703-993-1640.

**PhD Study in Information Systems, Software Engineering, and Information Security and Assurance**

Doctoral study in information systems, software engineering, and information security and assurance 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. Students can also pursue the PhD in computer science jointly offered by the Computer Science (CS) and Information and Software Engineering (ISE) Departments.

**PhD Study in Information Systems**

Students may designate a concentration in information systems in their doctoral degree title. The degree conferred on a graduating student is PhD in information technology with concentration in information systems. Students may also pursue such doctoral studies without designating a concentration in their degree title.

**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 ISE doctoral coordinator.

**Doctoral Supervisory Committee**

The dissertation director must be a faculty member of CS or ISE. The composition of the doctoral supervisory committee is to be approved by the ISE doctoral coordinator, ISE chair, and the Volgenau School associate dean for graduate studies and research. 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 ISE doctoral coordinator.

**Qualifying Exams**

To satisfy the breadth requirement of the PhD degree, each student must pass a set of qualifying exams designed to test fundamental knowledge. The general PhD in information technology requirement is that each student must take four exams from three different master’s programs. For the concentration in information systems

**Two exams from the following:**

- Operating Systems  
- Networks  
- Database Systems

- Communication Networks  
- Computer Network Architectures and Protocols  
- Principles and Practices of Communication Networks  
- Computer Communications and Networking  
- Internet Security Protocols  
- Distributed Software Engineering  
- Software Modeling and Architectural Design  
- Object-Oriented Software Specification and Construction  
- Software Testing
Two exams from software engineering, computer science, information security and assurance, and statistical science (at most one exam may be taken from each of these four master’s programs):

**Information Security and Assurance**
Information Security

**Software Engineering**
Software Construction
Software Design
Software Testing

**Computer Science**
Compilers and Languages
Artificial Intelligence

**Statistical Science**
Applied Probability
Apply Statistics

**Advanced Emphasis Requirement**
For students specializing in information systems, at least 18 of the 24 credits in the advanced emphasis requirement must be taken as follows:

At least 12 credits from Group A:
INFS and IT courses in information systems

The remaining 6 credits from Groups B and C:
SWE, CS, and IT courses in software engineering and computer science

**Group A**
INFS and IT courses in information systems:
INFS 740 Individual Project in Electronic Commerce
INFS 750 Application Framework for Windowed Information Systems
INFS 755 Data Warehousing and Mining
INFS 760 Advanced Database Management
INFS 764 Object-Oriented Database Systems
INFS 770 Knowledge Management for E-Business
INFS 790 Information Systems Policy and Administration
INFS 796 Directed Readings in Information Systems
INFS 797 Advanced Topics in Information Systems
INFS 798 Research Project
ISA 562 Information Security Theory and Practice
ISA 656 Network Security
ISA 765 Database and Distributed Systems Security
ISA 767 Secure Electronic Commerce
ISA 774 Intrusion Detection
IT 811 Principles of Machine Learning and Inference
IT 861 Distributed Database Management Systems
IT 862 Computer Security Models and Architectures
IT 864 Scientific Databases
IT 865 Networks and Distributed Systems Security
IT 867 Intelligent Databases
IT 950 Design and Management Aspects of Information Systems
IT 962 Advanced Topics in Information Security

**Group B**
SWE and IT courses in software engineering:
IT 821 Software Engineering Seminar (SWE)
IT 822 Software Maintenance and Reuse (SWE)
IT 823 Software for Critical Systems (SWE)
IT 824 Program Analysis for Software Testing (SWE)
SWE 720 Advanced Software Requirements
SWE 721 Reusable Software Architectures
SWE 763 Software Engineering Experimentation
SWE 796 Directed Readings in Software Engineering

**Group C**
CS and IT courses in computer science:
CS 583 Analysis of Algorithms
CS 750 Theory and Applications of Data Mining
CS 782 Machine Learning
IT 809 Scaling Technologies for E-Business
IT 811 Principles of Machine Learning and Inference
IT 844 Pattern Recognition
IT 858 Logic Models in Artificial Intelligence

### PhD Study in Information Security and Assurance

Students may designate a concentration in information security in their doctoral degree title. The degree conferred on a graduating student is PhD in information technology with concentration in information security. Students may also pursue such doctoral studies without designating a concentration in their degree title.

**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 ISE’s 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 ISE doctoral coordinator and department chair, and the Volgenau School associate dean for graduate studies and research. 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 ISE doctoral coordinator.

**Qualifying Exams**

To satisfy the breadth requirement of the PhD degree, each student must pass a set of qualifying exams designed to test fundamental knowledge. The general PhD in information technology requirement is that each student must take four exams from three different master’s programs.

The exams for the information security concentration are as follows:

- Information security
- One exam from operating systems or networks
- Two exams in the following, at most one from each master’s program:
  - Algorithms, operating systems, networks, artificial intelligence, database systems, compilers and languages, software construction, software design, software testing, applied probability, applied statistics.
Advanced Emphasis Requirement
In addition to courses taken to prepare for the qualifying exam, students must take at least eight courses (24 credits), including

One required course:
IT 862 Computer Security Models and Architectures

At least four courses (12 credits) from the following:
ECE 746 Secure Telecommunication Systems
ISA 656 Network Security
ISA 674 Intrusion Detection
ISA 765 Database and Distributed Systems Security
ISA 767 Secure Electronic Commerce
ISA 796 Directed Readings in Information Security
ISA 797 Advanced Topics in Information Security
ISA 798 Research Project
SWE 781 Secure Software Design and Programming
IT 865 Networks and Distributed Systems Security
IT 962 Advanced Topics in Computer Security

Where appropriate, one or two relevant courses may be substituted with courses from other Volgenau School departments. The student’s overall course work must satisfy the university requirement for the PhD.

PhD Study in Software Engineering
Students may designate a concentration in software engineering in their doctoral degree title. The degree conferred on a graduating student is PhD in information technology with concentration in software engineering. Students may also pursue such doctoral studies without designating a concentration in their degree title.

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 ISE doctoral coordinator.

Doctoral Supervisory Committee
The dissertation director must be a faculty member of the ISE or the CS departments. The composition of the doctoral supervisory committee is to be approved by the ISE doctoral coordinator, ISE chair, and the Volgenau School associate dean for graduate studies and research. 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 ISE doctoral coordinator.

Qualifying Exams
To satisfy the breadth requirement of the PhD degree, each student must pass a set of qualifying exams designed to test fundamental knowledge. The general PhD in information technology requirement is that each student must take four exams from three different master’s programs. For the specialization in software engineering, each student should take the following qualifying exams and courses, if needed:

Two exams from software construction, software design, or software testing,
Two exams from the following, at most one from each master’s program:
- Algorithms, operating systems, networks, information security, database systems, compilers and languages, artificial intelligence, applied probability, applied statistics, systems engineering design.

Advanced Emphasis Requirement
In addition to the PhD in information technology requirements, the software engineering track requires the following:
- 3 credits of SWE 763 or CS 700
- 12 credits from SWE 700-level courses and IT-SWE courses (defined below)
- 9 credits from the complete list of SWE, IT-SWE, and SWE relevant courses below:

SWE 600-level courses:
- SWE 619 Object-Oriented Software Specification and Construction (unless the Object-Oriented Software Specification and Construction qualifying exam was taken)
- SWE 620 Software Requirements Analysis and Specification
- SWE 621 Software Modeling and Architectural Design (unless the Software Architecture and Design qualifying exam was taken)
- SWE 622 Distributed Software Engineering
- SWE 623 Formal Methods and Models in Software Engineering (unless the Formal Methods and Models qualifying exam was taken)
- SWE 625 Software Project Management
- SWE 626 Software Project Laboratory
- SWE 630 Software Engineering Economics
- SWE 632 User Interface Design and Development
- SWE 637 Software Testing (unless the SWE 637 qualifying exam was taken)
- SWE 642 Software Engineering for the World Wide Web
- SWE 645 Component-Based Software Development

SWE 700-level courses:
- SWE 720 Advanced Software Requirements
- SWE 721 Reusable Software Architectures
- SWE 723 Precise Modeling
- SWE 724 Model-Driven Software Development
- SWE 763 Software Engineering Experimentation
- SWE 781 Secure Software Design and Programming
- SWE 796 Directed Readings in Software Engineering
- SWE 798 Research Project

IT-SWE courses:
- IT 821 Software Engineering Seminar
- IT 822 Software Maintenance and Reuse
- IT 823 Software for Critical Systems
- IT 824 Program Analysis for Software Testing
- IT 860 Software Analysis and Design of Real-Time Systems
- SWE 825 Special Topics in Web-Based Software

SWE relevant courses:
- CS 700 Quantitative Methods and Experimental Design in Computer Science
- CS 706 Concurrent Software Systems
- CS 707 Distributed Software Systems
- INFS 740 Individual Project in Electronic Commerce
- INFS 750 Application Frameworks for Windowed Information Systems
- INFS 755 Data Warehousing and Mining
- INFS 760 Advanced Database Management
Information Technology and Engineering

experience in response to digital age challenges and opportunities. This capstone project gives students an integrative experience in digital age organizations in Northern Virginia and elsewhere. They will study management, public policy, and information technology 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 comprises 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. After completion of these core courses, students take specialized courses, for a total of 15 credits, in one of four chosen fields of concentration: information technology, business and economics, public policy and law, and health care and services industry. Students deepen their theoretical and practical knowledge through courses in their concentration—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 concentration 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 Graduate Admissions Office of the Volgenau School. 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 organization, type of programs the applicant was responsible for developing, years of experience in each job, and 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 GRE, GMAT, or LSAT reports. TOEFL scores are required from nonnative English speakers who did not use English as the official language in their college education.

Degree Requirements

In addition to meeting general requirements that apply to all master’s degrees at the university, completion of this program requires the following:

The following core courses (3 credits each; total of 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  
EC 541 Integrative Case Studies in Electronic Commerce  
or MBA 734 Electronic Commerce  
or HSCI 722 Electronic Commerce and Online Marketing for Health Services  
EC 600 Group Project in Electronic Commerce

15 credits in one of the four concentrations:
Information technology, business and economics, public policy and law, and health care and services industry. The courses that can be used to fulfill these requirements are described below.

Information Technology Concentration

Students who select this concentration must take 15 credits, including the following three courses (3 credits each):
CS 650 Database Engineering  
or INFS 614 Database Management  
CS 656 Computer Communications and Networking  
or 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 concentration.

The Information and Software Engineering (ISE) Department has created a special certificate program in e-commerce for MS in e-commerce students that may be used for the information technology concentration. It consists of the following courses:

- INFS 612 Principles and Practices of Communication Networks
- INFS 614 Database Management
- INFS 770 Knowledge Management for E-Business
- ISA 562 Information Security Theory and Practice
- ISA 767 Secure Electronic Commerce

Business and Economics Concentration
Students must take MBA 623 Marketing Management, and select four additional courses from the following:

- MBA 712 Project and Cost Management
- MBA 725 Leadership
- MBA 731 Business Systems Development
- MBA 732 Knowledge Management
- MBA 733 Business Data Communications
- MBA 734 Electronic Commerce
- MBA 735 Systems Thinking and Business Simulation
- MBA 736 Managing Digital Business

Public Policy and Law Concentration
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 Concentration
Students must take 15 credits: 12 required and 3 elective credits. The elective course is selected, in consultation with the advisor, from List D below. The required courses are as follows:

- HAP 601 Electronic Commerce and Online Market for Health Services
- HAP 678 Introduction to the U.S. Health System
- HAP 709 Healthcare Databases
- HAP 740 Management of Health Information Systems
- HAP 678 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 SQL. Electives may be used to fulfill the 18 credits for the certificate from List D, below.

Courses in Concentrations
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, 707, 750/INFT 750, 755; ECE 646, 741; INFS 601, 623, 640, 750, 755, 760, 770; ISA 562, 564, 650 656, 674, 681, 763, 765, 767; CS 809/IT 809; OR 635; SWE 619/CS 619, SWE 620/CS 620, SWE 621/CS 621, SWE 621/CS 632, SWE 642; SYST 781/INFS 781/STAT 781. Note: CS 571 and INFS 601 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, 736

List C (Public Policy and Law):

- ITRN 604, 712, 730, 742, 756, 759, 768, 772, 773; LRNG 762; PUBP 736, 737, 760, 771, 773, PUBP 775/SYST 695, PUBP 777/SYST 697; PUAD 781

List D (Health Care and Services Industry):

- HAP 586, 601, 612, 678, 709, 715, 720, 730, 740, 745

Certificate in Health Care Information System
Students may also earn the certificate, which consists of the following six courses (18 credits):

- HAP 601 Electronic Commerce and Online Market for Health Services
- HAP 678 Introduction to the U.S. Health System
- HAP 709 Health Care Databases
- HAP 720 Health Data Integration
- HAP 740 Management of Health Information Systems
- HAP 745 Health Care Security Policy

Certificate in Health Care Information System
Students may also earn the certificate, which consists of the following six courses (18 credits):

- HAP 601 Electronic Commerce and Online Market for Health Services
- HAP 678 Introduction to the U.S. Health System
- HAP 709 Health Care Databases
- HAP 720 Health Data Integration
- HAP 740 Management of Health Information Systems
- HAP 745 Health Care Security Policy

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 information technology. 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 of the 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 INFS 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 represents a definitive contribution to applied knowledge in information technology. This document must meet format guidelines specified by the *Guide for Preparing Graduate Theses, Dissertations, and Projects*. 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

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 information technology 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 B (3.00 on a 4.00 scale) and a graduate GPA of 3.50 on a 4.00 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...
and 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.

To ensure a common ground of fundamentals, students should have a background in topics such as calculus, differential equations, linear algebra, discrete structures, probability, and statistics. In addition, students entering the doctoral program in information technology must have a sound working knowledge 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 information technology, 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 in any of these scenarios is dismissed from the program. Students may reapply to the PhD in Information Technology Program after either receipt of the engineer degree in information technology or a period of three years, whichever is shorter.

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 advanced concentration area. Successful completion of this requirement should enable the student to do basic or applied research in a significant contemporary area in information technology.

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. 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 courses listed below cannot be included in the plan of study.

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. 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 departmental sections.

**Concentrations**

Within the PhD in Information Technology Program, seven concentrations are offered: civil and infrastructure engineering, operations research, systems engineering, information systems, information security, and software engineering.

Students who complete requirements for a concentration have the concentration noted in the degree conferred on graduation.

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. For more information on the concentrations, please see the corresponding departmental sections of the catalog.

**Doctoral Supervisory Committee**

On admission to the program, students are assigned a temporary advisor. Students are responsible for working with the temporary advisor until selecting 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.
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 the following items: (1) a list of all courses taken by the student that form the plan of study for the PhD; (2) a one-page description of the intended area of research; and (3) 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, 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 re-examination 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 re-examination 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 990 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 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 predefense to 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 information technology. 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**

**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 engineering and information technology 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 Information Technology and Engineering.
Policy’s new master’s in telecommunications policy. More than 30 new engineering and information technology 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 (TFAS) certificate and the advanced networking protocols for telecommunications (ANPT) Certificate.

A novelty of the program is its structure, which consists of five specialty modules corresponding to areas of concentration. 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/laboratory course (TCOM 514) or an Internet protocol routing lecture/laboratory course (TCOM 515); and five specialty modules (areas of concentration). Students who enter the program with an undergraduate degree that shows evidence of successfully completing LAN and WAN network 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 concentration.

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 either 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 either 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, which is 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 in 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, 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.

** Students may not receive credit for both.

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 within that module or in 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 concentration) can be completed by a combination of full-semester courses and half-semester 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-semester, 1.5-credit courses may only be counted in one module, even if they apply to more than one. Full-semester, 3-credit courses may be counted in one module or split between two modules. For example, TCOM 551 Digital Communication Systems, which is in both 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 (ISM) 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*; INF 612*, 640*, 762*

Module 3, Wireless Communications:
TCOM 506, 516, 517, 526, 551, 552, 562, 606, 607, 660, 707; ECE 739*, 763*, 732*, 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 can 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; INF 612*, 614*, 640*; ITRN 772*
- **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. 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. If students are dropped from the accelerated program and have taken applied telecommunications core courses toward the BS degree, then they do not need to repeat those courses for the regular MS in Telecommunications Program if they earned a grade of B or above in those courses. Elective courses will be required to replace telecommunications courses already taken and dropped from the program. Note: Up to 6 credits of a combination of C, C+ or B- grades may be carried in portions of the regular telecommunications program. A minimum GPA of 3.00 is required to graduate with an MS in telecommunications. Students must complete all requirements for the BS in systems engineering. Students in the accelerated program may apply to have the BS degree conferred during the semester in which they expect to complete those requirements. The MS in telecommunications is granted on completion of all requirements for the accelerated degree.

Telecommunications courses that may be taken as a systems engineering undergraduate student as part of the accelerated program are TCOM 500, 501, and 502; OR 541; and SYST 530 and 573. SYST 573, if taken, replaces TCOM 521 in the telecommunications core requirements.

- **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 requirements for the BS in computer science (total of 120 credits) and the MS in telecommunications (total of 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 table that follows.

Applicants must be Mason undergraduate students who preferably 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, they must maintain a 3.25 average until they have satisfied all requirements for the BS in computer science. 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. If students are dropped from the accelerated program and have taken applied telecommunications core courses toward the BS degree, then they do not need to repeat those courses for the regular MS in Telecommunications Program if they earned a grade of B or higher for those courses. Elective courses will be required to replace telecommunications courses already taken and dropped from the program.

Note: Up to 6 credits of a combination of C, C+, or B- grades may be carried in portions of the regular telecommunications program. A minimum GPA of 3.00 is required to graduate with an MS in telecommunications. Students must complete all requirements for the BS in systems engineering. Students in the accelerated program may apply to have the BS degree conferred during the semester in which they expect to complete those requirements. The MS in telecommunications is granted on completion of all requirements for the accelerated degree.

Telecommunications courses that may be taken as a systems engineering undergraduate student as part of the accelerated program are TCOM 500, 501, and 502; OR 541; and SYST 530 and 573. SYST 573, if taken, replaces TCOM 521 in the telecommunications core requirements.
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 may apply to have the BS in computer science conferred during the semester in which they expect to complete those 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:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCOM 500</td>
<td>Modern Telecommunications</td>
<td>(Prerequisite: TCOM 501 or CS 455, or equivalent)</td>
</tr>
<tr>
<td>TCOM 502</td>
<td>Wide Area Networks and Internet</td>
<td>(Prerequisite: TCOM 500 or equivalent)</td>
</tr>
<tr>
<td>TCOM 503</td>
<td>Fiber Optic Communications</td>
<td>(Prerequisites: TCOM 501, CS 455, ECE 462, or equivalent)</td>
</tr>
<tr>
<td>TCOM 504</td>
<td>Asynchronous Transfer Mode Network</td>
<td>(Prerequisites: TCOM 501 and TCOM 502, or equivalent)</td>
</tr>
<tr>
<td>TCOM 505</td>
<td>Networked Multicomputer Systems</td>
<td>(Prerequisites: TCOM 501, CS 455, ECE 462, or equivalent)</td>
</tr>
<tr>
<td>TCOM 509</td>
<td>Internet Protocols</td>
<td>(Prerequisite: TCOM 501 and 502, or equivalent)</td>
</tr>
<tr>
<td>TCOM 510</td>
<td>Client Server Architectures and Applications</td>
<td>(Prerequisite: TCOM 505)</td>
</tr>
<tr>
<td>TCOM 513</td>
<td>Optical Communications Networks</td>
<td>(Prerequisite: TCOM 503)</td>
</tr>
<tr>
<td>TCOM 519</td>
<td>Voice Over IP</td>
<td>(Prerequisites: TCOM 509, CS 455, or equivalent)</td>
</tr>
<tr>
<td>TCOM 529</td>
<td>Advanced Internet Protocols</td>
<td>(Prerequisite: TCOM 509)</td>
</tr>
<tr>
<td>TCOM 539</td>
<td>Advanced Voice Over IP</td>
<td>(Prerequisite: TCOM 519)</td>
</tr>
<tr>
<td>TCOM 551</td>
<td>Digital Communication Systems</td>
<td>(Prerequisite: TCOM 500, or equivalent)</td>
</tr>
<tr>
<td>TCOM 607</td>
<td>Satellite Communications</td>
<td>(Prerequisite: TCOM 551, ECE 463, or equivalent)</td>
</tr>
</tbody>
</table>

**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, completing the two degrees with 144 credits. Students must satisfy requirements for the undergraduate degree (total of 120 credits) and the MS degree (total of 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 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 until they 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 3.25 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 may apply to have the BS in computer science conferred during the semester in which they expect to complete those 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 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 into the Accelerated BSIT/MS TCOM 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 (Prerequisite: 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 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 program 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 and may take an elective 1.5-credit course instead.

**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 a total of 120 credits) and the MS (total of 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, then 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 in the accelerated program may apply to have the BIS degree conferred during the semester in which 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)
Certification in Telecommunications

Core Courses
Choose 9 credits from the following:
- TCOM 504 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
A total of 6 credits is 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 Wireless Communications

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 (3 credits)

Elective Courses
A total of 6 credits is 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

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
A total of 6 credits is 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 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 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 551 Digital Communication Systems (Prerequisite: TCOM 500 or equivalent)
- 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.

Elective Courses
A total of 6 credits is 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.
Elective Courses
A total of 6 credits is 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.

■ Certificate in Telecommunications Forensics and Security (TFAS)
The objective of this certificate is to provide an in-depth understanding of security and forensics as they apply to both 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 Net. Security (1.5 credits each) or TCOM 515 Internet Protocol Routing (3 credits)
TCOM 562 Network Security Fundamentals (3 credits)
TCOM 660 Network Forensics (3 credits)
TCOM 661 Digital Media Forensics (3 credits)
TCOM 663 Operations of Intrusion Detection for Forensics

Elective Courses
Choose 6 credits from the following:
TCOM 509/529 Internet Protocols/Advanced Internet Protocols (1.5 credits each)
TCOM 609 Interior Gateway Protocols (IGP) (3 credits)
TCOM 610 Border Gateway Protocols (BGP) (3 credits)
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 Advanced Networking Protocols for Telecommunications (ANTP)
This certificate provides an in-depth understanding of advanced protocols used in a variety 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 548/556 Security Issues in Telecom/Cryptography and Net. Security (1.5 credits each) or TCOM 515 Internet Protocol Routing (3 credits)
TCOM 562 Network Security Fundamentals (3 credits)
TCOM 660 Network Forensics (3 credits)
TCOM 661 Digital Media Forensics (3 credits)
TCOM 663 Operations of Intrusion Detection for Forensics

Elective Courses
Choose 6 credits from the following:
TCOM 548/556 Security Issues in Telecom/Cryptography and Net. Security (1.5 credits each) or TCOM 515 Internet Protocol Routing (3 credits)
TCOM 562 Network Security Fundamentals (3 credits)
TCOM 660 Network Forensics (3 credits)
TCOM 661 Digital Media Forensics (3 credits)
TCOM 663 Operations of Intrusion Detection for Forensics

Note: TCOM 548/556 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.

Statistics
Phone: 703-993-3645
Web: statistics.gmu.edu

Faculty
Professors: Carr, Gentle, Rosenberger (chair), Wegman
Associate professors: Bell, Habib, Miller, Sutton
Assistant professors: Davis (assistant chair), Diao, Ry tikova, Tang
Adjunct professors: Cohen, Kamocsai, Keller, Kott, McFadden, Moumen, Sims, Sirgany, 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
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 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 undergraduate program coordinator in the Statistics Department. Courses currently approved for the minor are STAT 362, 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), and 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

Statistical science is regarded as one of the oldest and most successful information technology 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 relationship between two or more quantities possibly measured with error.

Students build on these core requirements by choosing one of five defined emphases or designing a customized curriculum with advisor concurrence. The defined emphases are applied statistics, computational statistics, engineering statistics, federal statistics, and statistical signal processing.

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
- **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 510, 530, 535, 700, and 701. Only one of STAT 501–503 can be applied to the degree requirements. STAT 779 and 789 may be repeated for credit with approval of the graduate coordinator. Also, certain courses from other departments may be chosen with approval of the department’s graduate coordinator, generally not to exceed 6 credits.

A student enrolled in the certificate program in actuarial sciences and in the MS program in statistical sciences 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 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. A total of 30 credits is 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 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 both 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:

- **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 in Statistics Program cannot get a reduction of 6 credits toward this dual degree. Students who want to proceed to a PhD degree will not 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.

MS in Epidemiology 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 Volgenau School faculty from the Department of Statistics and the Department of Global and Community Health in CHHS.

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 the Department of Global and Community Health in CHHS make admission decisions.

Program of Study
The degree requires 36 credits, as specified below:

Core Requirements
GCH 712 Introduction to Epidemiology .................................3
GCH 726 Advanced Seminar in Epidemiology .......................3
STAT 554 Applied Statistics ..................................................3
STAT 660 Biostatistical Methods ...........................................3

Additional Epidemiology and Biostatistics Requirements
Choose three from the following list of global and community health courses:
GCH 605 Social Epidemiology ..............................................3
GCH 722 Epidemiology of Infectious Disease .......................3
GCH 800 Advanced Quantitative Data Analysis ....................3
GCH 801 Advanced Multivariate Statistics and Data Analysis .................................................................3
GCH 802 Measurement Theories and Applications in Healthcare Research ..................................................3

and

Choose three from the following list of statistics courses:
STAT 544 Applied Probability ...............................................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
Choose two electives (6 credits) with consultation of advisor. .................................................................6

For these elective credits, students may choose to work with their advisor to conduct an epidemiology/biostatistics project.

Certificate in Biostatistics
The 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.

Program Requirements
Students must complete one course from each of the five groups.
GCH 722 or GCH 605
GCH 800 or STAT 656 or STAT 668
GCH 801 or STAT 662
STAT 535 or 554
STAT 660 or 665

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. Students with a minimal background in mathematics or statistics should consider taking STAT 530 or SYST 500/CSI 600; neither course counts toward the certificate. 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 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), which are selected from program courses and electives. The courses build the foundations of statistical analysis and survey methods. They consist of the following:

- STAT 510 Statistical Foundations for Technical Decision Making
- 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 510 and 535, may be used for credit toward the MS in statistical science. Credit is granted for only one of STAT 510, 535, and 554.

For the certificate program, students must choose three of the certificate courses plus two elective courses chosen with the consent of the certificate 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 by the department’s graduate coordinator. Suggested electives include STAT 544, 655, 656, 657, 660, 662, 664; CSI 703; 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 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 departmental faculty in the program include sampling, statistical signal processing, biometric identification, biostatistics, statistical genetics, statistical graphics, and data exploration.

Students will be required to complete 72 credit hours. Typically a student entering with a master’s degree in statistics, mathematics, or similar discipline will be 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. Students with master’s degrees in other fields may have completed some, but not all, of these courses and may be admitted provisionally on successful completion of the remaining courses.

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 four core courses:
- STAT 876 Measure and Linear Spaces
- STAT 971 Probability Theory
- STAT 972 Mathematical Statistics I
- STAT 973 Mathematical Statistics II

The remaining four courses will be selected and approved by the doctoral supervisory committee and the Statistics Department chair and should be numbered 600 or above. These do not have to be STAT courses. 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 will 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 four core courses and four advanced emphasis courses, and a dissertation proposal. The student is evaluated as pass, conditional pass, and fail. A student who fails the comprehensive examination may take the exam 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 examination and final examination 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, McDevitt, Nguyen, Patel, Rothwell, Taft, 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 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, machines, information, and procedures. The overall purpose is to provide a rational basis for decision making.

Mason’s operations research faculty 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 the engineering of 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 both orally and in writing.

### Systems Engineering, BS

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, MD 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, fine 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.

Course requirements for the systems engineering major are as follows:
- 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

Course requirements for the systems engineering major are as follows:
- 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

### Writing-Intensive Requirement

Mason’s writing-intensive requirement for systems engineering majors is satisfied by successful completion of SYST 495.

### 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 alternate schedule is available.

#### First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 100 Oral Communication</td>
<td>3</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 Introduction to Engineering</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>15</strong></td>
</tr>
</tbody>
</table>

#### Second 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>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>SYST 101 Understanding Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

#### Third 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 213 Analytic Geometry and Calculus III</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>
<td>1</td>
</tr>
<tr>
<td>SYST 210 Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</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>CHEM 251 General Chemistry for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>or CHEM 211 General Chemistry</td>
<td></td>
</tr>
<tr>
<td>MATH 203 Matrix Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 214 Elementary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>SYST 220 Dynamical Systems I</td>
<td>3</td>
</tr>
<tr>
<td>SYST 221 Systems Modeling Laboratory</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

#### Fifth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 302 Advanced Composition (for natural sciences and technology)</td>
<td>3</td>
</tr>
<tr>
<td>OR 441 Deterministic Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>STAT 346 Probability for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>SYST 320 Dynamical Systems II</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>
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
SYST 473 Decision and Risk Analysis ..................3
Total.................................................................15

Seventh Semester
SYST 470 Human Factors Engineering...............3
SYST 489 Senior Seminar ....................................3
SYST 490 Senior Design Project I ......................3
Arts.................................................................3
Technical elective..............................................3
Total.................................................................15

Eighth Semester
HIST 100 Western Civilization ...........................3
OR 442 Stochastic Operations Research ...............3
SYST 495 Senior Design Project II ....................3
Technical elective..............................................3
Global understanding.......................................3
Total.................................................................15

All systems engineering students are assigned a faculty advisor. With the help and approval of the advisor, 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

Control Systems
ECE 201 Introduction to Signal Processing
ECE 220 Signals and Systems I
SYST 421 Classical Systems and Control Theory

Computer Network Systems
ECE 462 Data and Computer Communication
ECE 465 Computer Networking Protocols
TCOM 500 Modern Telecommunications

Software-Intensive Systems
CS 310 Computer Science III
CS 332 Object-Oriented Specification and Implementation
CS 421 Software Engineering

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 see their advisor and the departments offering the minors for specific requirements.

BS/Accelerated MS 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 successfully completed all MATH and PHYS requirements.

Students must complete all requirements for the BS in their chosen major. Students in the accelerated program may apply to have the BS degree from the appropriate Volgenau School program conferred during the semester during which they expect to complete BS 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. These two courses may be chosen from the list...
of graduate courses in the following table. For BS candidates, these graduate courses replace the corresponding undergraduate courses listed in the table. The undergraduate version of these courses may not be applied toward the MS degree.

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 420</td>
<td>SYST 521</td>
</tr>
<tr>
<td>SYST 371</td>
<td>SYST 530</td>
</tr>
<tr>
<td>SYST 473</td>
<td>SYST 573</td>
</tr>
<tr>
<td>OR 441</td>
<td>OR 541</td>
</tr>
<tr>
<td>OR 442</td>
<td>OR 542</td>
</tr>
</tbody>
</table>

Any other 500-level SYST course may be applied to both the undergraduate and graduate degrees with approval of the advisor and department chair.

■ BS/Accelerated MS Program in Operations Research

Qualified undergraduate students may apply for this five-year program leading to a BS in an engineering discipline and an MS degree in operations research. 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 for the program after they have completed at least 90 credits applicable to the BS degree. Students must have an overall GPA of at least 3.00 on courses applicable to the BS degree and must have completed all MATH and PHYS requirements. Criteria for admission are identical to criteria for admission into the MS program, with the exception that students do not need to have completed an undergraduate degree before admission.

Students must complete all requirements for the BS in their chosen major. Students may apply to have the BS degree from the appropriate Volgenau School program conferred during the semester during which they expect to complete BS 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.

■ 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, queuing and network modeling, computer simulation and modeling, applied and computational probability, and application of these components to realistic and relevant operational analysis 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 courses and electives 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 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 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 concentration areas available are optimization, stochastic modeling, decision analysis, and military operations research.

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. Students concentrating in stochastic modeling must complete one 600-level statistics course (numbered 634 or above) and two courses from OR 645, 647, 648, 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.

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 at least one deterministic methods course and one stochastic methods course.

Finally, 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 in information technology are the core courses that satisfy the breadth requirement.

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 a concentration, 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 baccalaurate 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 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.
- 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 or OR 680, 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 may 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 methods, systems management, architecture-based systems integration, C4I, systems engineering of computer-based systems, and advanced transportation systems. Approved basic methods courses and electives for the major emphases are as follows.

**Systems Engineering Methods**
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

**Elective courses:**
Courses designated as basic methods courses may also be used as elective courses once the requirement of two basic methods courses has been met. The set of elective courses must constitute a well-defined focus and must be approved by the student’s advisor.

- CS 580 Introduction to Artificial Intelligence
- CS 681 Designing Expert Systems
- CS 688 Neural Network Principles
  or ECE 549 Theory and Applications of Artificial Neural Networks
- OR 641 Linear Programming
- OR 642 Integer Programming
- OR 643 Network Modeling
- OR 644 Nonlinear Programming
- SYST 542 Decision Support Systems Engineering
- SYST 619 Introduction to Architecture-Based Systems Engineering
- SYST 621 System Architecture Design
- SYST 671/OR 671 Judgment and Choice Processing and Decision Making

**Systems Management**
The defining reality of the 20th century is evolution into a society of organizations and the emergence of management as a discipline. The technical disciplines of systems engineering are necessary but not sufficient for the development of successful systems. The management aspect of systems engineering involves tracking and controlling system development through the major phases of the system life cycle; identifying and resolving problems to minimize their effects on cost, schedule, and performance, and iteratively improving both product and process. The emphasis in systems management focuses on theory and practice 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

**Elective courses:**
The set of elective courses must constitute a well-defined focus. Basic methods courses beyond the two required methods courses may also be counted as elective courses. Approved electives include the following:

- CEIE 610 Construction Systems and Management
- SYST 512 Systems Engineering and Management
- OR 641 Linear Programming
- OR 642 Integer Programming
- OR 643 Network Modeling
- OR 644 Nonlinear Programming
- SYST 542 Decision Support Systems Engineering
- SYST 619 Introduction to Architecture-Based Systems Engineering
- SYST 621 System 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

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

Elective courses:
The set of elective courses must constitute a well-defined concentration area. This emphasis area consists of three required courses and one elective course from an approved list. The three required courses are:
SYST 619 Introduction to Architecture-Based Systems Engineering
SYST 621 System Architecture Design
SYST 622 System Integration and Architecture Evaluation

The list of approved electives includes basic methods courses and the following:
SYST 571 Systems Engineering Management
SYST 683 Modeling, Simulation, and Gaming
SYST 692 Decision Support for Enterprise Integration
SYST 694 E-Commerce Architectures

Command, Control, Communications, Computing, and Intelligence (C4I)

C4I systems are pervasive throughout the civilian and military world, allowing responsible authorities, such as commanders or chief executive officers, to control resources such as personnel, equipment, and money. Civilian government examples include air-traffic control, drug enforcement, law enforcement agencies, and various emergency preparedness systems. Military systems include national-level crisis management systems, global command and control system, NATO command and control systems, and various tactical C4I systems of the military services. Private industry examples include the corporate management systems of large national and multinational firms.

These 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. This area stresses the multidisciplinary approach necessary to understand the field.

The specialization focuses on the theory and practice of C4I and prepares students for careers in research, design, and development in the use and management of C4I systems. Courses emphasize analytical and behavioral aspects of engineering complex C4I systems.

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

Elective courses:
The set of elective courses must constitute a well-defined concentration area. Examples of concentration areas include C3 architectures, C2 software, communications, decision support, modeling and simulation, or sensing and fusion.

Students in the C4I specialization area must complete SYST 680/ECE 670/OR 683 Principles of C4I.

They may select their remaining electives from the list of basic methods courses or the following:
ECE 542 Computer Network Architectures and Protocols
ECE 630 Statistical Communication Theory
ECE 642 Design and Analysis of Computer Communication Networks
ECE 731 Digital Communications
ECE 734/IT 830 Detection and Estimation Theory
ECE 737 Spread Spectrum Communications
ECE 739 Satellite Communications
OR 647 Queuing Theory
OR 651 Military Operations Research I: Cost Analysis
OR 652 Military Operations Research Modeling II: Effectiveness Analysis
SYST 542 Decision Support Systems Engineering
SYST 683 Modeling, Simulation, and Gaming
SYST 684 Sensor Data Fusion
SYST 685 Estimation and Tracking: Principles and Techniques
SYST 760 Special Topics in C4I Systems Engineering

Systems Engineering of Computer-Based Systems

The computer-based systems emphasis provides specialized knowledge and experience in developing and modifying large complex software systems. It emphasizes technical and management aspects of the software engineering process. Computer-based systems engineers are concerned with the theoretical and practical aspects of technology, cost, and the social effect of computer systems that are both effective and efficient.

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:

Elective courses:
The set of elective courses must constitute a well-defined focus. Basic methods courses beyond the two required methods courses may also be counted as elective courses. The set includes the following:
CS 571 Operating Systems
CS 631 Object-Oriented Design Patterns
INFS 622 Information Systems Analysis and Design
SYST 513 Total Systems Engineering, Reengineering, and Enterprise Integration
SYST 542 Decision Support Systems Engineering
SYST 619 Introduction to Architecture-Based Systems Engineering
SYST 621 System Architecture Design

One of the following:
CS 656 Computer Communications and Networking
ECE 542 Computer Network Architectures and Protocols
INFS 612 Principles and Practices of Communication Networks
Advanced Transportation Systems (ATS)
Transportation is one of the most important and increasingly complex infrastructure networks of modern society. This emphasis looks at transportation operations, monitoring, and control from a systems engineering perspective. It uses both analytical and complex simulations to create awareness of how future transportation systems will evolve.

Basic methods courses:
SYST 611 System Methodology and Modeling
One additional course from the list of basic methods courses.

Elective courses:
Two from the following list:
CEIE 560 Public Transportation Systems
SYST 560 Introduction to Air Traffic Control
SYST 660/OR 660 Air Transportation Systems Modeling
The remaining elective courses can be taken from the list above, the list of basic methods courses, and the following:
CEIE 660 Urban Transportation Planning
INFS 612 Principles and Practices of Communication Networks or TCOM 500/ECE 540 Modern Telecommunications
OR 647 Queuing Theory
PSYCH 530 Cognitive Engineering: Cognitive Science Applied to Human Factors
SYST 512 Systems Engineering for Design and Development
SYST 571 Systems Engineering Management
SYST 619 Introduction to Architecture-Based Systems Engineering
SYST 684 Sensor Data Fusion
SYST 697/PUBP 777 Critical Information Technology Infrastructures

Dual-Degree MS in Operations Research and Statistical Science
This program allows students to earn an MS degree in operations research 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 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.

Degrees 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 (ABSI)
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-required courses indicated in italics):

Core courses:
SYST 510, 520, 530

Methods courses:
SYST 611 or ECE 521 and SYST 620

Elective courses:
SYST 619, 621, and 622; and one additional approved ABSI elective course

Project:
SYST 798 or OR 680

Certificate in Command, Control, Communications, Computing, and Intelligence (C4I)
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 the list of electives for the C4I emphasis of the MS in systems engineering. 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

Elective courses:
SYST 680 and three C4I approved elective courses

Project:
SYST 798 or OR 680

■ Certificate in Systems Engineering for Computer, Information, and 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 elective courses 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, 530, and 619, and one of these elective courses: ECE 542; CS 656; INF 612; SYST 542, 563, 620, and 621; SWE 620; and INF 622. The following is a suggested program of study for obtaining the certificate while studying for the MS in systems engineering (required courses for the certificate are indicated in italics).

Core courses:
SYST 510, 520, 530

Methods courses:
Two courses approved for the master’s degree emphasis

Elective courses:
SYST 512, 619; certificate elective course; an elective approved for the master’s degree emphasis

Project:
SYST 798 or OR 680

■ Certificate in Military Operations Research

This program provides knowledge, tools, and techniques to those who are working 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 deterministc 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 Computational Modeling

This certificate program provides knowledge, tools, and techniques to those who are working or plan to work in the field of computational modeling. Courses taken for this certificate program can count toward a master’s degree in operations research or statistics or a PhD in computational sciences and informatics. One must be concurrently enrolled in the program for courses to count toward the certificate and the other degree. For admission into the certificate program, applicants must meet minimum entrance requirements for the MS in operations research, the MS in statistical science, or the PhD in computational sciences and informatics. Certificate candidates must complete the following courses: OR 700/ OR 682; OR 541 and 635; and STAT 634. In addition, candidates must choose any two of the following electives: OR 744, 773; OR 542, 680; and SYST 683. Students who have already taken the equivalent of any of the required courses may, with permission of the department chair, complete the certificate program by taking only 15 credits of course work.

■ 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 512 or 573 (recommended if going on for MS in civil and infrastructure engineering); STAT 664/SYST664; SYST 781/STAT 781; STAT 652, 700, and 701; OR 671/SYST 672; or IT 819.

■ PhD Study in Systems Engineering and Operations Research

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 specialization 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 specialization in their degree title.

Requirements
Students seeking one of these specializations 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. 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 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 supervisor 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.

Virginia Commonwealth Graduate Engineering Program
Graduate programs in engineering and information technology are offered under the auspices of a commonwealth network in Virginia. This network includes Mason, Virginia Tech, Old Dominion University (ODU), the University of Virginia (UVA), and Virginia Commonwealth University. It employs a mix of direct classroom instruction from Mason and live interactive televised lectures from other universities. Afternoon and evening instruction is provided at Mason’s Fairfax Campus and UVA and Tech’s Northern Virginia Center.
Master’s degree programs are offered by UVA, Tech, ODU, and Mason. The degree programs from UVA include the master of materials engineering, master of engineering in chemical engineering, mechanical and aerospace engineering (manufacturing systems engineering), electrical engineering, systems engineering, and civil engineering (structural focus). Tech offers the master of engineering administration; master of science or master of engineering in electrical engineering, civil engineering (environmental), and systems engineering; and a master in mechanical engineering. ODU offers the master of engineering management. For more information, go to ite.gmu.edu/degree/commonwealth_main.htm.
The School of Management (SOM) has provided high-quality business education to the region since 1972. SOM’s 71 full-time faculty and 35 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, effects 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. Mason’s
Management catalog.

SOM, and TECM in the Course Descriptions chapter of this FNAN, MBA, MGMT, MIS, MKTG, MSBM, MSOM, OM, SOM offers all course work designated ACCT, BULE, EMBA, FNAN, MBA, MGMT, MIS, MKTG, MSBM, MSOM, OM, and TECM in the Course Descriptions chapter of this catalog.

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.

Faculty

Accounting
Buchanan, Douthett, Heller, Hylton, Jones, Krishnan, Moraglio, Nutter, Phillips, Sengupta, Shen, Visvanathan, Zadeh, Zhang

Finance
Canterbury, Christophe, Crockett, Ferri, Gao, Hallows, Hanweck, Hsieh, Johnston, Nikolova, Stahel, Wang, Zhdanov

Information Systems and Operations Management
Auffret, C. Chen, M. Chen, Das, Dutta, Hsu, Hughes, Hutchison, Kim, Mazumdar, Mehta, Noar, Singer

Management
Coffinberger, Crampton, Cronin, Demory, Joshi, Klimoski, Kravitz, C. Lee, H. Lee, Lei, Ling, Marks, O’Brien, Parker, Rockmann, Samuels, Wolf, Wolfe, Yasai

Marketing
Entrikin, Harvey, Joiner, Jaju, Kulick, Li, Martin, McCrohan, Member, Mouri, Phlipot, Saini, Schneider, Sussan

Course Work
SOM offers all course work designated ACCT, BULE, EMBAB, FNAN, MBA, MGMT, MIS, MKTG, MSBM, MSOM, OM, and TECM in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Because all organizations face constant change driven largely by information technology (IT), new organizations and new 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 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 will 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 courses.

SOM students pursuing a BS degree must complete the university-wide general education program plus 1 additional credit of natural science, for a total of 41 credits. The natural science requirement must be satisfied by successful completion of SOM 301. All degree applicants must complete the following SOM degree requirements:

- ECON 103* .................................................................3
- ECON 104* ...............................................................3
- ECON 300–400 ..........................................................3
- ANTH, PSYC, or SOCI ..............................................3
- MATH 108 or 113* (satisfies university requirement for quantitative reasoning) 3

School of Management Core* .........................................35

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACCT 203</td>
<td>3</td>
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<tr>
<td>ACCT 301</td>
<td>3</td>
</tr>
</tbody>
</table>
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)
• 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 approval.

<table>
<thead>
<tr>
<th>Major*</th>
<th>18 credits</th>
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<tbody>
<tr>
<td>SOM 498</td>
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<tr>
<td>SOM 301</td>
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<td>OM 310</td>
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<td>OM 210</td>
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<td>MIS 301</td>
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<td>MIS 102</td>
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<tr>
<td>MGMT 301</td>
<td>3</td>
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<tr>
<td>FNAN 301</td>
<td>3</td>
</tr>
<tr>
<td>BULE 302</td>
<td>3</td>
</tr>
</tbody>
</table>

General Electives | 20 credits |

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 credits |

* Completion with a grade of C or better is required for graduation.

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 competency, 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 431 Advanced Financial Accounting
• ACCT 451 Advanced Federal Taxation
• 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 may dictate course selections.

Information Systems and Operations Management, BS
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
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

Beyond the two required management courses, students must choose four additional management courses from the following list:
- Human Resource Management
  MGMT 421, 431
- Front-Line Manager or Management Trainee
  MGMT 412, 463, 464
- Entrepreneur
  MGMT 451, 471

Two other courses 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 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 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 nonprofit 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.

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

Beyond the two required management courses, students must choose four additional management courses from the following list:
- Human Resource Management
  MGMT 421, 431
- Front-Line Manager or Management Trainee
  MGMT 412, 463, 464
- Entrepreneur
  MGMT 451, 471

Two other courses 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 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 faculty will select the most qualified students to participate.
Required Courses
MKTG 312 Consumer Behavior
MKTG 351 Marketing Research Techniques and Applications
MKTG 471 Marketing Management

The remaining 9 credits must be chosen from a variety of upper-level electives in marketing.

Concentration in Internet Marketing Resiliency
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
This program provides an opportunity for nondegree-seeking students to earn the academic credit necessary to sit for the Uniform CPA Examination for 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, 15 of which must be taken at Mason. 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 for Virginia are required to have completed 150 college-level credits, including at least 30 credits of accounting with 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 Decision Making
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

And two elective courses from the following list:
ACCT 372 Business Analysis and Valuation
ACCT 382 Financial Analysis and the Business Life Cycle
ACCT 411 Advanced Managerial Accounting
ACCT 431 Advanced Financial Accounting
ACCT 451 Advanced Federal Taxation
ACCT 472 Government and Not-for-Profit 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
OM 210 Statistical Analysis for Management
FNAN 301 Financial Management
FNAN 302 Financial Analysis and Forecasting
MIS 301 Introduction to Business Information Systems

If a student has a previous degree in business or accounting, the faculty recommends SOM courses above the 301 level to complete the 15 SOM credits needed for the 30-credit requirement.

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.
**BS in Business Administration (BUAD)**

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**

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. The priority deadline is April 1.

Students begin the program in the fall or spring semester. Students can be part-time or full-time status. Students completing the MS in accounting course work may elect to further their leadership potential by transferring to the MBA with a concentration in accounting. Please contact the department for details.

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
- MBA 603 Managerial Economics and Decisions of the Firm
- MBA 623 Marketing Management
- 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 678 Strategy and Organizational Leadership

Students must either graduate with an MSA degree upon completion of 30 credits or opt into the Mason MBA program.

**Business Administration, MBA**

Phone: 703-993-2136
E-mail: somgrad@gmu.edu

The Mason MBA Program provides a high-level professional education in business administration. It is offered in both part-time 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 applicant 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:

- MBA 603 Managerial Economics and Decisions of the Firm ........................................ 3
- MBA 612 Managing Costs and Evaluating Performance .............................................. 1.5
- MBA 613 Financial Reporting and Decision Making ................................................. 3
- MBA 623 Marketing Management ............................................................................. 3
- MBA 633 Statistics for Business Decision Making ................................................... 3
- MBA 638 Managing Operations and Technology for the Digital Enterprise ................. 3
- MBA 643 Managerial Finance .................................................................................... 3
- MBA 653 Organizational Behavior and Human Resource Management ..................... 3
- MBA 673 Legal Environment for Management ....................................................... 1.5
- MBA 678 Strategy and Organizational Leadership .................................................... 3
- MBA 798 Global Business Perspectives* ................................................................. 3

Total .......................................................................................................................... 30

* 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
- 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

Financial Management
- 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 Strategy
  - MBA 717 International Finance

Note: One elective must be taken outside this concentration.

Entrepreneurship
- 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 7098 Taxes and Business Strategy
  - 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.

Market and Business Development
- 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.

Information Systems Management
- 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.
Management experience:
Five residency sessions complete the Executive MBA Program Residency Weeks.

Executive MBA
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.

Diversity in Learning
Students encounter multiple approaches to teaching in the Executive MBA Program. Classroom discussions, team projects, individual reading, team presentations, team problem solving, business simulations, business case analyses, coaching, and domestic and international residencies all contribute to the creative learning environment delivered by the Mason Executive MBA.

Program Residency Weeks
Five residency sessions complete the Executive MBA experience:

- **Opening Residency:** The Leader’s View—Focuses on developing a broad understanding of the economic environment of business and the development of high-performing teams.
- **Global Residency:** Global Business Strategies—Encompasses a 10-day trip to selected international cities. Professors from local universities provide an introduction to the business environment of each country visited and help prepare students for company visits and meetings with executives from local and multinational firms. Company presentations are delivered by directors and top managers. Housing is provided in business-class hotels, and time is provided for cultural excursions and other activities.
- **Midprogram Residency:** Professional Advancement and Organization Performance—Provides a comprehensive integrated learning experience designed to draw from the first year’s courses and prepare the student for the second year. The residency includes a workshop that pertains to career planning and development.
- **New York Residency:** Financial Markets—Concludes MBA 703 Financial Markets. During this a four-day trip, residency students hear from top managers of financial institutions and visit a number of those institutions to develop a comprehensive understanding of financial markets worldwide.
- **European Residency:** Understanding the European Union—Includes faculty presentations on the European Union and the variety of European cultures and approaches to doing business worldwide. Site visits to local companies are also organized with presentations from senior managers and directors.

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

**Modules 5 and 6:** Sustainable Business Performance

**Modules 7 and 8:** Leadership and Strategy

**Academic Year I**

- **EMBA 603 Managerial Economics**
- **EMBA 613 Financial Reporting and Decision Making**
- **EMBA 633 Statistics for Managers**
- **EMBA 641 Building the High Performance Team**
- **EMBA 653 Organizational Behavior**
- **EMBA 638 Strategies for Operations Management: Process and Supply Chain Leadership**
- **EMBA 623 Marketing Management**
- **EMBA 643 Managerial Finance**
- **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 716 Managing Change
EMBA 724 Integrated Marketing Communication
EMBA 717 Corporate Governance
EMBA 725 Leadership and the Role of the General Manager
EMBA 734 Electronic Commerce
EMBA 751 Corporate Strategy and Policy
EMBA 715 Special Topics in Accounting
EMBA 735 Special Topics in Decision Science
EMBA 745 Special Topics in Finance
EMBA 755 Special Topics in Management
EMBA 765 Special Topics in Management Information Systems
EMBA 775 Special Topics in Marketing

■ Technology Management, MS
Phone: 703-993-2136
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 12 years of work experience, and the classes are balanced evenly between men and women. Almost 30 percent of the students already have graduate degrees. Approximately two-thirds of the students work for the private sector, while the remainder works for federal government agencies or departments.

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

■ CIO University Partnership
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.
School of Public Policy

School of Public Policy
Finley Building
4400 University Drive, MS 3C6
Fairfax, VA 22030
Phone: 703-993-2280
Web: policy.gmu.edu
E-mail: spp@gmu.edu
3401 Fairfax Drive, MS 3B1
Arlington, VA 22201
Phone: 703-993-8200
Web: policy.gmu.edu
E-mail: spp@gmu.edu

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

SPP and the School of Law offer a joint JD/MPP degree program in law and public policy studies. For more information, go to www.law.gmu.edu/academics/lbm.html.

The school also offers certificate programs. For the most current information regarding SPP, go to policy.gmu.edu.
Admission
Kingsley E. Haynes, Dean
James H. Finkelstein, Senior Associate Dean
Catherine E. Rudder, Associate Dean for Academic Affairs
Roger R. Stough, Associate Dean for Research, Development, and External Affairs
Keith B. Segerson, Assistant Dean for Research Administration and Outreach
Matthys van Schaik, Assistant Dean for Academic Programs and Student Services
William H. Coester, Administrator

Faculty

Associate Faculty
Avruch, Bernold, Conlan, Donahue, Fearsides, Flood, Frase, Friesz, Guagnano, Heclio, Hennessey, Mahler, Paden, Regan, Scimecca

Research and Term Faculty
Benson, Clarke, Cook, Courtot, Davis, Ferrin, Garreau, Ha, Hall, Holleman, Jain, Johnson, Keenan, Kil, Kingston, Kulkarni, Leitch, Lugg, Melmed, Nicogossian, Paelinck, Regan, Riggie, Rikhye, Robb, Spalding, Wheeler, Woodcock

Adjunct Faculty
Bensimon, Burris, Cherukupalle, Curtis, Gaske, Gianturco, Gordon, Kewley, Ravera, Robinson, Rogowsky, Rosenwasser, Sando, Spear, Sullivan, Thompson, Varkonyi

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
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.

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 seminar paper
• For international applicants, TOEFL results with a minimum score of 600 on the paper-based; 250 on the computer-based; or 100 with a minimum of 23 on each of the subsections for 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 for international students and all students requesting funding consideration is February 1. The deadline for domestic students not requesting funding is March 1.

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 core courses (two in research and analytic methods, and two in foundational
policy topics), two semesters of participation in the research colloquium, two courses in an area of program concentration, 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, usually in the second or third year of study. 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
Phone: 703-993-8200

The master’s program in public policy leads to a degree for aspiring or experienced professionals who seek career advancement through cutting-edge education and training in policy analysis and development in increasingly technical and global environments. The program prepares the 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 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; 230 on the computer-based; or 88 with a minimum of 20 on each of the subsections for 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 concentration, 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 concentration sequence will also have an international focus. The plan of study includes the following:

### SPP Common Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 503 Culture, Organization, and Technology</td>
<td>4</td>
</tr>
<tr>
<td>PUBP 502 Governance and Policy Processes</td>
<td>4</td>
</tr>
</tbody>
</table>

### Required Public Policy Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 700 Theory and Practice in Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 704 Statistical Methods in Policy Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 720 Managerial Economics and Policy Analysis</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 741 Financial Policy Processes and Procedures</td>
<td>3</td>
</tr>
<tr>
<td>ITRN 503 Investment and Macroeconomics</td>
<td>3</td>
</tr>
</tbody>
</table>

### And one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBP 705 Advanced Statistical Methods for Policy Research</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 711 Rational Choice and Uncertainty: Systems Dynamics Policy Making</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 712 Policy Analysis and Management Science</td>
<td>3</td>
</tr>
<tr>
<td>PUBP 713 Policy and Program Evaluation</td>
<td>3</td>
</tr>
</tbody>
</table>

### Substantive Policy Concentrations

Electives are chosen from one of the following policy concentrations:
- 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
- International E-Commerce and Telecommunications
- National Security
- Global Medical and Health Policy

### Professional Experience Requirement

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

| Credits | 39–42 |

### Certificate Programs

Students pursuing the master’s degree who complete an additional 9 semester credits in a specified concentration (for a total of 48 to 51 credits) will receive a certificate in addition to the master’s degree. Otherwise, graduate certificates will be awarded to students in a substantive policy sequence upon the completion of at least 15 credits, which must include a
3-credit public policy core course and at least 12 credits of a policy concentration sequence.

Certificate programs are offered in transportation policy, operations, and logistics; regional economic development and technology planning; governance systems and policy management; international governance and institutions; culture, values, and social policy; collaborations and learning in policy organizations; science and technology policy; international e-commerce and telecommunications policy; global medical and health policy; and national security. The programs are open to those individuals with a bachelor's degree who seek continuing education and the skills to remain competitive in an increasingly complex global economy. Admission requirements are the same as those for the master's program above.

International Commerce and Policy, MA
Phone: 703-993-8200

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 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. Departments of Commerce and State, 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 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.

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; 230 on the computer-based; or 88 with a minimum of 20 on each of the subsections for 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 |
| PUBP 502 Governance and Policy Processes ...................... 4 |
| PUBP 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 503 Investment and Macroeconomics 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
Students pursuing the MA who complete an additional 9 credits in a designated area (for a total of 51 credits) will receive a certificate in addition to the master's degree. Otherwise, graduate certificates will be awarded to students in one of the following areas upon completion of at least 15 credits, which must include ITRN 500. Certificate programs are offered in global trade management; international business planning; international market analysis; managing international commerce; regional trade policy and planning; and science,
technology, and the global economy. The programs are open to those individuals with a bachelor’s degree who seek continuing education and skills to remain competitive in an increasingly complex global economy. Admission requirements are the same as those for the master’s program above.

### Transportation Policy, Operations, and Logistics, MA

**Phone:** 703-993-8200

The Transportation Policy, Operations, and Logistics (TPOL) MA 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 for effectively and efficiently supplying and operating 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.

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; 230 on the computer-based; or 88 with a minimum of 20 on each of the subsections for 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.

- **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 Studies: Organization Development and Knowledge Management, MS

**Phone:** 703-993-8200

The 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

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.

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; 230 on the computer-based; or 88 with a minimum of 20 on each of the subsections for 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.

**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

**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: Peace Operations, MS**

**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 for effectively and efficiently participating in or conducting 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; 230 on the computer-based; 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. Other students enroll in cohorts that complete courses at a pace equivalent to five courses per year. All students are required to take the three common courses and four core courses listed below (24 credits), as well as three electives (9 credits). Following consultation with their advisor, students will complete the remaining 6 credits by either writing a thesis, or taking a fourth elective and completing a project or internship.

**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

**Peace Operations Core Courses** ..................................12

CONF 501 Introduction to Conflict Analysis and Resolution (or equivalent) .........................3

MNPS 700 The New Professionalism: Theory of Peace Operations* ................................3

MNPS 702 The New Professional as Reflective Practitioner: Practice of Peace Operations* ........3

MNPS 703 Technology and Learning in the New Professions: Experiential Applications in Conflict and Post-Conflict Environments* ........................................3

**Electives** .....................................................................15

Students choose electives with the assistance of the program director to develop a specific substantive policy area. No more than two courses may be at the 500 level.

**Total Credits** .............................................................39

* Only those sections of MNPS 700, 702, and 703 designated for the Peace Operations Program will satisfy degree requirements.

**New Professional Studies: Knowledge Management, MA**

**Phone:** 703-993-8200

This 36-credit program is offered jointly with the National Defense University (NDU) Information Resources Management College (IRMC). Admission is limited primarily to holders of NDU certificates, although other applicants will be considered for a graduate certificate in knowledge management. 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.

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.
- For international students, TOEFL scores, with a minimum score of 575 on the paper-based; 230 on the computer-based; or 88 with a minimum of 20 on each of the subsections of 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:

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNPS 700 The New Professionalism: Theory and Practice*</td>
<td>3</td>
</tr>
<tr>
<td>MNPS 702 The New Professional as Reflective Practitioner*</td>
<td>3</td>
</tr>
<tr>
<td>MNPS 703 Technology and Learning in the New Professions*</td>
<td>3</td>
</tr>
<tr>
<td>LRNG 762 Strategic Knowledge Management</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

**Experiential Component**

0–3

In 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.

**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 Anerswald, 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, in enhancing their internal efficiency and smoothing the interface between U.S. agencies and other government agencies, the private sector, and foreign counterparts.

**Societal Dynamics Research Center**
**Director:** Alexander E. R. Woodcock, PhD
This research center synthesizes the latest computer technology with the study of human behavior to devise new models that can be used to find solutions to challenges such as international peacekeeping and drug interdiction. Working closely with a sister program in Sweden to maximize the potential for accurate computer modeling of human behavior, the center specializes in providing rapid analytic support to help policy makers anticipate and manage crises that threaten global, national, and regional stability.
Phone: 703-993-3622
Web: cos.gmu.edu

Departments
• Bioinformatics and Computational Biology
• Chemistry and Biochemistry
• Climate Dynamics
• Computational and Data Sciences
• Earth Systems and Geoinformation Sciences
• Environmental Science and Policy
• Geography
• Mathematical Sciences
• Molecular and Microbiology
• Physics and Astronomy

Undergraduate Majors
• Astronomy
• Biology
• Chemistry
• Computational and Data Sciences
• Earth Science
• Geography
• Geology
• Global and Environmental Change
• Mathematics
• Medical Technology
• Neuroscience
• Physics

Undergraduate Certificates
• Environmental Chemistry
• Environmental Management

Undergraduate Minors
• Astronomy
• Bioinformatics
• Biology
• Chemistry
• Earth Science
• Geographic Information Systems
• Geography
• Geology
• Mathematics
• Math for Undergraduates in the School of Management
• Ocean and Estuarine Science
• Physics

Graduate Degree Programs
• Applied and Engineering Physics, MS
• Biodefense, MS, PhD
• Bioinformatics, MS, PhD
• Bioinformatics Management, MS
• Biology, MS
• Biosciences, PhD
• Chemistry, MS
• Climate Dynamics, PhD
• Computational Science, MS
Graduate Certificate Programs

- Actuarial Sciences
- Bioinformatics
- Biological Threat and Defense
- Computational Social Science
- Computational Techniques and Applications
- Environmental Management
- Geographic Information Sciences
- Geospatial Intelligence
- Microbial Biodefense
- Nanotechnology and Nanoscience
- Remote Sensing and Earth Image Processing

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 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 Geospatial Intelligence

This college-wide interdisciplinary graduate certificate program is designed for students seeking training in geospatial intelligence applications, and also for current professionals employed by the federal government, private corporations, or professional associations. The objective of the program is to offer these students fundamental knowledge on basic geospatial intelligence issues, and the ability to apply this knowledge to a diversity of ever changing threat environments. For further information, please visit http://esgs.gmu.edu.

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, 330, 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
Student 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, Olds

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. Students must complete the following courses with a minimum GPA of 2.00, distributed as follows:

- BIOL 231 Cell Structure and Function
- 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
- 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

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. For further information, visit http://binf.gmu.edu.

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-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 for 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 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. The 15-credit certificate is based on the set of core courses supporting the bioinformatics MS and PhD degree programs, along with a set of elective courses. Students completing the certificate receive the most advanced bioinformatics education available in the region. Completion of the certificate will enhance the careers of those students who are already working in the bioinformatics field and can serve as a useful intermediate step toward later enrollment in the bioinformatics MS or PhD programs. Courses are generally offered in the late afternoon or early evening to accommodate students with full-time employment outside the university. For complete curriculum requirements, go to bioinformatics.gmu.edu.

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 Prince William Campus 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.

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 medicine, 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 Prince William 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 72 required credits may be reduced by up to 30 credits, depending on graduate course 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 biosciences 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, Chen, Davis (associate chair), Honeychuck, Hussam, Schreifels, Slayden, Weatherspoon
Term associate professor: Hatton
Assistant professors: Bishop, Couch
Term assistant professor: Kort

Course Work
This program offers all course work designated CHEM in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Chemistry, BA

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

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, 333, 334, 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
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
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 university-wide requirements in natural science and quantitative reasoning.)

• 45 credits of chemistry courses: CHEM 211, 212, 313, 314, 315, 318, 321, 331 or 333, 332 or 334, 336, 350, 446, 463, 464, 465
• 8 credits of math: MATH 113, 114
• 8–12 credits of physics: PHYS 243–246 or PHYS 160, 161, 260–263
• 8 credits of biology: BIOL 213, 305, 306
• 9 credits of approved science electives chosen from chemistry or biology courses at 302 or above (Courses from other disciplines may be submitted as electives, subject to approval of the coordinator.)

Concentration in Chemistry Education
Those interested in teaching high school chemistry should choose this major. This degree is approved by the American Chemical Society and leads to state licensure to teach in Virginia on completion of the degree.

In addition to satisfying the university-wide general education requirements for the BS degree, students majoring in chemistry education must present the following:

• 41 credits of chemistry courses: CHEM 211, 212, 313, 314, 315, 321, 331 or 333, 350, 446, 463, 470, 336 or 465, upper-level chemistry elective
• 11 credits of math: MATH 113, 114; STAT 250

• 8–12 credits of physics: PHYS 243–246, or PHYS 160, 260–263
• 8 credits of other general science: BIOL 103 or 213 and GEOL 101
• 21 credits of education courses: EDUC 422, 472; EDCI 473, 483, 491; EDRD 419

The course work above satisfies university-wide requirements in natural science, information technology, and quantitative reasoning.

During the sophomore year, students should contact the Graduate School of Education to arrange to attend an information session and take the PRAXIS I and II exams.

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 chemistry fulfill this requirement by successfully completing CHEM 336, 337, or 465.

Honors Program in Chemistry
Chemistry majors who have completed prerequisites for CHEM 455 and 456 Honors Research in Chemistry and have maintained an overall GPA of at least 3.00 in mathematics and science courses are eligible to enter the departmental honors program. To graduate with honors in chemistry, a student is required to maintain a minimum GPA of 3.00 in mathematics and science courses and successfully complete the two semesters of CHEM 455 and 456 with a minimum GPA of 3.50.

Minor in Chemistry
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. 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, 335, 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. Well-prepared 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 (nonthesis 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 concentration 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 preapproved 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.

Core courses may be taken as electives beyond the stated credit requirement for each option. CHEM 500 and 501 may not be applied toward the MS degree. CHEM 502 through 510 may be applied toward the MS degree only with prior written approval of the department.

Thesis Option, Chemistry
This program is specifically designed for students who wish to pursue a doctoral degree or a career in the chemical industry. Students must complete the following requirements:

• CHEM 633
• 9 credits from the different core areas of chemistry (analytical, biochemical, environmental, inorganic, and organic)
• 3 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:

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Concentration in Biochemistry, 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 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, 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.)
- 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

Physical Sciences, PhD
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 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 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.

Curriculum Requirements
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
typically, the area may not yet be specific enough to define
have selected a rather broad area of future research interest;
the program director. At this point, the student is expected to
composition of the student’s committee must be approved by
formed by the student as soon as possible after admission
703) is only 1 credit and must be repeated three times.
areas in the physical sciences. One of the three courses (PSCI
methods and current developments across a broad spectrum of
The 9 credits that make up the core consist of three courses
¬ 24 credits of dissertation research
¬ up to 24 credits of electives (approved by committee)
¬ a minimum of 15 credits of course work chosen as part of
¬ 9 credits of core courses (see below)
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), Straus  
**Associate professors:** DelSole, Houser, Huang, Kinter,  
Kirtman, Klinger  
**Assistant professor:** Jin  
**Contract professor:** Krishnamurthy  
**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 excite-
ment in recent years.

Climate variability has important ramifications for society,  
from planning for next year’s electrical demand and forecast-
ing 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 tem-
perature, 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 mon-
ssoons; 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 AdmissionsProcessing 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 core 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: 703-993-1990
Web: cds.gmu.edu

Faculty
Professors: Aharonov, Becker, Blaisten-Barojas, Cioffi-Revilla, Gentle, Lohner, Papaconstantopoulos (chair), Wegman
Associate professors: Axtell, Cebral, Wallin, C. Yang, Zoltek
Assistant professors: Camelli, Griva, Töllaksen, Weigel, Zhang
Research professors: Borne, Buot, Dere, Gomez, Poland, Titarchuk
Senior contract professor: Beall
Affiliates: Back, Carr, Klimov, Mazin, Morisette, Opher, Polyak, Sauer, Summers, Vassiliadis, R. Yang
Adjuncts: Guharay, Ikossi, Lanzagorta, Luo, Soto, Veytsman

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 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 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 Physics
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.

### Concentration in Chemistry
This concentration is intended 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 Biology
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.

### GRADUATE PROGRAMS

#### Computational Science, MS

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 techniques 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 following list: CSI 654, 701, 702, 703, 709, 710, 721, 740, 744, 771, 773; MATH 686; CS 635; INF 614
- 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.

Each student completing the CSI doctoral program receives extensive training in a selected area of scientific concentration, along with a broad background in modern computational techniques. Graduates are qualified to pursue careers in academia, private industry, and many government laboratories and agencies. The program provides interdisciplinary research opportunities, including atmospheric transport and dispersion, bioinformatics and computational biology, climate dynamics and global change, computational chemistry, computational finance, computational fluid dynamics, computational intelligence and knowledge mining, computational mathematics, computational neuroscience, computational physics,
computational statistics, computational materials science, Earth observing and remote sensing, and space sciences and computational astrophysics.

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, 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 will be waived if the student holds a master's degree from a U.S. institution. TOEFL scores are required for all international applicants.

Degree Requirements
The program emphasizes three intellectual elements: common computational science topics, computationally intensive courses in specific areas of interest, and doctoral research. The course work is divided as follows:
- 12 credits of common computational core courses from the group CSI 700, 701, 702, 703, and 710
- Scientific core courses in one of the areas of concentration
- Scientific electives from specialty courses in the area of concentration or individualized study based on professional experience and research
- General electives
- 3 credits of colloquia or seminars, with at least 1 credit of CSI 899

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. At the end of the semester when course work is completed, students must form a doctoral committee, which will write the student's candidacy exam. The exam includes written, oral, and computational components. On passing the candidacy exam and submitting an acceptable dissertation proposal, students are advanced to doctoral candidacy.

Students are encouraged to apply their knowledge to a broad range of natural science problems using computational skills and techniques missing from the more traditional degree programs in science and mathematics. Note that research opportunities are not limited to the listed areas, and many opportunities exist to create new areas of interdisciplinary research that would be difficult to accommodate within a traditional doctoral program. Students are to consult with their advisors to prepare specific plans of study. Complete information regarding the curriculum requirements (including electives) for each area of concentration is available at cos.gmu.edu. In addition to the common core (4 of CSI 700, 701, 702, 703, and 710) required scientific core courses for the specific areas of concentration are as follows:
- Comprehensive atmospheric modeling: CSI 655, CLIM 711, and EOS 854
- Computational economic systems: ECON 632, 633, 885, and 895; OR 649; one of CSI 771, CSI 773, MATH 674, or CSS 610
- Computational finance: CSI 771 and 776; STAT 652 and 656; two courses in finance
- Computational fluid dynamics: CSI 720, 721, 722, and 742
- Computational materials and chemical science: CSI 780, 783, and 787, CSI 685 or 687, CSI 786 or 885
- Computational mathematics: CSI 740; MATH 677 or 678; two additional math courses
- Computational physics: CSI 780, CSI 783 or 784; CSI 785 or PHYS 513; and one of CSI 782, 783, 784, 888, or PHYS 705
- Computational statistics: CSI 771 or 773; CSI 778; CSI 876 or 877; CSI 972 and 973
- Quantum information science: CSI 615, 715, and 716; one of CSI 717 or 718; one of CSI 783 or 784
- Space sciences and computational astrophysics: CSI 661 and 784; CSI 781 or 782; CSI 785 or PHYS 513; one of CSI 721, 761, or 788

Students may also pursue interdisciplinary research that combines the areas of concentration listed above with each other and also with high-performance computing, computational neuroscience, computational intelligence, Earth systems and geoinformation sciences, computational chemistry, climate dynamics, and bioinformatics, several of which are autonomous PhD programs within COS.

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
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 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 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 area of concentration; 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 Physics and Astronomy.

### 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 computer science 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 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.

### 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.

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. 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.

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 for all international applicants.

Graduate Certificate in 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 on 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. 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. Requirements are 9 credits of core courses and 6 credits of electives. The prefix of the associated courses is NANO.

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.

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.

Earth Systems and Geoinformation Sciences
Phone: 703-993-1212
Web: esgs.gmu.edu

Faculty
Professors: Agouris, Di, Kafatos, Taylor, Wong (chair)
Associate professors: Beach, Boybeyi, Chiu, Stefanidis, R. Yang
Assistant professors: Cervone, Qu, Sun, C. Yang, S. Yang, W. Yang
Senior contract professors: Resmini, Wood
Research professors: Gomez, Kwiatkowski, Murphy
Research associate professors: Amitai, Ji

Course Work
This department offers all course work designated EOS in the Course Descriptions chapter of this catalog.

UNDERGRADUATE PROGRAMS

Global and Environmental Change, BS
This interdisciplinary undergraduate program is jointly offered by the Department of Earth Systems and Geoinformation Sciences (ESGS) (http://esgs.gmu.edu) and the Department of Environmental Science and Policy (ESP) (http://esp.gmu.edu). This program examines the dynamics of the Earth (geosphere, atmosphere, ecosphere, and sociosphere) from local, regional, and global perspectives. The use of earth observing/remote sensing techniques and related geoinformation technologies in detecting change at various scales is emphasized. For detailed degree requirements, please refer to the department websites listed above.

GRADUATE PROGRAMS

Earth Systems Science, MS
This interdisciplinary master’s program is offered jointly by the Earth Systems and Geoinformation Sciences Department, the Department of Environmental Science and Policy, and the Department of Geography. 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
related to the science and applications of remote sensing. 

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, 616; GEOG 575
- 3 credits of colloquium or seminar: EOS 792 and EOS 900
- 3–6 credits of research: EOS 798 or 799
- General electives

Graduate Certificate in 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 rate for 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.

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 either 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
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, Bradley, Gilleveit, Harlan, Jonas, McBride, Rockwood, Torzilli
Assistant professor: Ahn, Balint, Crate, Darnall, Edwards, Kraus, Krekeler, Kysar-Mattietti, Parker, Weeks
Term assistant professors: Cressley, Largen, Parsons, Verardo
Research associate professor: Litchfield
Research assistant professor: Bartoldus
Emeritus professors: Bradley, Ernst, Kelso, Shaffer, Skog

Other Environmental Faculty
Professors: Foster, Haack, Houck, Mose, Mushrush, Willett, B. Wright
Associate professors: Beach, deMonsabert, Fryxell, Gifford, Guagnan, Honeychurch, Kozlowski, Mahler, Meyer, R. Paden, Palkovich, Regan, E. Rodgers, Royt, Wan, Wong
Assistant professor: T. Wood
Affiliate faculty: Boggs, Briggs, Buchino, Cook, Cooper, Creque, Emerson, Fox, Hamdan, Hazen, Jordan, Leimgruber, Maldonado, Marra, Maurakis, Megonigal, Mineau, Nerad, Noe, Oren, Peters, Seidensticker, Winston, 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
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
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. (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
- Choice 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, STAT 250
- 3 credits of computer skills: IT 103

** 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
  - 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 and geological hazards: GEOL 102 or EVPP 110; GEOL 302, 303, 306, 316 or CS 117**; GEOL 317; and four of the following: GEOL 304*, 305, 313, 315, 363, 403, 417; GEOG 311, 412, 416
  - Environmental science: BIOL 307; EVPP 110, 111, 336, 377; GEOL 303, 305, 306; and two of the following: BIOL 345, 449; EVPP 350, 363
  - Geology: GEOL 102, 302, 304*, 308*, 312, 317, 401, 404***
  - Earth science education: 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 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.
*Students must achieve a grade of 2.00 or better in GEOL 302 before taking GEOL 304 or 308.

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.

Students may not receive both minors. For policies governing all minors, see the Academic Policies chapter of this catalog.

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, NCLC 395 (Biology of the Chesapeake Bay or Exploring Underwater Archaeology topics), EVPP 490 (Marine Conservation or Marine Mammal Biology and Conservation topics), NCLC 495/BIOL 440 (Coral Reef Ecology), BIOL/EVPP 546, and BIOL/EVPP 537. PHED 225 is strongly recommended but not required.

*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 requirement, students must complete a two-semester laboratory science sequence in environmental science, biology, chemistry, or geology. Only courses with a grade of C or better are counted toward the certificate program.

Students select at least 27 credits of course work chosen in consultation with the certificate director. The courses are divided into five categories. Courses listed in more than one category can satisfy the requirements of only one. Any substitution in the following list requires permission from the certificate director.

- Environmental certificate core (four courses): EVPP/BIOL 377; GEOG 303 or 303; ECON 103, EVPP 361, 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/BIOL 577; GEG 102, 309; GEOL 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 318, 515, 550, 538; EVPP/BIOL 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; GEOL 301, 304, 305, 306, 316, 325, 406; GOVT 318, 357, 364, 366; MGMT 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 three letters of recommendation, 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 interest 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
Environmental Science and Policy Concentration
This degree 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 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 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 five 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, instrumental 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.

Environmental Biocomplexity Concentration
This concentration is for students desiring an MS degree with the 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 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 (3–6 credits) as described above for the environmental sciences and policy concentration.

Earth Surface Processes and Environmental Geochemistry Concentration
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 16 credits are required, including at least one course from each of the following areas (10 of the 16 credits): soils science, hydrogeology, and geochemistry. The remainder may be chosen from a list of applicable EVPP, CHEM, and GEOL graduate courses, including GEOL 500, 501, 601; CHEM 633, 651, 728, and EVPP 503, 505 543, 546, 550, 563, 577, 607, 610, 643, 644, 745.
- Public Policy: At least 6 credits are required in environmental law, human dimension of global change, environmental ethics, human ecology, or planning.
- Methods: At least 6 credits are required in remote sensing, GIS, statistics, instrumentation, or modeling.
- Seminar: At least 1 credit of EVPP 692 Master’s Seminar in Environmental Science and Public Policy on an appropriate topic is required.
- Research: At least 3 credits of 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 Management Concentration

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

Earth Systems Science, MS

The department participates in the MS in earth systems science administered by the Department of Earth Systems and Geoinformation Sciences.

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

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
  SOC 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
SOC 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, 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.
Science

• 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.

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 examination 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

Phone: 703-993-1210
Web: geog.gmu.edu

Faculty
Professors: Falconer (chair), Haack, Haynes (dean, School of Public Policy), Self (also College of Education and Human Development), Stough (School of Public Policy), Waters (director, GIS Center)

Associate professors: Beach (ESGS), Pilon

Assistant professors: Kronenfeld, Parker, Schintler (School of Public Policy), Zohnik

Instructors: Boudinot, Dillon, Grymes, Hallden, Roper, Salem, Sheers, Ward, Young

Adjuncts: Allen, DeCola, Hosek, Jampoler, Mobley, Salamonowicz, Shipley, Slover, Wheeler, Zinn

Course Work
This department offers all course work designated 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 in 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 bullet 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 GEOG 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 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 GIS content may be substituted for one of the above.

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.

GRADUATE PROGRAMS

Geographic and Cartographic Sciences, MS
The focus of this program is to prepare students for careers in geography, remote sensing, GIS and its increasing applications in diverse fields, and cartography, visualization, and modeling. This expertise is useful to both 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.

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 area. Specialized instructional space for geographic information science is housed in Innovation 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 (non-thesis 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

Admission Requirements
Applicants should submit an application for graduate study and must meet all requirements for graduate study at Mason. GRE scores and letters of recommendation are not required.

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.

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.

PhD Studies in Geography
The Department of Geography participates in programs that provide opportunities for geographical research. Geography participates in the Environmental Science and Public Policy PhD program and faculty serve both as dissertation committee members and as 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 Public 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. Geography faculty provide joint supervision and serve as committee members to support those pursuing research that is primarily geographic in nature. Program description and degree regulations can be found under the School of Public Policy listing.

The department is a member of the Executive Council for the Earth Systems and Geoinformation Sciences PhD, that offers concentrations in geosciences, geography, remote sensing and earth observations, and geographic information systems. These areas of specialization are often of direct interest to geographers. Those wishing to maintain a strong discipline emphasis should pursue the geography concentration. Several departments participate in supervisory committees providing a rich opportunity for students to expand their interdisciplinary interests within the degree program. Program description and degree regulations can be found under the Department of Earth Systems and Geoinformation Sciences listing.

Earth Systems Science, MS
The interdisciplinary Earth Systems Science (ESS) Program is offered by the Department of Environmental Science and Policy, the Department of Geography, and the Department of Earth Systems and Geoinformation Sciences. The program addresses the growing national and regional 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 either an optional master’s thesis for more in-depth studies or a research project. In the latter case, students will have to pass a qualifying exam.

Degree Requirements
Candidates must successfully complete 30 credits as follows:

- Earth science core (9 credits): CSI 655; EOS 656/EVPP 652/GEOG 570; and EOS 657/GEOL 601/GEOG 671
- Earth observation courses (3 credits): EOS 753 or GEOG 579
- Quantitative techniques courses (3 credits): EOS 754 or GEOG 585
- Human and biological perspectives courses (3 credits):
  - 3 credits of EOS 704; EOS 721; EVPP 577, 636, 741; GEOG 575, 590, 670 (see advisor for complete list)
  - 3 credits of colloquium/seminar: EOS 900/EVPP 791/GEOG 791 and EOS 792/ EVPP 792/GEOG 792
- 3–6 credits of research: EOS 798/EVPP 798/GEOG 750, or EOS 799/EVPP 799/GEOG 799
- General electives (see advisor for course options)

Mathematical Sciences
Phone: 703-993-1460
Web: math.gmu.edu

Faculty
Professors: Alligood, Colonna, Fischer (chair), Kulesza, B. Lawrence, J. Lawrence, Levy, Morris, Polysak, Sachs, Saperstone, Sauer (COS Distinguished Scholar), Shapiro (undergraduate coordinator), Singman, Soltan, Walnut (graduate coordinator)
Associate professors: Anderson, Gabel, Goldin, Kiley, Lamba, Lim, Lin, Sander, Wanner, Zoltek
Assistant professors: Agnarsson, Griva
Adjuncts: Choukha, Crain, Ellis, Hiles, Lightbourne, Perencevich, Roberts, Shaw, Wallace, Romanovskaya, Zampedro
Admin Professional: O’Brien
Term instructors: Crossin, Goldman, Granfield, Matveev, Nuttall, O’Beirne, Orlova-Shokry
Affiliates: Loustaunau, Peterson

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
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
Students must pursue one of the following concentrations: traditional mathematics, actuarial mathematics, or applied 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, or 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 a traditional or applied 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 in traditional mathematics 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 354.
- 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:

<table>
<thead>
<tr>
<th>MATH 113</th>
<th>MATH 105 or 108</th>
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<tbody>
<tr>
<td>MATH 351 or STAT 344</td>
<td>MATH 110</td>
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<tr>
<td>MATH 441</td>
<td>MATH 111</td>
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<tr>
<td>MATH 125</td>
<td>MATH 112</td>
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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 Undergraduates in the School of Management

To receive this minor, students must complete 20 credits with a minimum GPA of 2.00, including MATH 113, 114, 203, 213, and 351; and one course chosen from MATH 352, 441, and 554.

For policies governing all minors, see the Academic Policies chapter of this catalog.

Math Tutoring Center

The department manages the Math Tutoring Center, which offers free tutoring for first- and second-year math courses (math.gmu.edu/tutorcenter.htm). Tutoring is given by advanced mathematics students and available on a drop-in basis with daytime and evening hours throughout the term.

Math Learning Center

The Math Learning Center (math.gmu.edu/mathlearningcenter.htm) for a small fee offers self-paced and classroom non-credit tutorial programs for students who do not place into the math course they need. Special tutors and tutorial software are available to those enrolled in the program. Successful completion of the relevant program enables students to enroll in Math 105, 106, 108, 110, 111, 112, or 125.

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.

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

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/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/Creative Component
A student may fulfill the research/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/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 the 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 toward the MS Degree
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 primarily interested in pursuing a career in undergraduate education at the community college or four-year college level is encouraged to consider enrolling in the higher education program’s college teaching certificate.

Students must complete 18 credit hours as follows: CTCH 601, 602, 603, 604, 885, and 3 credits of CTCH electives. Credit can be earned for CTCH 885 (Internship) 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 assistantships, 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 Admission Office.

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. 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: Petricoin
Professors: Bailey (distinguished), Chandhoke, Liotta, Soyfer (distinguished university), Willett
Associate professors: Christensen, Fryxell, Grant, Popov, Royt
Assistant professors: Baranova, Cox, van Hoek, Wu
Term assistant professors: Beck (associate chair), Coss, Cupo, Fondufe, Kocate, Pelayes
Research professor: Izbister
Research assistant professor: Popova
Adjunct faculty: Davis, Kaminiski, Kindred, McClintock, Tondi
Affiliate faculty: Anderson, Burgess, Cook, Edmiston, Frank, Gunasinghe, Hearing, Hicks, Hunt, Karginov, Kulesh, Liu, McCreight, Niemeyer, Patrick, Reilly, Volschikina, Wilhelmsen, Wu
Course Work
The department offers all course work designated BIOD, BIOL, BIOS, and MTCH 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 website 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.

Biology, BA
In addition to satisfying the university-wide general education requirements and requirements for a BA degree in COS, students must complete the following credits with a minimum GPA of 2.00. (Through the course work below, biology majors satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- 32 credits of biology, including BIOL 213, 303, 304, 305, 306, 307, 311 Students must earn a minimum GPA of 2.50 in these courses. No more than 8 credits of 100-level BIOL courses (103, 104, 124, and 125) may be applied to the required 32 BIOL credits.

Students must earn a minimum GPA of 2.00 in the following courses:
- 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 2.00. (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 Students must earn a minimum GPA of 2.50 in these courses. No more than 8 credits of 100-level BIOL courses (103, 104, 124, and 125) may be applied to the required 44 BIOL credits.

Students must earn a minimum GPA of 2.00 in the following courses:
- 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, not CHEM 314)
  - 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
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
Concentration in Environmental and Conservation Biology
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.
- 3 credits of computer skills: IT 103
- 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)
- 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
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.)

- 24 credits in biology, including BIOL 213, 303, 304, 305, 306, 307, 311
- 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, 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, 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
Biology majors who have completed 16 credits of math and science, including BIOL 213, 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 in math and science, and a B or better in BIOL 213, are also eligible. To graduate with honors in biology, a student is required to maintain a minimum GPA of 3.00 in math and science and earn a GPA of at least 3.50 in at least three semesters of BIOL 494 Honors Seminar. For more information, contact the departmental honors advisor at 703-993-1050.

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 300- to 400-level biology course at the 300, 400, or 500 level (not BIOL 301). For policies governing all minors, see the Academic Policies chapter of this catalog.

Minor in Bioinformatics
A minor in bioinformatics is an interdisciplinary program consisting of required courses in biology, computer science, and statistics. Students must complete 19 to 20 credits with a minimum GPA of 2.00, distributed as follows:

- BIOL 482 (with prerequisites BIOL 213, 305, 306)
- BIOL 580
- CS 112, 211, and 310
- One course in statistics: STAT 250/IT 250, STAT 344, or BIOL 312

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
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.

Biology Club
The Biology Club functions as both a social and an informational network for all interested students. In addition, it serves the Molecular and Microbiology Department by sponsoring a seminar program and working at university functions.

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.

Accelerated Master's Degree in Biology
Qualified undergraduates may be admitted to an accelerated master’s program and obtain both a BS and an MS within five years. 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.

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 (CHSS). 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 cell 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 Molecular 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 Microbiology and Infectious Disease 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 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 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

Concentration in Bioinformatics and Computational Biology Requirements
2–3 credits of BIOL 690 or BIOS 702
2 credits of BIOL 695 or 696
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 of electives in BIOL, BIOS, or related areas as approved by the student’s advisor, graduate committee, and the program director

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. Areas of emphasis in the functional genomics and biotechnology concentration include 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 the 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 to any concentration 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
- Concentration: 12–16 credits required courses for one concentration (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 concentration director approve the program of study.

On near 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 concentration coordinator.

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, student 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 concentration director. Graduate credits taken previously and not used toward another degree may be transferred, subject to the approval of the advisor, the concentration 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.

Concentration in Functional Genomics and Biotechnology
This concentration 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 concentration courses:

BIOS 740, 741, 742, 743, and 744

Concentration in Microbiology and Infectious Disease
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 biocontainment laboratory work.

Requirements
In addition to the degree requirements stated previously, students are required to take the following:

BIOL 563 Virology ....................................................3
BIOL 669 Pathogenic Microbiology ...............................3
BIOL 715 Microbial Physiology ....................................3
BIOL 720 Microbial Metabolism .................................3
BIOL 718 Techniques in Microbial Pathogenesis ...........3
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 of BINF 633, 636, 705
In response to this challenge, the rapidly developing field of understanding of human cognition and higher brain function. The program focuses on the complexity of the human brain and addresses the challenge of developing an integrative advanced study.

The interdisciplinary doctoral program in neuroscience is offered by the COS, CHSS, and the Krasnow Institute for Advanced Study. Applicants should also include three letters of recommendation attended, a current résumé, and a statement of purpose. Any official transcripts from each college and graduate institution who may be suitable as advisors or supervisory committee members. To apply, prospective students should forward to the systems and behavioral level (including cognitive studies on great apes in collaboration with the 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, connection between quantum processes and brain dynamics, 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 concentrations 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 concentration prerequisites may vary slightly. For example, students in the TCP concentration must have basic knowledge of integral calculus. It is expected that the selection of elective thesis topics will vary widely between the two concentrations; however, students will be allowed to mix and match electives from both concentrations, with guidance and consent from the advisor or graduate coordinator.

The courses, seminars, and laboratory rotations and readings (comprising a total of 48 credits) are organized as follows:

- Core biology: 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
- 15 credits of electives
- 2 credits of seminar: NEUR 709, 710

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*, Blaisten-Barojas*, Dworzecka, Ehrlich (chair), Ellsworth, Kafatos, Lieb, Mishin, Satija, Summers, Trefl (Robinson Professor)
Associate professors: Barreto, Ceperley, Rubin, Sauer, Satyapal, So, Wallin*
Assistant professors: Ophor, Rosenberg, Tollaksen*, Weigel*, Weingartner, Zhang*
Term associate professor: Oerter
Term assistant professors: Geller, Goldman, Iacoletti, Wyczalkowski
Term instructors: Ericson, Ewell, Jazaeri
Professor Emeritus: Mielczarek
* These guest faculty hold appointments in other departments.
Research faculty: Meier, Poland

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
The BS in astronomy prepares students for graduate school and 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 228, 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 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.

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 510; and MATH 446 or 447. In addition, they should complete a senior project (ASTR 408) or internship (ASTR 409).

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).

Sample Schedule for Astronomy BS
(excluding general education courses)

First Semester
MATH 113 Calculus I ......................................................4
ENGL 101 Composition ..................................................3
ASTR 103 Astronomy ....................................................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

Third Semester
ASTR 302 Foundations of Cosmology ...............................3
PHYS 260 University Physics II .......................................3
PHYS 261 University Physics II Lab ................................1
MATH 213 Calculus III ...................................................3

Fourth Semester
ASTR 301 Astrobiology ..................................................3
PHYS 262 University Physics III ......................................3
PHYS 263 University Physics III Lab ...............................1
MATH 214 Elementary Differential Equations ..................3

Fifth Semester
ASTR 328 Introduction to Astrophysics ............................3
PHYS 305 Electromagnetic Theory ..................................3
ENGL 302 Advanced Composition ..................................3

Sixth Semester
MATH 313 Introduction to Applied Mathematics ..............3
PHYS 307 Thermodynamics ..........................................3
PHYS 308 Modern Physics ............................................3

Seventh Semester
MATH 446 Numerical Analysis I ....................................3
ASTR 401 Computation in Astronomy ............................3
ASTR 403 Planetary Sciences ........................................3
ASTR 490 Astronomy seminar ......................................3

Eighth Semester
MATH 447 Numerical Analysis II .....................................3
ASTR 404 Galactic Astronomy .......................................3
ASTR 408 Senior Project ...............................................3
ASTR 428 Relativity and Cosmology ................................3

Astronomy, BA
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 intending 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 the university-wide requirements in natural science and quantitative reasoning. PHYS 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. 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
The BS in physics prepares students for graduate school or one of the many careers in business or industry in which physics graduates are employed. 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.

- Nine required core physics courses (22 credits): PHYS 160, 161, 260, 261, 262, 263, 305, 308, and 407 (Students double majoring in engineering and physics may substitute ECE 305 for PHYS 305)
- 12 credits from PHYS 251, 303, 306, 307, 402, 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 12 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 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 Computational Physics
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 510, ECE 442, and MATH 446 and 447. In addition, they 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 Astrophysics
This emphasis is for students who are planning to attend graduate school in astrophysics or pursue a career in industry. To complete this emphasis, students should select four courses from the following: 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 Electronics
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 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 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 advisor 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).

**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** ..........1

**Fifth Semester**
- **PHYS 303 Classical Mechanics** ..........3
- **PHYS 305 Electromagnetic Theory** ..........3
- **PHYS/MATH elective** ..........3
- **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 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.

**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.

**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.

For policies governing all minors, see the Academic Policies chapter of this catalog.

**Alternative Introductory Sequence**
Normally, students who intend to major in physics should take the introductory sequence (PHYS 160, 161, 260, 261, 262, and 263). Students who decide to major in physics after completing PHYS 243 and 245 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, chemistry, 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 also by 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.

**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 gaeline2@gmu.edu, or go to gse.gmu.edu.

**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. Admission 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.

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 two emphases. 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, administered with the Department of Electrical and Computer Engineering, allows students to select a larger number of courses from electrical engineering.

All 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 2.75 (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 as follows:

- 6 credits of required core courses: PHYS 685 or 513, PHYS 686
- 12 credits in an emphasis
  - For the applied physics emphasis, any four 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
  - For the engineering physics emphasis, PHYS 510 and 533, and any 6 credits in electrical engineering (ECE)
- 12 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, 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), and 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.

■ Physical Sciences, PhD

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 because modern research in the physical sciences is highly specialized. But 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, biophysical sciences, and astronomy). Yet, the program curriculum has been designed to provide enough flexibility to accommodate students seeking a fully interdisciplinary program and those students 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

Applicants should have a bachelor’s degree in physics, astronomy, chemistry, mathematics, or engineering, including a course in ordinary differential equations. Admission requires a minimum GPA of 3.00 in undergraduate work and acceptable scores on the GRE-GEN. Applicants with insufficient undergraduate records may be accepted provisionally.

Degree Requirements

The total curriculum consists of 72 credits, representing 48 credits of course work and 24 credits of dissertation research. For students entering the doctoral program with a
previous graduate degree or graduate work, the 48 credits may be reduced by a maximum of 30 credits. Of the 48, 9 credits are core courses to be taken by all students in the program, and at least 15 are selected as part of a student’s contract with a three-member faculty committee (explained below). The program consists of

- 9 credits of core courses (see below)
- Minimum of 15 credits of contract course work
- Up to 24 credits of approved electives
- 24 credits of dissertation research

The 9 credits composing the core consist of three courses that are intended to expose all students to current research methods and current developments across a broad spectrum of areas in the physical sciences. PSCI 703 (see below) is only 1 credit and must be repeated three times. The core courses are

- PSCI 701 Frontiers of Physical Sciences (3:3:0)
- PSCI 702 Research Methods (3:3:0)
- PSCI 703 Seminar in Physical Sciences (1:1:0)

A three-member predissertation committee will be formed by the student as soon as possible after admission but not later than after completing the 9-credit core. The committee will work with the student to define the contract core courses applicable to the specific student, which will be a minimum 15 credits and constitute the subject matter for the qualifying exams. After students select a dissertation advisor and finalize the composition of the dissertation committee, they take the candidacy exams, which have written and oral components. On passing the candidacy exams and approval of the dissertation proposal by the committee, the student is advanced to doctoral candidacy.

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

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
• Theater BA

Minors
• Art and visual technology
• Arts administration
• Dance appreciation
• Jazz studies
• Multimedia
• Music
• Theater
• World music

Certificates
• Artist certificate in instrumental performance
• Artist certificate in piano performance
• Artist certificate in vocal performance
• Arts entrepreneurship
• Professional development certificate in piano pedagogy

“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 Johnson Center Gallery, Harris Theater, and other campus venues make the arts pervasive at Mason and in our larger community.

Administration
William F. Reeder, Dean
Rick Davis, Associate Dean and Artistic Director,
Center for the Arts and Theater of the First Amendment
Linda G. Miller, Associate Dean of Academic Affairs and
Student Advancement
Brian Marcus, Associate Dean of Development
Scott Martin, Assistant Dean, Research, Technology,
and Institutional Development

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.

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 registra-
tion 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**

**Faculty**

**Associate professors:**

- Carbonneau, Frederick, Kravitz (gallery director), Linton (chair), Mandes, Sandell

**Assistant professors:**

- Reber, Davis (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.

**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 art 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**

Beginning in spring 2006, 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
- 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 digital art. Students can concentrate a portion of their study in digital arts, graphic design, painting, drawing, photography, printmaking, sculpture, or interdisciplinary arts (InterArts).

**Degree Requirements**

### General Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Requirements</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>Arts</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>Breadth and Experience</strong></td>
<td><strong>12</strong></td>
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<tr>
<td><strong>Synthesis</strong></td>
<td><strong>4</strong></td>
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<tr>
<td><strong>Concentration</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td><strong>Upper-Level Credits</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

**Foundation Requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written communication: ENGL 101 and 302</td>
<td><strong>6</strong></td>
</tr>
<tr>
<td>Nonnative speakers of English with limited</td>
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<tr>
<td>proficiency in the language may substitute ENGL 100</td>
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<tr>
<td>for ENGL 101. Students must attain a minimum</td>
<td></td>
</tr>
<tr>
<td>grade of C in ENGL 100 or 101, as well as in 302,</td>
<td></td>
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<tr>
<td>to fulfill degree requirements.</td>
<td></td>
</tr>
<tr>
<td>Oral communication</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>Quantitative reasoning</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>Information technology</td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

**Core Requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio Foundation</td>
<td><strong>17</strong></td>
</tr>
<tr>
<td>AVT 101 New Majors Colloquium</td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>AVT 104 and 105 Studio Fundamentals I and II</td>
<td><strong>8</strong></td>
</tr>
<tr>
<td>AVT 222 and 323 or 324 Drawing I and II, or</td>
<td></td>
</tr>
<tr>
<td>Figure Drawing</td>
<td><strong>8</strong></td>
</tr>
<tr>
<td>Art History, Critical Analysis, Contemporary</td>
<td><strong>18</strong></td>
</tr>
<tr>
<td>Practice</td>
<td></td>
</tr>
<tr>
<td>ARTH 200 Survey of Western Art I</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>or ARTH 203 Survey of Asian Art</td>
<td></td>
</tr>
<tr>
<td>ARTH 201 Survey of Western Art II</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>ARTH 374 Art Now</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>AVT 301 Visual Voices Colloquium</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>AVT 307 Aesthetics</td>
<td><strong>3</strong></td>
</tr>
<tr>
<td>AVT 395 Writing for Artists</td>
<td><strong>3</strong></td>
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</table>

**Breadth and Experience**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Art History</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td><strong>Oral Communication</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>Information Technology</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

**Synthesis**

- AVT 497 Senior Project or AVT 498 Senior Design Project

**Concentration**

- **Digital Arts**: 12 credits from AVT 382, 383, 390, 482, 483, 487
- **Drawing**: AVT 422, 423; 4 credits from AVT 324, 326, 333, 336, 337, 342, 432, 433. Note: All AVT majors concentrating in drawing must complete AVT 232 (Painting I) under Breadth and Experience.
- **Graphic Design**: AVT 311, 313, 414
InterArts: AVT 373, 473; 4 credits from 372, 374, 376, 377, 378, 491
Painting: AVT 333, 432, 433
Photography: AVT 353, 459; and 4 credits from AVT 452, 453, 454, 455, 456, 457, 458
Printmaking: AVT 343; and 8 credits from 345, 346, 442, 443
Sculpture: AVT 363, 462, 463

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
This intensive, 120-credit studio production program emphasizes analytical, creative, and experiential aspects of studio and digital arts. 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: digital arts, graphic design, painting, drawing, photography, printmaking, sculpture, or interdisciplinary arts (InterArts).

Application deadlines are at the end of the sixth week of the fall and spring semester of each year. Students planning to apply are encouraged to 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
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
or ARTH 203 Survey of Asian 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 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:

Digital Arts: 12 credits from AVT 382, 383, 390, 482, 483, 487; and 12 credits from AVT 300–499
Drawing: 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: AVT 311, 313, 414, 415, and 8 credits of AVT 419 Topics in Graphic Design InterArts: AVT 373, 473; and 12 credits from 372, 374, 376, 377, 378, 491, or 492; and 4 credits from AVT 300–499 Painting: AVT 333, 432, 433; and 12 credits from 300–499 Photography: AVT 353 and 459; 8 credits from AVT 452, 453, 454, 455, 456, 457, and 458; and 8 credits from AVT 300–499 Printmaking: AVT 343; and 8 credits from 345, 346, 442, 443; and 12 credits from 300–499 Sculpture: AVT 363, 462, 463; and 12 credits from 300–499

General Electives ...............................................................2

Total ................................................................................120

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

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
Option recommended for BFA/MAT: AVT 180, plus either CS 105 or PHIL 112

Breadth and Experience

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
ART 307 Aesthetics .............................................................3
ART 472 Critical Theory in the Visual Arts ....................3
ART 493 Teaching Visual Thinking through Media/ Processes K–12 (Meets the ARTH 300+ requirement) .3
ART 494 Teaching Critical Response to Art, K–12 (Meets the AVT 395 writing-intensive requirement) …3

Synthesis ...........................................................................4

AVT 497 Senior Project or AVT 498 Senior Design Project

Concentration…………………………………………………………24
24 credits in one of the following areas:
Digital Arts: 12 credits from AVT 382, 383, 390, 482, 483, 487; and 12 credits from AVT 300–499
Painting: 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: AVT 311, 313, 414, 415; and 8 credits of AVT 419 Topics in Graphic Design InterArts: AVT 373, 473; and 12 credits from 372, 374, 376, 377, 378, or 491; and 4 credits from AVT 300–499 Photographic: AVT 353 and 459; 8 credits from AVT 452, 453, 454, 455, 456, 457, 458; and 8 credits from AVT 300–499 Printmaking: AVT 343; and 8 credits from 345, 346, 442, 443; and 12 credits from 300–499 Sculpture: AVT 363, 462, 463; and 12 credits from 300–499

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 in the following areas: digital arts, graphic design, InterArts, painting, photography, printmaking, or sculpture. The requirements are as follows:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVT 104 and 105 Studio Fundamentals I and II</td>
<td>8</td>
</tr>
<tr>
<td>AVT 222 Drawing I</td>
<td>4</td>
</tr>
<tr>
<td>AVT 200–299</td>
<td>4</td>
</tr>
<tr>
<td>AVT 300–399</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

Interdisciplinary Minor in Multimedia

For the program of study 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 digital arts.

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 purpose 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 of 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 labs 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>30</td>
</tr>
<tr>
<td>AVT 599 Special Topics in Art and Visual Technology</td>
<td>10</td>
</tr>
<tr>
<td>AVT 600 Research Methodologies</td>
<td>5</td>
</tr>
<tr>
<td>AVT 610 Graduate Seminar</td>
<td>5</td>
</tr>
<tr>
<td>AVT 620 Theory and Criticism in the Visual Arts</td>
<td>4</td>
</tr>
<tr>
<td>AVT 693 Apprenticeship</td>
<td>6</td>
</tr>
</tbody>
</table>

**Visual and Performing Arts**

### Digital Arts Emphasis 15

MA students must complete any three of the following courses:
- AVT 616 Internet Multimedia Art
- AVT 676 Sound and Music for Video and Animation
- AVT 687 Interface and CD-ROM Design
- AVT 684 Two-Dimensional Digital Art
- AVT 686 Three-Dimensional Digital Art
- AVT 688 Digital Animation

**Total** 45

### MFA 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>30</td>
</tr>
<tr>
<td>AVT 599 Special Topics in Art and Visual Technology</td>
<td>10</td>
</tr>
<tr>
<td>AVT 600 Research Methodologies</td>
<td>5</td>
</tr>
<tr>
<td>AVT 610 Graduate Seminar</td>
<td>5</td>
</tr>
<tr>
<td>AVT 620 Theory and Criticism in the Visual Arts</td>
<td>4</td>
</tr>
<tr>
<td>AVT 670 Teaching Practicum</td>
<td>6</td>
</tr>
</tbody>
</table>

**Digital Arts**

Any three of the following courses:
- AVT 616 Internet Multimedia Art
- AVT 676 Sound and Music for Video and Animation
- AVT 687 Interface and CD-ROM Design
- AVT 684 Two-Dimensional Digital Art
- AVT 686 Three-Dimensional Digital Art
- AVT 688 Digital Animation

**Total** 15

### Studio Emphasis

MFA students must complete 15 credits in digital arts, InterArts, painting, photography, printmaking, or sculpture, as follows:

**Digital Arts**

Any three of the following courses:
- AVT 616 Internet Multimedia Art
- AVT 676 Sound and Music for Video and Animation
- AVT 687 Interface and CD-ROM Design
- AVT 684 Two-Dimensional Digital Art
- AVT 686 Three-Dimensional Digital Art
- AVT 688 Digital Animation

**InterArts**

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.

**Painting**

All three of the following courses:
- AVT 632 Graduate Painting I
- AVT 633 Graduate Painting II
- AVT 634 Advanced Graduate Painting

**Printmaking**

All three of the following courses:
- AVT 642 Graduate Printmaking I
- AVT 643 Graduate Printmaking II
- AVT 644 Advanced Graduate Printmaking

**Sculpture**

All three of the following courses:
- AVT 662 Graduate Sculpture I
- AVT 663 Graduate Sculpture II
- AVT 664 Advanced Graduate Sculpture

**Printmaking**

### MFA Comprehensive Experience 15

Candidates must complete all of the above core and studio requirements as well as the following:
- AVT 796 Directed Project
- AVT 798 Directed Reading
- AVT 799 Thesis

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.

**Total credits required** 60

### Master of Arts in Teaching in Art Education

This preservice degree program prepares students with a BFA degree 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.

### 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 program may demand additional course work to establish proficiency in visual arts. Students lacking a 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 art education program director and faculty. Meeting minimum criteria does not guarantee admittance to the program.

Applications will be accepted for the fall semester only. The deadline for receipt of application materials is January 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
- Proof of passing score on Praxis I or equivalent
• Graded writing sample
• TOEFL score, if required by Mason policies
• Portfolio that reflects artistic breadth and depth, including drawing skills. 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.
• In-person portfolio review, writing sample, and oral interview

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 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 EDVC 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. Students are expected to pass Praxis I or equivalent within the first semester of enrollment.

**Degree Requirements**

**Credits**

<table>
<thead>
<tr>
<th>Course</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</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>1</td>
</tr>
<tr>
<td>EDRD 501 Literacy and Curriculum Integration for Specialist Teachers</td>
<td>4</td>
</tr>
</tbody>
</table>

MAT students will receive ongoing evaluation reviews by the MAT committee. Those who do not have successful reviews will be terminated from the program.

**Professional Teaching Portfolio and Qualifications Review**

The Comprehensive Experience for the MAT includes the following: (a) 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 (b) 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. The faculty advisory committee will determine whether the student has mastered the field of study. Students who are unable to successfully complete the full Student Teaching Internship in Art Education and Seminar for Student Teachers will be terminated from the MAT in Art Education Program.

**Arts Management**

4260 Chain Bridge Road
Fairfax, VA 22030
Phone: 703-993-8926
Web: artsmanagement.gmu.edu

**Faculty**

Richard Kamenitzer, Program Director

Professors: Reeder, Davis

Associate professors: Brindle, Marcus, Martin

Term associate professor: Kamenitzer (program director)

Adjuncts: Bienvenu, Carlborg, Hauptle, Hill, Huschle, Kraft, Madden, Richard, Rosenberg, VanDyke

**Arts Management, MA**

The MA in arts management responds to a 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 in 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, candidates must hold an undergraduate degree.

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
- GRE scores

Applicants will 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 Course Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAM 601 Fund Raising and Development in Arts</td>
<td>3</td>
</tr>
<tr>
<td>MAM 602 Seminar in Arts Management</td>
<td>3</td>
</tr>
<tr>
<td>MAM 603 Arts in Society</td>
<td>3</td>
</tr>
<tr>
<td>MAM 604 Public Relations and Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MAM 606 Board of Directors</td>
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</tr>
<tr>
<td>MAM 704 Budgeting and Finance for</td>
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</tr>
<tr>
<td>Arts Organizations</td>
<td></td>
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<tr>
<td>MAM 705 Budgeting and Finance for</td>
<td>3</td>
</tr>
<tr>
<td>Arts Organizations II</td>
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</tr>
<tr>
<td>MAM 710 Arts Policy</td>
<td>3</td>
</tr>
<tr>
<td>MBA 623 Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>PUAD 654 The Community, Marketing, and</td>
<td>3</td>
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<tr>
<td>Public Relations</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
</tr>
<tr>
<td>Arts/Arts Management Specific Cluster</td>
<td></td>
</tr>
</tbody>
</table>

Arts Management Specific Cluster

Arts Management in either general or specific to an arts discipline such as music, theater, art and visual technology, or dance

Total credits required .................................................. 36

Graduate Certificate in 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.

Entrance 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 not eligible to be applied toward the master of arts in arts management.

Core Courses Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAM 604 Public Relations and Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MAM 704 Budgeting and Finance for Arts</td>
<td>3</td>
</tr>
<tr>
<td>MAM 750 Art Entrepreneurship I</td>
<td>3</td>
</tr>
<tr>
<td>MAM 751 Art Entrepreneurship II</td>
<td>3</td>
</tr>
<tr>
<td>Three credits of electives as approved by</td>
<td>3</td>
</tr>
<tr>
<td>Arts Management Program</td>
<td></td>
</tr>
</tbody>
</table>

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
Adjuncts: Bush, Clancy, Goodson, Koucheravy, Lee, Lees, Reedy, Summerall
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 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; EDRG 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 post-baccalaureate 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 technical mastery and devote a large portion of their college study to an intensive and comprehensive dance curriculum. 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. Entrance into the BFA program is by audition during the candidate’s freshman year. Student progress in the BFA program is assessed annually.

Degree Requirements

<table>
<thead>
<tr>
<th>General Education</th>
<th>Credits</th>
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Foundation Requirements

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Core Requirements

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Dance Major Core

<table>
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<th>DANC 114 Rhythmic Analysis and Music Resources for Dance</th>
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<th>DANC 454 Teaching Principles of Modern Dance</th>
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<tr>
<th>DANC 480 Introduction to Laban Movement Analysis</th>
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Dance Electives..........................................................15
Chosen from the following:
DANC 130 Beginning Tap Dance
DANC 225 Beginning Intermediate Modern Dance
DANC 245 Beginning Intermediate Ballet
DANC 314 Music Accompaniment for Dance
DANC 370 Dance Performance
DANC 455 Teaching Practicum
DANC 453 Teaching Creative Movement
DANC 459 Teaching Practicum

Electives...........................................................................3
Total................................................................................126

■ Dance, BA
The BA degree is a 120-credit general program of dance study
within a liberal arts degree framework.

Degree Requirements

General Education ..........................................................58

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 1, 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 a 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 require-
ment.

Dance Major Core.........................................................47
DANC 114 Rhythm Analysis..............................................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.............................................1
DANC 325/425 Intermediate/Advanced Modern Dance...........6
DANC 345/445 Intermediate/Advanced Ballet........................3
DANC 370 Dance Performance...........................................2
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

Dance Electives.................................................................7
Choose from the following:
DANC 118 World Dance
DANC 119 Dance in Popular Culture: Afro-Latino Dance
DANC 220 Special Topics in Dance
DANC 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 370 Dance Performance
DANC 455 Teaching Practicum
DANC 453 Teaching Creative Movement
DANC 459 Teaching Practicum

Minor in Dance Appreciation
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 may be applied to the dance minor.

All minors must complete the following courses:
DANC 101 Dance Appreciation...........................................3
DANC 118 World Dance*..................................................3
All students are required to take the following:

**Dance, MFA**

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 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:

<table>
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<tr>
<th>Course</th>
<th>Credits</th>
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<tr>
<td>DANC 501 Graduate Dance Seminar</td>
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<tr>
<td>18 credits of advanced dance technique</td>
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<td>DANC 525 Advanced Modern Dance</td>
<td>9-12</td>
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<td>DANC 545 Advanced Ballet</td>
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<tr>
<td>DANC 560 Advanced Choreography</td>
<td>6</td>
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<tr>
<td>DANC 570/571 Advanced Performance/Residency Workshop</td>
<td>3</td>
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<tr>
<td>DANC 580 Laban Movement Analysis</td>
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</table>
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

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. 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

Total Core Requirements ...................................................9

Film and Video Studies Core Requirements .........................21

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 355 Introduction to Business and Distribution of Film and Video ..................................................3

THR 382 Screenplay Workshop or THR 482 Advanced Screenplay Workshop ..................................................3

Film and Video Studies Core Requirements .........................14

FAVS 100 Colloquium (1 credit, three times) .................3

FAVS 450 Internship ....................................................3

FAVS 499 Senior Thesis/Project ...................................3

Analysis, History, Theory ...............................................6

CHIN 320 Contemporary Chinese Film

COMM 255 Media Literary

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

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.

** 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: Sternbach

Associate professors: Billingham, Carroll, Monson (associate chair), T. Owens

Term associate professors: Casagrande, Rendler

Assistant professors: Bergman, Bullard, Nichols

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.

**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.

Brian 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:** Jeanie Chalifour, 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.

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).

**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 Summy, 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, MM, 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.

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. BME, University of Iowa; MA, DMA, Catholic University of America; trumpeter, U.S. Army Band of Washington, D.C., and National Gallery Orchestra.

Tuba: Roger Behrend (see Euphonium).

Viola: Edwin Johonnott, Adjunct Professor. Former violinst, 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, Moscow Conservatory and the Juilliard School; violinist, National Symphony Orchestra.

Edwin Johonnott (see Viola).

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.

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
Social or behavioral science*......................................3

* Also have significant elective choices as per general educa-
tion listing.

Remaining general education requirements are fulfilled with
major course work.

Other.................................................................0–21

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 arts requirement).......................3
MUSI 415 Music in Computer Technology..................3
(Meets university general education information
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

Music, BM

One hundred twenty credits are required for the BM degree.
Admission to a concentration normally occurs at the end of
the sophomore year.

Concentration in Performance

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
in 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 educa-
tion listing.

Remaining general education requirements are fulfilled with
major course work.

Performance Basic Musicianship Requirements........63

Applied music (PMI)............................................20
MUSI 113, 114, 213 Sight Singing/Ear Training I–III........6
MUSI 115, 116, 215, 216 Music Theory I–IV...............12
MUSI 251 Art of Teaching Music..............................3
(Meets university general education oral
communication requirement)
MUSI 273 Keyboard Skills III...............................1
MUSI 300 Recital Attendance (five semesters).............0
MUSI 319 Class Composition and Arranging...............3
MUSI 324 Junior Recital........................................1
MUSI 331, 332, and 432 Music History in Society I, II,
and IV.................................................................9
MUSI 415 Music in Computer Technology..................3
(Meets university general education information
technology requirement)
MUSI 424 Senior Recital........................................1
MUSI 431 Music History in Society III.......................3
(Meets university general education global
understanding requirement)
MUSI 491 Performance Synthesis...........................1
(Meets university general education synthesis
requirement)

* Concentrations in:

Performance—Piano/Organ
Performance—Voice
Performance—Woodwind
Performance—Brass
Performance—String
Performance—Percussion

General Electives..................................................9–11

* See department for specific requirements
Jazz Concentration .......................................................................................................................... 30
Ensemble .......................................................................................................................... 5
Ensemble ......................................................................................................................... 3
(Meets university general education arts requirement)
Jazz Chamber Ensemble .......................................................... 4
MUSI 107 The Development of Jazz ........................................ 3
MUSI 171 and 172 Keyboard Skills I and II .................................. 2
(Keyboard students substitute MUSI 371 and MUSI 372 Techniques of Accompanying I and II)
MUSI 311 Jazz Studies (Jazz Theory, Styles, and Analysis) ................................................................ 3
MUSI 379 Introduction to Jazz Improvisation .......................... 1
MUSI 450, 452 Jazz Improvisation I and II (2 credits each) .......................................................... 4
MUSI 454 Jazz Arranging .................................................. 3
MUSI 492J Topics in Jazz Studies ........................................... 2

Composition Concentration ................................................................................................. 31
To be admitted, students must submit a portfolio of compositions and be interviewed by a faculty committee. While each student will be advised according to individual circumstances, those who anticipate pursuing the concentration in composition should take note of the following guidelines:
• Theory I and II should be passed through proficiency prior to the first semester of the freshman year.
• Theory III, Theory IV, and Keyboard Skills should be taken during the freshman year.
• Class Composition and Arranging I should be taken during the sophomore year.
• Undergraduate private music instruction in composition can be taken simultaneously with Class Composition and Arranging I provided the student’s portfolio has been approved and the interview with the faculty committee has been successful.
• The first three semesters, the student enrolls in 2 credit PMI on major instrument; fourth semester, PMI Composition for 2 credits; and the remaining four semesters, PMI Composition for 3 credits (by audition).

The following courses, in addition to those listed under the BM in performance, musicianship, are required:
Major Instrument (PMI) ........................................................................................................ 6
Composition (PMI) ......................................................................................................... 4
*MUSI 324 Junior Recital .......................................................................................... 1
MUSI 424 Senior Recital .......................................................................................... 1
MUSI 491 Performance Synthesis “Lecture Recital” ................................................. 1
MUSI 251 Art of Teaching .......................................................................................... 3
Class Instruments (brass, woodwinds, strings, percussion) .................................................. 4
Large Ensemble ............................................................................................................. 4
**Small Ensemble (M3E and/or Healing Arts) .................................................. 4
Additional ensembles or theory/composition elective ........................................ 3
Elective .......................................................................................................................... 5

* Composition majors will be required to present an approved, substantive work in concert in M3E or large ensemble. Work is to be written, produced, rehearsed, and conducted by the student under the supervision of the composition faculty or ensemble director. **Composition students are expected to assist in the planning, organization, rehearsal, and performance in these ensembles in addition to what would be considered normal participation. This requirement is equivalent to an internship experience.

Music Education
Certification to Teach
The music education concentration 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). Minimum scores on the Praxis I and II 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 recommended 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 completed 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 fingering proficiency exam during the first music methods course.
• Complete all course work in the program sequence.

Upon 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 Praxis II (Music: Content Knowledge) test during the internship semester.

Degree Requirements
General Education ............................................................................................................. 21
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, and 302 to fulfill degree requirements.
Quantitative reasoning (Mathematics) ........................................................................ 3
Core Requirements
Literature......................................................................................................................... 3
Natural science (non-lab) .......................................................................................... 3
Western civilization ...................................................................................................... 3
Social or behavioral science* .................................................................................. 3
* Also have significant elective choices as per general education listing.

Remaining university general education requirements are fulfilled with major course work.
Music Education Basic Musicianship Requirements...67
Applied Music (PMI).................................................12
MUSI 323 Music Education Recital ............................0
Large ensemble ......................................................4
Additional ensembles .............................................3
(Meets university general education arts requirement)
MUSI 113, 114, 213 Sight Singing/Ear Training I–III .......6
MUSI 115, 116, 215, 216 Theory I–IV ..........................12
MUSI 171, 172, 273 Keyboard Skills I–III ....................3
Piano majors substitute MUSI 371 and 372 for
MUSI 171 and 172)
MUSI 251 Art of Teaching Music .................................3
(Meets university general education oral
communication requirement)
MUSI 319 Class Composition and Arranging ................3
MUSI 415 Music in Computer Technology ....................3
(Meets university general education information
technology requirement)
MUSI 331, 332, and 432 Music History in Society I, II,
and IV ..............................................................9
MUSI 431 Music History in Society III ..........................3
(Meets university general education global
understanding requirement)
MUSI 391 and 396 Conducting I and II .........................4
MUSI 393 Music Administration and Management ......2
MUSI 300 Recital Attendance (five semesters) ..........0
Professional Education ...........................................15
EDRD 300 Language and Curriculum Integration ........3
EDUC 301 Educationally Diverse Populations .............3
EDUC 302 Human Growth and Development .............3
(Instrumental emphasis may take EDUC 539 Human
Development and Learning)
MUSI 495 Internship in Music Education .................6
(Meets university general education synthesis
requirement)
* Concentrations in:
  Music Education—Keyboard/General Music
  Music Education—Voice/General Music
  Music Education—Woodwind
  Music Education—Brass
  Music Education—Strings
  Music Education—Guitar/General Music
  Music Education—Percussion
Elective ...............................................................2–3
* See department for specific requirements.

Teacher Licensure
Undergraduate students seeking certification to teach vocal
and choral or instrumental music at the elementary and sec-
ondary 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.

Total Required ................................................................21
MUSI 101 Introduction to Classical Music ........................3
MUSI 113 Sight Singing/Ear Training I ..........................2
MUSI 115, 116 Theory I and II ....................................6
MUSI 171 Keyboard Skills I ........................................1
Applied Music (PMI) ....................................................6
MUSI 300 Recital Attendance (two semesters)* ..............0
Ensembles ..............................................................3

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 instru-
entalists 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.

Total Required ................................................................21
MUSI 107 The Development of Jazz ............................3
MUSI 113 Sight Singing/Ear Training I ..........................2
MUSI 115, 116 Theory I, II .........................................6
MUSI 171 Keyboard Skills I ........................................1
Applied Music (PMI) ....................................................2
MUSI 300 Recital Attendance (two semesters)* ..............0
MUSI 311 Jazz Studies ................................................3
MUSI 485 Jazz Chamber Ensembles .........................3
MUSI 379 Jazz Improvisation ....................................1
*All students who enroll as music minors and jazz studies
minors must take MUSI 300 for two semesters. A grade of S
(satisfactory) must be earned each semester.

Interdisciplinary Minors
World Music
Faculty and Staff
Bullard (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 func-
tions 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 ethnographic enquiry.

Requirements
Students must complete 16 to 18 credits, with a 10-credit
core and opportunities to take electives in several depart-
ments 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.
Visual and strategies appropriate for private and group settings. Students student development, and a comprehensive study of teaching
text of teaching repertoire and technical skills at different levels of
pedagogy including business aspects of teaching, techniques
The curriculum includes concentrated course work in keyboard
certification requires a certain level of performance profi ciency and basic knowledge of music theory, sight singing and ear training, and keyboard skills. Entry to the certificate program includes testing in theory, sight singing and ear training, and keyboard skills; and a performance audition to
determine profi ciency or placement in appropriate levels of
private music instruction or course work to achieve required profi ciency for certification.

Entrance Requirements
Students must demonstrate musical proficiency comparable to
the following minimum levels of course work:

- Private music instruction: four semesters
- MUSI 116 Theory II
- MUSI 113 Sight Singing/Ear Training I
- MUSI 273 Keyboard Skills III (functional keyboard skills, including transposition, harmonization, and score reading)

If entrance exams indicate that a student is defi cient in any area, the student may enroll in the appropriate level class at Mason; however, remediation classes will not count toward
the 16 credits needed to earn the certifi cate.

Total Required.................................................................16

Required Courses .........................................................12
- MUSI 351 Keyboard Pedagogy I .....................................3
- MUSI 451 Keyboard Pedagogy II ...................................3
- MUSI 492H Keyboard Literature ..................................3
- MUSI 496 Teaching Internship .....................................2
- MUSI 497 Independent Study: Pedagogy Recital/Project
  (may be in the form of a lecture-recital or research
  paper) ........................................................................1

Electives: To be chosen from the following options: .............4
- Piano pedagogy workshops .............................................1–3
- MUSI 421 or 442 PMI ..................................................1–4
- MUSI 371 Techniques of Accompanying I (vocal) ..........1
- MUSI 372 Techniques of Accompanying II
  (instrumental) ..............................................................1
- MUSI 373 Advanced Accompanying and
  Musicianship Skills ..................................................3
- MUSI 382 Piano Ensemble .............................................1
- MUSI 485 Piano Chamber Music ....................................1

Additional classes in music theory or music history
(with approval of advisor)

GRADUATE PROGRAMS

Music, MM
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 infl uence 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 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: 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/performance. All students are required to complete the 11 credits listed below as 1. General Requirements plus one of the six areas identified below as 2. Additional Requirements (2a. through 2f). There are some limited possibilities for double concentrations. For details, see the director of graduate studies.

**General Requirements (for all six options): 11 credits**

- MUSI 611 Analytical Techniques
- MUSI 630 Topics in Music History/Literature
- MUSI 662 Introduction to Research in Music

**Additional Requirements: MM, Concentration in Performance: 19 credits**

- MUSI 610 Topics in Music Theory
- MUSI 628X Graduate PMI
- MUSI 790 Graduate Recital

**Additional Requirements: MM, Concentration in Performance (multiple instruments): 19 credits**

- MUSI 610 Topics in Music Theory
- MUSI 628X Graduate PMI in Primary Instrument
- MUSI 628X Graduate PMI in Secondary and Tertiary Instruments (4 credits each)

**Additional Requirements: MM, Concentration in Music Education: 19 credits**

- MUSI 563 Orff Schulwerk I
- MUSI 564 Orff Schulwerk II
- MUSI 565 Orff Schulwerk III
- MUSI Electives

**Or 9 advisor-approved credits from**

- MUSI 560
- MUSI 640
- MUSI 654
- MUSI 660

**Additional Requirements: MM, Concentration in Composition: 19 credits**

- MUSI 628X Graduate PMI in Primary Instrument
- MUSI 630 Topics in Music History and Literature
- MUSI 790 Graduate Recital

**Additional Requirements: MM, Concentration in Conducting: 19 credits**

- MUSI 729 PMI Conducting
- MUSI 613 Graduate Orchestration
- MUSI 610 Topics in Music Theory
- MUSI Electives
### Visual and Performing Arts

#### Additional Requirements: MM, Concentration in Pedagogy and Performance: 19 credits

**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 (solo recitals) ............... 2  
  - 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

**Studies in Performance (17 credits)**

- MUSI 72X Graduate PMI (over four semesters) ............ 4  
- MUSI 592 Topics in Music: Solo Vocal Repertoire Coaching ......................................................... 4  
- MUSI 526 Performance Seminar and Solo Vocal Repertoire II ..................................................... 2  
- MUSI 544 or 545 Diction I or II .................................. 2  
- Elective .................................................................. 1

**Support Studies in Accompanying or Ensemble plus Electives (7 credits)**

(choose A or B)

**A**

- MUSI 571 Techniques of Accompanying I .................. 1  
- MUSI 572 Techniques of Accompanying II ................ 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

#### Studies in Performance (20 credits)

- MUSI 723 (over four semesters) ............................... 12
- MUSI 592 Topics in Music: Solo Vocal Repertoire Coaching ......................................................... 4
- MUSI 526 Performance Seminar and Solo Vocal Repertoire II ..................................................... 2
- MUSI 544 or 545 Diction I or II .................................. 2
- Elective .................................................................. 1

**Solo Performance Emphasis** .................................. 2

- MUSI 684 Graduate Lecture Recital ............................ 1
- MUSI 724 Graduate (certificate) Recital ..................... 1
- Elective .................................................................. 1

**Total** .................................................................... 32

#### Support Studies in Accompanying or Ensemble plus Electives (12 credits)

- MUSI 685 Graduate Chamber Ensemble and 688 Advanced Opera and Musical Theater Ensemble ... 9
- MUSI 690 Graduate Lecture-Recital ......................... 1–3
- MUSI 790 Graduate Recital ...................................... 1
- Elective .................................................................. 1

**Total** .................................................................... 32

#### 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  
- Assistant professors: Elston, Kurtz  
- Term associate professor: McDonald  
- Term assistant professors: Chew  
- Adjuncts: Lechter, Lee, McManus, Nanni-Messegee, Mountain, Murray, 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 a 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 classes 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.

■ Theater, BA

Degree Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>General Education</td>
<td>40</td>
</tr>
<tr>
<td>Foundation Requirements</td>
<td></td>
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<tr>
<td>Written communication: ENGL 101 and 302</td>
<td></td>
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<tr>
<td>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.</td>
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<tr>
<td>Oral communication</td>
<td>3</td>
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<tr>
<td>Quantitative reasoning</td>
<td>3</td>
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<tr>
<td>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</td>
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<tr>
<td>Information technology</td>
<td>3</td>
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<tr>
<td>Core Requirements</td>
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<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>Arts (outside the major)</td>
<td>3</td>
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<tr>
<td>Natural science (including one laboratory science)</td>
<td>7</td>
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<tr>
<td>Western civilization</td>
<td>3</td>
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<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral sciences</td>
<td>3</td>
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<tr>
<td>Synthesis requirement</td>
<td>3</td>
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<tr>
<td>Additional units</td>
<td>18</td>
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<tr>
<td>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.</td>
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<tr>
<td>Performance</td>
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<tr>
<td>This area 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.</td>
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<tr>
<td>THR 300 Voice and Speech Fundamentals</td>
<td>3</td>
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<tr>
<td>THR 301 Voice and Speech for the Performer</td>
<td>3</td>
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<tr>
<td>THR 303 Movement for Actors I</td>
<td>3</td>
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<tr>
<td>THR 304 Movement for Actors II</td>
<td>3</td>
</tr>
<tr>
<td>THR 305 Stage Combat</td>
<td>3</td>
</tr>
<tr>
<td>THR 310 Acting II</td>
<td>3</td>
</tr>
<tr>
<td>THR 320 Beginning Modern Acting</td>
<td>3</td>
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<tr>
<td>THR 321 Acting Shakespeare</td>
<td>3</td>
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<tr>
<td>THR 322 Alexander Technique/Stage Combat</td>
<td>3</td>
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<tr>
<td>THR 342 Makeup Design</td>
<td>3</td>
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<tr>
<td>THR 345 Puppetry: History and Technique</td>
<td>3</td>
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<tr>
<td>THR 365 Characterization</td>
<td>3</td>
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<tr>
<td>THR 420 Advanced Modern Acting</td>
<td>3</td>
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<tr>
<td>THR 421 One-Person Show</td>
<td>3</td>
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<tr>
<td>THR 423 Audition Techniques: Stage and Camera</td>
<td>3</td>
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<tr>
<td>THR 425 Verse Speaking</td>
<td>3</td>
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<tr>
<td>Design and Technical Theater</td>
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<tr>
<td>This area 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.</td>
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<tr>
<td>THR 314 Lighting Stagecraft</td>
<td>3</td>
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<tr>
<td>THR 330 Seminar in Technical Theater</td>
<td>3</td>
</tr>
<tr>
<td>THR 331 Drafting and Model Making</td>
<td>3</td>
</tr>
<tr>
<td>THR 332 Seminar in Costume History</td>
<td>3</td>
</tr>
</tbody>
</table>
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

Theater Studies
This area 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 355 Moral Vision in American Theater ......................3
Thr 359 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 482 Advanced Screenplay Workshop .........................3
Thr 491 Majors Seminar in the Profession .......................3
Thr 496 Text in Performance .............................................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 CVP A, 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.
### 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 | ART |
| Arts Management | MAM |
| Astronomy | ASTR |
| Bachelor of Arts in Interdisciplinary Studies | BAIS |
| Bachelor of Individualized Study | BIS |
| Biodefense | BIOD |
| Bioinformatics | BINF |
| Biology | BIOL |
| Bioscience Management | MSBM |
| 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 | EDG |
| 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  FRLN
French  FREN
Geography  GEOG
Geology  GEOL
German  GERM
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  INF
Information Technology  IT
Initiatives in Educational Transformation—Teaching
Instructional Technology  IETT
Interdisciplinary Studies  MAIS
International Commerce and Policy  ITRN
Italian  ITAL
Japanese  JAPA
Latin  LATN
Law  LAW
Learning, Social and Organizational
Linguistics  LRNG
Management  MGMT
Management Information Systems  MIS
Marketing  MKTG
Master of Business Administration  MBA
Master of New Professional Studies  MNPS
Master of New Professional Studies—Teaching
Medical Technology  MTL
Military Science  MLSC
Music  MUSI
Nanotechnology  NANO
Neurosciences  NEUR
New Century College  NCLC
Nursing  NURS
Operations Management  OM
Operations Research  OR
Parks, Recreation, and Leisure Studies  PRLS
Philosophy  PHIL
Physical Education  PHED
Physical Sciences  PSCI
Physics  PHYS
Psychology  PSYC
Public Administration  PUAD
Public Affairs  PUAF
Public Policy  PUBP
Reading Education  EDRD
Religious Studies  RELI
Russian  RUSS
School of Management  SOM
Social Work  SOCW
Sociology  SOCI
Sociology and Anthropology  SOAN
Software Engineering  SWE
Spanish  SPAN
Special Education  EDSE
Sport Management  SPMT
Statistics  STAT
Systems Engineering  SYST
Technology Management  TECM
Telecommunications  TEL
Telemcommunications  TCOM
Theater  THR
Tourism and Events Management  TOUR
University/Interdisciplinary Studies  UNIV
Urban and Suburban Studies  USST
Women’s Studies  WMST

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: usually available every semester
af, as: offered only in alternate fall or spring semesters
ay: offered only in alternate years
ir: offered on an irregular basis at the discretion of the department or school

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
Course numbers 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
Course numbers 500–699 are graduate 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.
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

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 C 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: ACCT 301 with grade of C or higher. 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 the accounting process and the conceptual framework, financial statements, and accounting for current and noncurrent assets and liabilities.

332 Intermediate Financial Accounting II (3:3:0) Prerequisite: ACCT 331 with grade of C or higher and FNAN 301 with a grade of C or higher. This course is a continuation of ACCT 331 and 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; grade of C or higher in ACCT 301. Produces managers with sufficient understanding of the tax environment to identify important issues when evaluating business transactions. Develops a framework of taxpayer activities and taxable-income components to teach the fundamental tax concepts and apply them to a variety of business, investment, employment, and personal transactions. Students learn to weigh tax and nontax costs and benefits in making decisions. Specific topics include business formation and organization; capital expenditures; employee and executive compensation; international and multistate operations; and the financial statement disclosure of tax information.

361 Accounting Information Systems (3:3:0) Prerequisites: degree status; grade of C 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; grade of C or higher in ACCT 301. 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; multijurisdictional 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.

431 Advanced Financial Accounting (3:3:0)
Prerequisite: ACCT 332 with a C or higher. 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; 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; grade of C or higher in ACCT 321 and 361. Focuses on process and techniques of providing various assurance services. Also provides information for students to successfully complete auditing portion of the CPA exam.

472 Government and Not-for-Profit Accounting (3:3:0)
Prerequisites: degree status; grade of C or higher in ACCT 301. Introduction to accounting for nonbusiness organizations. Emphasizes accounting issues unique to these entities, including nonexchange transactions and lack of ownership interest. Includes accounting and reporting for state and local governments, charitable organizations, and the federal government.

491 Seminar in Accounting (3:3:0)
Prerequisite: degree status. Advanced study of accounting concepts and selected topics.

499 Independent Study (1–3:9:0)
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.

716 International Business Strategy (3:3:0)
Prerequisites or corequisites: Completion of MBA core requirements. This course 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.

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.

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.

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, GOVT 103. 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, GOVT 103. 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 302; COMM 100, 101, or 104; and 60 credits. Experiential learning course designed to give preservice 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 documentation 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: 6 sociology credits including ADJ 100 and SOCI 101, or permission of instructor. 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 or GOVT 301. 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 the 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: GOWT 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.


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; ADJ/GOWT 300; ADJ 303; and at least 21 credits of other upper-level courses required for the ADJ major from one or more of the following categories: justice system, law, and the legal process; social and human problems; and legal, philosophical, and ethical standards. Students may be simultaneously enrolled in ADJ 303 and 479. Preparation for internship 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 (3–9:0:0) 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 9. Students using the internship to satisfy skills for the justice professional must accumulate a total of 9 credits.

490 Special Topics in Administration of Justice (1–3:1–3:0) Recent developments in the field. Content varies. Recent topics covered workplace violence and international 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 particular 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 varies. Recent topics covered violence in the workplace and international terrorism. May be repeated for credit.

Adult Education (EDAL) 

541 Understanding Adult Learners (6:6:0) Examines a variety of adult learning issues, including theory, developmental psychology, and motivation and experience. Adult learners are considered in terms of individual learning needs, incentives, support systems, and learning style differences.

542 Arranging Conditions for Adult Learning (6:6:0) Focuses on linking adult learners to resources, and establishing the environment for learning. Covers program development 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 American 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.

300 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 Reconstruction 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: undergraduate senior status and permission of the director. Investigation of an area related to African American studies according to individual interest, with emphasis on research.

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. 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. 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.

308 Peoples and Cultures of Island Asia (3:3:0) Prerequisites: ANTH 114, 60 credits, or permission of instructor. Examines cultures of the Island Asia culture region, focusing on native cultures of Indonesia, Borneo, and the Philippines.

309 Peoples and Cultures of India (3:3:0) Prerequisites: ANTH 114 and 60 credits, or permission of instructor. Examines the peoples and cultures of ancient India, including the Aravalli, Maurya, and Gupta empires. Major topics include the development of Hinduism, Buddhism, Jainism, the rise of the Chola and Pandyas, and the growth of the Mughal empire.

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 primarily 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) Pre requisite: 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.

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, primates, social organization, morphology, comparative ethology, 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 the relationship between 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 culture 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.
Anthropology (ANTH) 435

Prerequisites: ANTH 120, 60 credits, or permission of instructor. Considers public significance of archaeology and anthropology including ANTH 114, or permission of instructor. Explores some of the most useful non-quantitative research techniques in social sciences, and offers practice in their application.

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.

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.

Prerequisites: 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.

Introductory course for anthropology majors. Required for anthropology majors, and usually taken in the first semester, and focusing on topics such as sex roles, anthropology and ethics, and primate social organization. May be repeated for credit.

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.

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.

Covers general conceptual issues of information technology and society, with emphasis on information technology. 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.

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.

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.

Engaging the World: Anthropological Perspectives (3:3:0) Prerequisites: ANTH 114, 60 hours, 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.

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.

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.

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.

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.

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.

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.

Special Projects: Archaeology and Biological 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.

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.

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 non-quantitative research techniques in social sciences, and offers practice in their application.

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.

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.

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.

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.

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.

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. Examine 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. Examine contemporary theorists of anthropology, covering ongoing debates over epistemology and the multiple strands that inform anthropological theory and practice.

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.

610 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 methodological 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. 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.

635 Regional Ethnography (3:3:0) Prerequisite: graduate standing, or permission of instructor. Examines geographical study of regions and cultures. 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 form through texts 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) Prerequisites: 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 Readings in Cultural Anthropology (3:3:0) Prerequisite: permission of instructor. Directed reading and research on a specific topic in cultural anthropology chosen by student and instructor. 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 ethology.

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.
Courses

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. 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.

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. Focuses on skills and methods of learning as well as subject matter as a way of introducing the discipline of art history. Topics vary. May be repeated for credit with different course content.

311 Design of Cities (3:3:0) Prerequisite: 24 credits. Focuses on skills and methods of learning as well as subject matter as a way of introducing the discipline of art history. Topics vary. May be repeated for credit with different course content.

315 Modern Architecture (3:3:0) Prerequisite: 24 credits. Studies 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.

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 Eighteenth- and Nineteenth-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 Twentieth-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. Approaches 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 500-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 Twentieth-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 Twentieth-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 the 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.

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.
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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. Emphasis 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 communication solutions.

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). Emphasis 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, 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.

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.

385 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.

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 Introduction to Art Teaching and Learning (3:3:0) Prerequisites: junior standing, completion of ENGL 302, and/or permission of instructor. 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.

397 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 collaterals, web branding, and broadcast advertising development. Special attention is given to the creation of a graphics standards guide.

398 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.

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 Drawing III (4:2:4) Prerequisite: 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.

415 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 IV (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 V (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 projects and explore their relevance 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) Prerequisite: 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 365 or permission of instructor. Advanced studio course for continued exploration of photographic 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, philosophy, 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.

473 Advanced Performance Studio (4:2:4) **Prerequisite:** AVT 373 or permission of instructor. Advanced laboratory for performance. Emphasizes new technologies and their applications, multimedia scriptwriting and storyboarding, and the creation of audiovisual performance. Students participate in collaborative production.

482 Advanced Two-Dimensional Digital Art (4:2:4) **Prerequisite:** 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. Independent research project in student's area of emphasis. Explores principal methods of researching and documenting art and arts practice. May be repeated for credit.

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 diverse 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.

596 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 (1–6:1–6:0) **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 contemporary 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, cyberpunk, 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 postproduce 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 aesthetics 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.

682 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 cel animation and stop motion animation to rotoscoping and two-dimensional digital animation. Emphasizes idea generation, concept development, and visual aesthetics.

684 Two-Dimensional 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 cel 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.
underpinnings, and current manifestations? How can arts
our society offer to the creative artist or arts institution? How
the value of art? What encouragements or impediments does
require art at all? What constitutes good or bad art? What is
art in society in an effort to address questions: Why do we
practice. Consideration is given to the essential functions of
that have most directly influenced contemporary American
institutions, with emphasis on historic traditions and trends
ines role of visual and performing arts as social and cultural
master’ s program in CVP A or permission of instructor.

Arts Management (MAM)
College of Visual and Performing Arts

503 Information Technology for Arts Managers (1:0:0)
Prerequisite: acceptance to graduate program in CVPA or
permission of instructor: Provides arts management students
the opportunity to advance IT skills to required levels. Fol-
following skills assessment and seminar, students take three
classes in campus media labs ranging from MS Office/Excel
to advanced IT.

599 Special Topics in Arts Management (1–6:1–6:0)
Prerequisite: admission to MAM graduate program or permission
of instructor: Provides opportunity to explore special and
applied areas. Topics and credit vary; may be repeated for
up to 12 credits taken under different topics.

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 concen-
tration. 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.
Analyses 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 suc-
cessful pursuit of a management career in visual and perform-
ing 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: Exam-
ines 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: Intro-
duces 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 instruc-
tor. 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: Focus on two active arts organizations and create
a development plan and various proposals specifically geared
to their situations. The course focuses on practical applica-
tion of development principles, writing and communications
skills, and strategic thinking and planning.

608 Executive Management of Arts Communications
(3:3:0)
Prerequisites: MAM 604 Public Relations/Marketing
Strategy for Arts. Conception, planning, and implementa-
tion and control of platforms to create and manage a holistic
communications strategy for arts organizations. This includes
Management of Brand, Public Relations, Advertising and
the Evolving Marketplace: New Technologies, and Theories
in Marketing.

609 Facilities Management (3:3:0)
Prerequisite: admission to arts management program or permission of instructor:
Bridging strategic planning and marketing; audience devel-
opment; financial management and board and volunteer
management, with issues of scheduling, ticketing and sales,
motion 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 pro-
gram, 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 organiza-
tions. Includes 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 grantwriting 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 multiyear 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 and strategic analysis, human resource allocation, and fund raising.

780 Arts Consultancy (3:3:0) Prerequisite: admission to CVP A graduate program or special written approval of program director. Studies techniques, frameworks for selecting and using consultants effectively. Incorporates business development, project scope, contract and pricing, and independent contractor as opportunities in arts management field.

790 External Internship (2–4:0:6–12) Prerequisite: admission to master of arts in arts management, 15-credit standing; or permission of program director. Designed to follow internal internship. Provides a specific work environment to build on skills developed in the classroom, and integrates work experience with specific academic exercises. Students advised to pursue a three-pronged approach toward specialization: electives; internal internship in the same area as concentrated electives; and external internship consistent with specialized course work and internal internship (minimum 42 hours/credit).

Astronomy (ASTR)

Physics and Astronomy

103 Astronomy (3:3:0) Not for physics majors. Introduces 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.

504 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.

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, Hertz-sprung-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.

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.

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 (1–6:0:0) 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 acceptable technical report and oral defense acceptable to three-faculty-member thesis committee. May not be repeated.

Astronomy (ASTR) • Athletic Training (ATEP) 363

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.
Courses

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, 357; 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, 354, 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/Threat Analysis I: Bacterial Agents (3:3:0) Covers pathology, metabolism, and threat of bacterial agents that can be used as biological weapons.

605 Introduction to Biodefense/Threat Analysis 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.

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.

702 Biodefense Colloquium (1:1:0) Forum for presentation and discussion of original and current research in biodefense. May be repeated for credit.

705 Detecting Production of Biological Agents (2:2:0) Prerequisite: BIOD 604 and 605, or permission of instructor. Studies detection techniques for biological-weapon production facilities. Shows the difference in detecting a large-scale, state-run facility and detecting a home laboratory. Teaches differences between illicit biological agents and biological agents used for pharmaceutical research.

706 History of Biological Agent Use and Treaties (3:3:0) Prerequisites: BIOD 604 and 605, or permission of instructor. Discusses historical uses of biological weapons as well as treaties signed by various countries and powers concerning their use.

709 Nonproliferation in Biodefense (3:3:0) Prerequisites: BIOD 604 and 605, or permission of instructor. Explores issues in nonproliferation of biological agents as weapons...
of mass destruction. Covers theories in nonproliferation and looks at nonproliferation in practice in recent history.

710 Approaches to Bioweapon Medical Treatment and Response (3:3:0) Prerequisites: BIOD 604 and 605. Research, treatment, and preparedness strategies against 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. History of known organized terrorist activity, including study of common cultural and historical correlations, groups’ modus operandi, and latest developments in terrorist profiling.

723 Counterterrorism and Civil Rights (3:3:0) Prerequisites: BIOD 604 and 605, or permission of instructor. Analyzes legal issues associated with counterterrorism surveillance, interrogation, search, detainment, and decontamination in the context of civil rights and rule of law.

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 Bioengineering and Bioprocessing (2:2:0–6) Prerequisite: BIOD 604 and 605, or permission of instructor. Covers methods, means, and processes to research, develop, and manufacture biologicals and pharmaceuticals, which are important in the field of medical biodefense. Emphasizes laboratory pilot plant and industrial production of diagnostic and prophylactic means, as well as therapeutics for medical biodefense and civilian medicine.

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 (1–3:0:0) Experimental or theoretical research project chosen and completed under guidance of graduate faculty member. Requires comprehensive report acceptable to a project committee. Graded S/NC.

799 Master’s Thesis in Biodefense (1–6:0:0) Master’s thesis research under direction of thesis committee. Graded S/NC.

889 Directed Research in Biodefense (1–12:0:0) Prerequisites: 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 under direction of dissertation chair. Graded S/NC.

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 biochemistry, molecular biology, and cell biology necessary to begin research in bioinformatics. Topics include cell structure and cell cycle; DNA replication, transcription, and translation; and molecular structure of genes and chromosomes.

633 Molecular Biotechnology (3:3:0) Prerequisites: graduate standing, or permission of instructor. Laboratory intensive introduction to theory and practice. Includes study of recombinant DNA, gene expression, and genetic analysis and associated methods. Lab exercises reflect more recent advances in the field.

634 Bioinformatics Programming (3:3:0) Prerequisites: graduate standing and computer programming experience, or permission of instructor. Data representation, 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 531, or permission of instructor. Theory and practice of genome 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) 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.

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. 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. Examines 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. Details computational methods in biomolecular simulations, such as molecular dynamics and Monte Carlo algorithms. Special emphasis given to practical applications. Reviews most recent advances in biomolecular simulations.

751 Biochemical and Cellular Systems Modeling (3:3:0). Prerequisites: calculus and knowledge of a computer programming language; and BINF 690 and 701; 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. Project chosen and completed under guidance of graduate faculty member that results in acceptable technical report (master’s thesis) and oral defense. Graded S/IP.

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 biomembranes and cell architecture, cell signaling, receptor activation, gene 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. fall, summer
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

124, 125 Human Anatomy and Physiology (4:3:3), (4:3:3) Must be taken in sequence. Does not satisfy natural science requirement for BA 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 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

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,summer

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,summer

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,summer

306 Biology of Microorganisms Laboratory (1:0:3) Corequisite: BIOL 246 or 305. Laboratory techniques in culturing, staining, and identifying microorganisms. f,s,summer

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,summer

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,summer

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 nonbiology 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.
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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 succeptions 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 significance 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.

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 anabolic 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, developmental genetics, cancer genetics, behavior genetics, evolutionary genetics, and ethics of genetic technology.

413 Human Genetics for Biologists (3:3:0) Prerequisites: BIOL 311 and permission of instructor. May not be combined with BIOL 572 for credit. Emphasizes topics of interest to students in social sciences, but open to any nonbiology 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.

417 Selected Topics in Molecular and Cellular Biology (1–4:0–3:0–6). Prerequisite: 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.

418 Current Topics in Microbiology (3:3:0) Prerequisites: BIOL 305 and 306. Study of current topics in microbiology. Topics vary. May be repeated for credit.


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 (1–4:0–1:0–6) 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. s

453 Immunology Laboratory (1:0:3) Prerequisite or corequisite: BIOL 452. Techniques relevant to BIOL 452, including enzyme-linked immunosorbant assay, immunodiffusion, protein electrophoresis, and immune fixation.

459 Fungi and Ecosystems (3:3:0) Prerequisite: BIOL 304, course in microbiology, or permission of instructor. Considers 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 genetics, properties of populations, and population differentiations. s

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 115; 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

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 required for BS, and only 4 credits toward 32 credits for BA, not to exceed 4 credits in any one semester.

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, or 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 Advanced 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. Study of systematic, evolution, physiology, ecology, and behavior of fish.

### 537 Ornithology (4:2:6)
Prerequisite: course in ecology, or permission of instructor. Study of evolution, systematic, 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, systematic, 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, systematic, physiology, ecology, and behavior of amphibians and reptiles, emphasizing field work.

### 541 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, or 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 432, 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 in 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
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.

585 Eukaryotic Cell Biology Laboratory (1:0:1) Prerequisite: permission of instructor.

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 biochemistry, 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. 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.

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. Permission of instructor.

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 Microphysiology (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, transport, cell-to-cell signaling, biofilm formation, antibiotic resistance, and secondary metabolites.

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.

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 usefully 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.

650 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.

653 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.

703 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.

712 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.

720 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.

735 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.

745 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, 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.

750 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

701 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?”

702 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.

703 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).

704 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 international universities 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).

710 Current Topics in Bioscience (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.

740 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 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 developmental 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: graduate course work including BIOL 311; CHEM 313, 314, 315, and 318; equivalency; 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 hand-held, 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.

898 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. Exposure to general legal environment of business, emphasizing government regulatory process, business ethics, and social responsibility. Regulatory topics include torts and crimes, product liability, intellectual property and cyberlaw, contracts, and issues related to employment and competition. Lecture, discussion, cases.

402 Commercial Law (3:3:0) Prerequisites: BULE 302; degree status. Survey of commercial law. Emphasizes contracts; commercial paper; secured transactions; debtor-creditor rights; business organizations; federal securities regulation; and accountant’s legal responsibilities. 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 resource management. Special attention to best practices used by effective managers.

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) Graduated 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 104. 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 212. 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 [prerequisite?] for CHEM 314. Theoretical, synthetic, industrial, and biological aspects of the chemistry of carbon compounds.


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, polynuclear 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 use of 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, cobalamins, 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, and specialized function. 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. Introduces 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, geologic, 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: 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 ions 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) Prerequisite: 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 245, 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.

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 crystalinity, polymerization types, and commercial and electroactive polymers.

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.

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.

563, 564 Biochemistry (3:3:0) Prerequisites: CHEM 313 and 314. CHEM 663 is prerequisite to CHEM 664. Previous course in biology recommended but not required. CHEM 663 is the biochemistry core course. Important biological compounds, including proteins, carbohydrates, lipids, and nucleic acids, and their interrelations.

670 Teaching Practicum (1–2:0:0) Prerequisites: enrollment in graduate program and demonstrated proficiency in English language. Prelaboratory 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, desorption 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, piezo and pyroelectric 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, electronatom 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.

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. 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.

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.

325 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)

Civil, Environmental, and Infrastructure Engineering

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 river systems; 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. 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.

290 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, 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) Prerequisites: 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.

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.

311 Structural Analysis (3:3:0) Prerequisite: ENGR 310. Basic concepts and assumptions of structural analysis, including static 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 methods 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. 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; design of storm water management systems and sanitary sewers. Laboratory and field work required on selected topics. f

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 service; 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. 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

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 (3:2:3) Prerequisites: CS 112, CEIE 360; corequisite: 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 multiattribute 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 250. 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

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, 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

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. f

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 367. 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 400. Overview of urban construction industry, including organizations and interactions. Topics include project and construction management for operations, tactical, and strategic planning and decision making; cost estimation and scheduling, accounting, estimating, resource planning, and structuring of urban systems construction projects; and legal theories and relationships in the construction process, including role of design professional and manager. Introduces value engineering. 

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. 

498 Independent Study in Civil Engineering (1–3:0:0) Prerequisite: 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. May be repeated for maximum 6 credits if topics are substantially different. 

500 Land Development Engineering (3:3:0) Prerequisite: CEIE 300. 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 infrastructure systems, and ways in which infrastructure systems design can be achieved. 

511 Introduction to Design and Inventive Engineering (3:3:0) Covers design theories; engineering method and design paradigms; knowledge-based systems in design; collaborative and Internet-based design; evaluation in design; human problem solving; and inventive design methods such as constraint search, morphological analysis, brainstorming, Synectics, and TRIZ. Requires group projects using problems provided by industry. 

516 Engineering Law and Ethics (3:3:0) Prerequisite: CEIE 400. Overview of body of law surrounding design, construction, and facilities maintenance and operations. Introduces tort law and its relationship to design and construction contracting. Uses case studies of contract form, general and special conditions, ethics, contract administration, claims, dispute resolution, arbitration, and appeals process. 

530 Water Resource Systems Analysis (3:3:0) Prerequisite: CEIE 400 or equivalent. Introduces concepts, applications, and tools of systems analysis for water resources planning, management, and design. Problems including river basin planning, real-time hydrosystem operations, water quality management, capacity expansion, urban drainage network design, and sanitary sewer design used to illustrate applications of systems analysis. Tools include optimization and simulation modeling, and knowledge-based systems. 

550 Environmental Engineering Systems (3:3:0) Prerequisite: CEIE 400. Overview of body of law surrounding design, construction, and facilities maintenance and operations. Introduces tort law and its relationship to design and construction contracting. Uses case studies of contract form, general and special conditions, ethics, contract administration, claims, dispute resolution, arbitration, and appeals process. 

552 Wastewater Engineering (3:3:0) Prerequisite: CEIE 455 or 555. 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. Includes consequences of environmental policies; environmental impact assessments; and federal, state, and local government laws and regulations related to wastewater collection, treatment, and disposal. 

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. 

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...
561 Traffic Engineering (3:3:0) Prerequisite: CEIE 360. Credit is not given for both CEIE 461 and 561. 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, urban travel characteristics and data collection methods; project and plan evaluation; and technology options for urban transport.

562 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 360 or 363 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.

563 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 road design and highway tort liability; pavement design, maintenance and safety; edge dropoff; clear zone concept; roadside barriers; guided 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.


Also includes multiple objective, multiple decision maker problems, and case studies in areas such as transportation, water resources, the environment, energy, telecommunications, and construction.

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.

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.

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.

selected 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, designing, 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 (3:0:0) Pre-requisite: 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

150 Introduction to Classical Greek (3:3:0) Addresses linguistic, semantic, and cultural properties. Covers basic structure and vocabulary, its place among other world languages, and its unique role in development of modern thought. Lecture, discussions supplemented by over-the-web instructional module.
160 Readings in Classical Greek (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Expands proficiency, refines grasp of morphology and syntax, and forges greater command of vocabulary. Introduces selected original passages from classical authors.

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 biocritical, 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.

390 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)

710 Introduction to Physical Climatology (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 processes by which climate is maintained. Covers theoretical models of general circulation of atmosphere, including time mean and transient behavior. Describes 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 geostrophic 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 Atmosphere-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 time stepping schemes; nonlinear computational stability; include accuracy, consistency, convergence and stability; 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 thermal 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 5 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 selection and process selection. Students should contact faculty director one semester prior to semester of enrollment. Work at oversees locations under faculty director and site supervisor. Predesigned 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 Teaching with Technology (3:3:0) Prerequisites: basic familiarity with computer operations. Basic skills in word processing, spreadsheets, and electronic presentation software applications. Basic Internet and electronic database research skills. Offers overview, hands-on experience with technology tools to enhance classroom and online learning. Examines issues related to using technology in teaching and learning, and guides in developing effective technology-enhanced learning activities for undergraduate 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 program. 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 (3:3:0) 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) Focuses on 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 Higher Education Practicum (3:3:0) Serves as an essential part of MAIS in higher education or student services program. Supervised on-the-job experience in approved college or university setting or public agency involved in higher education. Approval of practicum coordinator needed one semester before registration.
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.

885 Internship in College Teaching and Administration (3:0:1:0)
Prerequisites: admission to certificate, MAIS/CCT, MAIS/Higher Education, or doctoral program; approval of advisor and internship coordinator; CTCH 601 or 602; 6 additional credits of core requirements; and 3 additional credits in knowledge area. Students must contact the program at least one semester before enrolling. Supervised internship at community college or nonteaching higher-education setting such as government agency or administrative office. Develops skills applicable to college-based teaching or higher education administration or policy. Minimum 200 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: admission to doctoral program and permission of 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.

305 Seminar in Arts Management (3:3:0) 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)

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.

489 Field Experience in the Arts (3–6:0:0)
Prerequisite: 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)
Communication

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 rhetorical 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 forensic 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, 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.

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.

250 Introduction to Communication Research (3:3:0) Introduces research, emphasizing development of library skills and generating research questions and hypotheses. Covers basic procedures for research and writing about communication. May be repeated once.

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- or 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 Intercultural Communication (3:3:0) Prerequisite: COMM 305, or permission of instructor. Structured communication learning experience: one to three weeks of travel in a foreign environment involving another country or relevant U.S. subcultural group. Students must complete readings relevant to communication in host society; laboratory assignments that require observations about
intercultural communication; and personal learning paper integrating learning from observation and interactions during the travel. Seminar sessions and lectures. Uses intercultural communication concepts and principles to analyze observations and communication experiences.

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 recreational 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 or corequisite: 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 145, 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 noncommercial radio.

355 Video I: Principles and Practices (3:3:2) Prerequisite for all 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.
358 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 courses 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 wire-line telegraphy to wireless, voice, 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.

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. May be repeated.

400 Research Methods in Communication (3:3:0) Prerequisites: COMM 250; and at least two of COMM 300, 301, 302 or 305. 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, or 305. 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 or permission of instructor. Theory, principles, and practical skills essential to interview process. Emphasizes information gathering, journalistic, persuasive, employment, and performance-appraisal interviews.

435 Computers and Communication (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 (3:1:0) 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 maximum 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 303, 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, audience, and government intervention. Topics include birth of press, development of modern new spaper, and American development including Revolutionary and Civil wars, rise of independent press, and yellow journalism.

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 competence 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) Prerequisite: 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 campaigns. 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, bioterrorism. 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 position, 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.

697 Independent Production (1–3:0:0) Prerequisite: permission of department. Media or creative production activities under direction of faculty member. Requires completed production; written report, oral 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) Explores relational health 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 24 credits of COMM 998 and 999 may be applied to doctoral degree requirements. Graded S/NS.

Comparative Literature (CL)

English/Modern and Classical Languages

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
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.

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 a 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)
Computational and Data Sciences

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, 603, or 604; programming experience with C, C++, or Fortran, and familiarity with UNIX operating system; or permission of instructor. Introduces tools for software construction and development. Covers revision control, debuggers, profilers, Makefiles, and regular expressions. Designed for those seeking to develop moderate to large software systems.

606 Scientific Graphics and Visualization Tools (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, XMGRI, and pmn 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 translating.
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, 605, 604, 605, and 700; or permission of instructor. Covers advanced numerical methods, computer 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 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 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) Prerequisites: 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 Astrophyics (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.

CSI 662 Space Weather (3:3:0) Prerequisites: PHYS 303, 305, 307, and MATH 213, or permission of instructor. Introduction to space weather involving systems such as the sun, the heliosphere, and the Earth’s magnetosphere and ionosphere. 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) Prerequisites: 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, material, 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,
Computational Sciences and Informatics (CSI)

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) Prerequisites: 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 554 or CS 632, 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: INF 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/CHM 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/CHM 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/CHM 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 quantum information theory 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 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.

741/ECE 721 Nonlinear Dynamical Systems (3:3:0) Prerequisites: knowledge of linear algebra, advanced calculus, and differential equations. Contemporary topics illustrated in mathematical models from natural sciences and engineering. Traditional qualitative analysis of difference and differential equations provides background for understanding chaotic behavior when it occurs in these models. Topics include stability of equilibria and periodic orbits, bifurcation theory, Hamiltonian systems, Lyapunov exponents, and chaotic attractors.

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 methods 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.

745 Mathematical Tomography (3:3:0) Prerequisite: MATH 675. Covers physical principles of tomography; Radon transform in Euclidean space; inversion formulas; Radon transform on distributions; integral geometry and generalized Radon transforms; Radon transform on symmetric spaces; and applications to CAT, PET, radar imaging, and synthetic aperture radar.

746 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. Covers multiresolution analysis, splines, time-frequency localization, and wavelet packets.

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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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 actual data sets and hypothesis. Examples drawn from current space science research.

764/ASTR 764 Computational Astrophysics (3:3:0)  
Pre-requisite: 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 comptonization, 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)  
Pre-requisite: 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)  
Pre-requisites: 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)  
Pre-requisite: 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)  
Pre-requisites: 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.

773/STAT 663 Statistical Graphics and Data Exploration (3:3:0)  
Pre-requisite: 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)  
Pre-requisites: 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)  
Pre-requisites: 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 552; 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/CEM 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.


783/PHYS 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 Schroedinger’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 732 Quantum Mechanics (3:3:0) Prerequisite: PHYS 502, or permission of instructor. Studies fundamental concepts of quantum mechanics, time evolution, Schroedinger 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 722 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, multipoles, 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 method 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 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.

885 Atomic Modeling of Materials (3:3:0) Prerequisite: CSI 685, 700, and 786; or permission of instructor. Advanced course focusing on utilization of atomic 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 735 or PHYS 732/CSI 734; 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.

898 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 CSI 898, 899, and 991 may be applied to PhD.

899 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 CSI 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.

986 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 CSI 898, 899, and 991 may be applied to PhD.

996 Doctoral Reading and Research (1–6:0:0) 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 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)
Center for Social Complexity

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, or 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. Examines long-term evolution of human 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
Courses

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: CSS 600. Methods and applications that examine complex social systems based on relations, structures, connectivity, matrix representations, location, roles, interactions, and other network properties. Applications to terrorism, cognition, organizations, and other social phenomena.

739 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 faculty member, resulting in a technical report. May be repeated for credit.

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 faculty member, resulting in acceptable technical report. 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.

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 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)

101 Preview of Computer Science (3:3:0) Corequisite: CS 112. 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 computing environment at the university. Topics include basic concepts in hardware, operating systems, programming languages, and algorithms. Includes a project to introduce problem solving using computers. All computer science majors are required to take this course within their first year.

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.)

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.

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.

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 ECE 303, 331, or 445. Uses bottom-up approach to teach how high-level language control, data structures represented at machine level. Introduces systems programming.

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.

440 Language Processors and Programming Environments (3:3:0) Prerequisite: grade of C or better in CS 310, 330, and 365. 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 syntaxic definition methods, parsing techniques, and code-generation techniques.

450 Database Concepts (3:3:0) Prerequisite: grade of C or better in CS310 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 365. Basic graphics principles and programming. Topics include scan conversion, transformation, viewing, lighting, blending, texture mapping, and some advanced graphics techniques.

455 Computer Networking Systems (3:3:0) Prerequisites: grade of C or better in CS 310 and 365, 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 365. Issues in multiprogramming. Covers concurrent processes and synchronization mechanisms; processor scheduling; memory, I/O, and deadlock management; performance of operating systems; and projects dealing with synchronization in multiprogrammed OS and virtual memory management. F, S

475 Concurrent and Distributed Systems (3:3:0) Prerequisite: grade of C or better in CS 471, or permission of instructor. Practical issues in designing, implementing concurrent and distributed software. Topics include concurrent programming, synchronization, multithreading, local and wide-area network protocols, distributed computation, systems integration, and techniques for expressing coarsely-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. F, S

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. F, S

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, pre-processing, 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. F, S

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, search and traversal techniques, 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 queueing 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 630, SYST 611 or 535, 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) Prerequisites: 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 632. 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 652. Advanced graphics methods and tools. Topics include visualization, modeling, rendering, animation, simulation, virtual reality, graphics software tools, and current research topics.

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 multimedia.

775/IT 844 Advanced Pattern Recognition (3:3:0) Prerequisite: CS 688 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 380, 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.

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.

995 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.

990/IT990 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 to interested faculty and students. 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, although degree credit is given once.

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 (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.

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 cogent 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 and its broad range of approaches to analyzing and resolving conflict, including consideration of 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 social scientific theories of conflict. Emphasizes need for theories to inform ability to resolve conflict. Weaves together ideas from conventional disciplines with new approaches, especially to causes of deep-rooted conflict. Focuses on analysis as a tool.

610 Philosophy and Methods of Conflict Research (3:3:0) Prerequisite: CONF 501 or 801. Introduces research design, including use of theory to define problem; exploring research approaches; gathering, analyzing, and interpreting data. Latter includes field observation; field experiments; lab experiments (simulations); surveys and sampling techniques; and archival, documentary, and literature resources. Quantitative techniques include theories of measurement (numerical and ordinal scales); distributions; and analysis techniques (chi-square, correlating, factor analysis). Briefly introduces philosophies, limits of science.

611 MS Research II (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, resolution.

642 Integration of Theory and Practice (3:3:0) Taken in last semester of master student course work. Assists in developing students’ own generic theory of conflict by reviewing, integrating prior course work. Students expected to demonstrate holistic comprehension by writing major essay of publishable quality about causes, events, and resolution of conflict of their own choosing.

650 Conflict Analysis and Resolution Advanced Skills (3:3:0) Prerequisite or corequisite: CONF 501 or 502. Covers innovative practices such as narrative mediation, conflict coaching, and conflict conferencing; and innovative technologies such as positive connotation, appreciative inquiry, circular questions, and stakeholder mapping.

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 conflict, 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. Considers designs and methods for conflict analysis and resolution that integrate multiple approaches,
stakeholders, and methods. Applies to social conflicts in local and international contexts.

657 Facilitation Skills (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.

658 Diversity 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 mentorship, application and experiential learning.

690 Practicum in Conflict Analysis and Resolution (6:1:5) Prerequisite: CONF 501 or 801, and 713; 714 or 715 recommended but not required. 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 and 714. CONF 715 recommended. Under direction of clinical coordinator, students spend at least 160 hours on project involving study, resolution of conflict. 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. Part of series of theory courses; companion to CONF 601. Explores theories that define and explain social harmony and cooperation. Examines social institutions that manage and mediate conflict at all levels, and provides foundation for subsequent courses in peace building, peace making, multilateral organizations, social change, and development.

702 Peace Studies (3:3:0) Traces evolution of peace studies since World War II, with particular attention to changing definitions of peace, conflict, and violence, and implications for conflict analysis and resolution. Links peace keeping, peace building, and peace making in integrative framework.

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. Explores 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/panel data/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 Laboratory and Simulation I: Interpersonal and Intergroup Conflict (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 Laboratory and Simulation II: Organizational and 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 713 by adding recording chronology; identifying roles played by
various participants; observing turning points in process; and precisely stating agreed upon solution.

715 Laboratory and Simulation III: International and Intercommunal Conflict (3:0:3) Prerequisites: CONF 501, 713, and 714; or permission of instructor. 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 organized religions 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.

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, or permission of instructor. 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 802 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 cases examining 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. Economic and social development cause trauma as new ideas conflict with old ones. When development is generated or directed by forces outside a culture, conflict takes on deep-rooted character. Course explores how conflict analysis and resolution approaches can be applied to conflicts of development and change.

733 Law and Jurisprudence in Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801. Contrasts legal processes and institutions with alternative approaches to dispute resolution. Defines and distinguishes among law, “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, or permission of instructor. 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, or permission of instructor. Explores how people translate underlying grievances into collective action. Examines how groups organize, frame, 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, or permission of instructor. Uses negotiating experiences to construct framework for thinking about and analyzing negotiation processes. Framework then used to organize review of research literature on rhythms, 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, or permission of instructor. Studies nature of peace process in terminating international, transnational, and civil conflicts. Includes analysis of parties’ decision-making procedures during processes of de-escalation, prebargaining, and negotiation. Examines impact of various third-party roles (mediator, conciliator, facilitator) on overall process, including implementing and monitoring agreements. Takes as case studies efforts to terminate conflicts including Iran-Iraq war, Cyprus dispute, and the Eritrean conflict.

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; or permission of instructor. 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, or permission of instructor. Examines how world religions play 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) 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.

759 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 Micro Theories (3:3:0) Prerequisites: CONF 801, and acceptance into doctoral program; or permission of instructor. 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. Surveys work of major personality theorists as well as material on cognition, creativity, and change.

803 Macro Theories (3:3:0) Prerequisites: CONF 801 and 802, and acceptance in the doctoral program; or permission of instructor. Understanding social conflict and potential for conflict resolution requires that both conflict and cooperation be perceived in relationship 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 of the Social Sciences (3:3:0) Prerequisite: CONF 801, or permission of instructor. Philosophical inquiry into history and structure of ideas and building of scientific hypotheses. Assumes close link between ways we think and ways we build and test theories about world. Explores and critiques thinking of major 20th century thinkers from the social sciences, thus forming introduction to research methodology.

811 Advanced Research Methods I (3:3:0) Prerequisites: CONF 801 and 810; or permission of instructor. Presumes prior course in intermediate statistics such as STAT 510. Building on logic of inquiry, introduces steps in research process to prepare dissertation and implement published research. Covers wide array of quantitative and qualitative research approaches in social sciences, with emphasis on conflict analysis.

812 Advanced Research Methods II (3:3:0) Prerequisite: CONF 811, or permission of instructor. Continuation of steps in research process to prepare dissertation and implement published research. Builds on CONF 811 by extending coverage of quantitative and qualitative research approaches used in social sciences, with emphasis on conflict analysis.

890 Practicum in Conflict Analysis and Resolution (6:1:5) Prerequisites: CONF 713, 714 or 715 recommended but not required. 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 in doctoral core program. Analyzes theoretical basis undergirding methods of research in conflict resolution. Explores how theory is built through reciprocal influence of research and practice.

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 for maximum 6 credits toward degree.

999 Doctoral Dissertation Research (1–12:0:1–12) At least 12 credits of 998 and 999 must be accumulated toward degree. Credits vary; at least 6 must be taken toward degree. Research on approved dissertation topic under direction of committee.

Counseling and Development (EDCD)
Graduate School of Education

500 In-Service Educational Development (1–6:0:0) See EDUC 500.

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) See EDUC 597.

598 Directed Reading, Research, and Individual Projects (1–6:0:0) See EDUC 598.

599 Thesis (6:0:0) See EDUC 599.

600 Workshop in Education (1–6:0:0) See EDUC 600.

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) Provides basic counseling skills. Emphasizes history of counseling, multifaceted role of counselors, professional organizations and memberships, and APA style of research. Introduces portfolio.

603 Counseling Theories and Practice (3:3:0) Prerequisites: EDCD 602 and admission to counseling and development program, or permission of instructor. Covers major theoretical approaches to counseling, including psychodynamic, Adlerian, existential, person-centered, cognitive-behavioral, systems, solution-focused, and integrated. Provides supervised practice in basic counseling skills. Includes lab.

604 Assessment and Appraisal in Counseling (3:3:0) Prerequisites: admission to counseling and development program, and EDCD 601. Prepares students to become skilled practitioners of psychological and educational tests and assessment procedures.

606 Counseling Children and Adolescents (4:4:0) Prerequisites: admission to counseling and development program and EDCD 603, or permission of instructor. 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 counseling and development program; EDCD 603 or 605; and either EDCD 606, 607, or 609. 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 (4:4:0) Prerequisites: EDCD 603 and admission to counseling and development program, or permission of instructor. 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 counseling and development program; EDCD 603 and 604; or permission of the instructor. 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: EDCD 602 and admission to counseling and development program, or permission of instructor. Introduces school counseling programs at elementary, middle, and high school levels. Presents philosophy, principles, and practices of effective school counseling, as well as developmental needs of students ages 5 to 18.

628 Counseling and Social Justice (3:3:0) Prerequisites: admission to program; EDCD 663; EDCD 626 or EDCD 654; or permission of instructor. Studies relationship between counseling and social justice, theories, models and strategies of social justice, social change, leadership, and advocacy in
community and school settings. Emphasizes application of theories and models.

629 Principles and Practices of School Counseling Leadership and Administration (3:0:0) Prerequisite: master's degree in counseling or related counseling field from accredited institution of higher education; admission to school counseling leadership certificate program; or permission of counseling and development coordinator. Provides advanced study of philosophy, principles, and practices in education for secondary school counselors preparing for career in school counseling leadership and administration. Introduces specific school counseling leadership and administrative responsibilities at secondary level, including middle and high school.

630 School Counseling Leadership (3:3:0) Prerequisite: master's degree in counseling or related counseling field from accredited institution; admission to school counseling leadership certificate program; or permission of program coordinator AND completion of EDCD 629. Covers basic theories, models, and applications of leadership in education. Major emphasis is on leadership in school counseling.

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 or corequisites: admission to counseling and development program, EDCD 603. Using actual and hypothetical cases, 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 counseling and development program; EDCD 603 or 605; and EDCD 607 or 609. 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 counseling and development program; EDCD 608; EDCD 603 or 605; and EDCD 606, 607, or 609. Covers issues, characteristics, and needs relevant to diverse populations as they relate to counseling. Explores counseling from multicultural perspective.

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 603 or 605, 608, 606, 607 or 609, and 610; 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 (3:3:3) 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 603 or 605, 608, 606, 607 or 609, and 610; no more than two grades of C in any other graduate course work required by counseling and development program. Provides supervised practice of at least 200 hours minimum in counseling setting similar to setting in which student may work. Weekly graduate class emphasizes site processing.

790 Internship in Counseling (3:3:0) Prerequisites: admission to counseling and development program; EDCD 603. Provides advanced supervised practice in 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 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 of at least 200 hours 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.

795 Advanced Internship in Counseling and Development (2–6:3:0) Prerequisite: EDCD 629 and one of the following: master's degree in counseling or related counseling field from accredited institution; admission to school counseling leadership certificate program; or permission of counseling and development coordinator. Supervised practice of counseling in setting similar to setting in which student plans to work.

797 Advanced Topics in Education (1–6:1–6:0) 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) Prerequisite: 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.

990 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.

991 Advanced Internship in Multicultural Counseling Leadership (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, and EDCD 895 and 896, or equivalent. 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)

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, semi-otic 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. Investigates notion 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 theories and major debates on culture of science, social construction of nature, and effects of technology on modern cultural forms. Includes readings from theorists 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 cultural studies course work, fulfilled foreign language requirement, and passed
Cultural Studies (CULT) • Dance (DANC)

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 CAS students, and global understanding requirement 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 Intermediate Modern Dance (3:3:0) Prerequisite: admission to dance major, or permission of instructor. Further development of knowledge and skills in modern dance. Meets general education fine arts requirement. May be repeated for total 9 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 total 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 art 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 development of 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. Continuing 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 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 framework of dance. 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 spectacles, 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 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, 330; 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 preprofessional 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.

790 Internship (1–3:0:0) Prerequisite: admission to MFA in dance program, and permission of advisor. Study involv-
ing 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.

**799 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 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: admission to UTEEM program, or permission of instructor. Focuses on 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.

612 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.

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.

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 works in 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. 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.
Earth Observing Systems (EOS)

Earth Systems and Geoinformation Sciences

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 synthesis requirement.

600 Communication Skills for Computational Scientists (1:2:0) Prerequisite: graduate standing. Develops basic set of essential skills for scientific communication and delivery of successful and informative oral presentations, with focus on both scientific meetings and more general public presentations. Encourages students to develop and exercise scientific writing skills as applied to abstracts, manuscripts, and grants. Meets objectives through combination of activities, including practical writing assignments, training in composing grants for extramural competition, and advice in developing and delivering oral presentations.

655/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, including 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 Atmospheric Transport and Dispersion (3:3:0) Prerequisite: permission of instructor. Introduces students to general survey of the atmosphere and the fundamentals of atmospheric and dispersion processes.

680 Environmental Applications of Integrated Geographic Information Technologies (3:3:0) Prerequisite: 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.


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.

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 580, 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, and GEOG 579. 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: introductory course in GIS and some programming experience, or permission of instructor. Examines different aspects of science and technology in the context of 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.

780 Graduate Internship in Earth Systems and Geoinformation Sciences (1–6:0:0). Prerequisites: permission of program director and instructor. Applications of knowledge and skills in Earth systems and geoinformation sciences to real-world issues and problems in private industry, government agencies, or nonprofit organizations.

791 Advanced Spatial Statistics (3:3:0) Prerequisites: GEOG 585 or STAT 535/554, or permission of instructor. Advanced course focusing on analyzing georeferenced or spatial data represented as points or polygons. Addresses higher moments, point pattern analyses, and interpolations of points to surfaces. Includes spatial regression.

792/EVPP 792/GEOG 792 Seminar in Earth Systems Science (2:2:0) Prerequisite: 15 graduate credits, including CSI 655, EOS 656 and 657. Seminar for Earth systems science graduate students who have background in Earth's major systems. Intended to be capstone experience. Seminars presented by faculty and students; topics vary from semester to semester.

796 Directed Reading and Research (1–6:0:0). Prerequisite: permission of instructor. Reading and research on specific topic in Earth systems and geoinformation sciences under direction of faculty member. May be repeated as necessary.

798 Research Project (3:0:0). Prerequisites: admission to Earth systems science MS program, 12 graduate credits, and permission of instructor. Reading project chosen and completed under guidance of graduate faculty member resulting in acceptable technical report. For students enrolled in Earth systems science master's program.

799 Master's Thesis (1–6:0:0). Prerequisites: admission to Earth systems science MS program, 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. For students enrolled in Earth systems science master's program.

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 Introduction to Planetary Boundary Layer (3:3:0) Prerequisite: CLIM 710 or 711, or permission of instructor. Explores interaction between atmosphere and Earth's surface, dealing with important exchanges of heat, mass, and momentum that occur continuously. Introduces numerical models for land surface and applications in numerical weather prediction. Discusses vertical distributions of meteorological variables such as wind, temperature, and humidity; and trace gas concentrations and their role in the energy balance near the surface.

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 multithreaded 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.


541 Integrative Case Studies in Electronic Commerce (3:3:0) Open to EC majors only. Prerequisites: EC 511, 521, and 531. Students apply knowledge and skills from core courses to manage complexity of e-commerce in specialized applications. Using case study methods, analyzes and synthesizes requirements for successful e-commerce program development and management in industry-specific applications in health care, banking, retail, and government.

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)  
Prerequisites: ECON 103 and 104, 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. Examines 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.

380 Economies 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. 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.

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.

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. Applied introduction to estimating economic relationships. Includes simple equation and simultaneous equation system estimation. Students who take ECON 535 may not take ECON 637 for credit.

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. 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 615, 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.
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 611. 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 macroeconomics; 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 840. 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 nontariff 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. Employs economic theory and methods to analyze religious beliefs, behavior, institutions, and social and economic consequences.

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. The course also explores the role of interest groups and public choice in the political process. The course concludes with a capstone examination of an economic theory.

881 Austrian Theory of the 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) Prerequisite: 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.

895 Special Topics in Economics (3:3:0) Topics vary according to interests of instructor. Emphasizes new areas of discipline. May be repeated for credit as topics vary.

896 Directed Reading and Research (3:0:0) Independent reading and research paper on a topic agreed on by student and faculty member.

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.

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. Examines 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) Examines American political system, and explores how interactions among various levels and branches of government affect education.

372 Human Development, Learning, and Teaching (3:3:0) Examines research and theories for understanding learning process. School-based field experience required.

418 Student Teaching in Music Education (6:6:0) 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.


472 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.

500 In-Service Educational Development (1–6:0:0) 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 theory, research, and professional practice relating to development and learning in inclusive PK–12 classroom settings. School-based field experience required.

542 Introduction to Elementary Curriculum (3:3:0) Prerequisite: admission to elementary education licensure program. Examines historical background of education as it relates to elementary schools and curriculum. Helps develop understanding of relationship between society and education, and explores contemporary innovations that influence curriculum. School-based field experience required.

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.

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 (1–6:0:0) 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 (6:0:0) 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 (1–6:0:0) 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, sociolinguistics, 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 implications of factors and influences 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.

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 audiovisual 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) Develops 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. Explores 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 project is submit during the semester the candidate is enrolled in EDUC 675. Helps beginning teachers become more effective by critiquing various research paradigms,
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>EDRS 810</td>
<td>Northern Virginia Writing Project In-Service Program (1–3:0)</td>
<td>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 EDRS 695, 695, or 699 may be applied toward master’s degree.</td>
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<tr>
<td>ENGL 697</td>
<td>Theory of Composition (3:3:0)</td>
<td>Prerequisites: ENGL 615 and 695, 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.</td>
</tr>
<tr>
<td>751</td>
<td>Mentoring/Supervising Intern Teachers and Mentor Teacher Career Development (3:3:0)</td>
<td>Prerequisite: EDRS 810. 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.</td>
</tr>
<tr>
<td>797</td>
<td>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.</td>
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<tr>
<td>800</td>
<td>Ways of Knowing (3:3:0)</td>
<td>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 educational practice and research. Required course during first spring semester of study in the program.</td>
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<tr>
<td>802</td>
<td>Leadership Seminar (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>805</td>
<td>Doctoral Seminar in Education (1:1:0)</td>
<td>Prerequisite: admission to PhD program. Covers selected topics in education. Students, faculty members, and scholars discuss current research interests and ideas.</td>
</tr>
<tr>
<td>850</td>
<td>The Study of Teaching (3:3:0)</td>
<td>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.</td>
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<tr>
<td>851</td>
<td>Research on Teacher Education (3:3:0)</td>
<td>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.</td>
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<tr>
<td>870</td>
<td>Education Policy: Process, Context, and Politics (3:3:0)</td>
<td>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.</td>
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<tr>
<td>871</td>
<td>Advanced Policy Issues in Education (3:3:0)</td>
<td>Prerequisite: EDRS 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.</td>
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<tr>
<td>872</td>
<td>Social Science Research and Education Policy (3:3:0)</td>
<td>Prerequisites: admission to PhD program, and EDRS 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.</td>
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<tr>
<td>873</td>
<td>Education Policy: Comparative and International Perspectives (3:3:0)</td>
<td>Prerequisites or corequisites: EDRS 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.</td>
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<tr>
<td>874</td>
<td>The Achievement Gap (3:3:0)</td>
<td>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.</td>
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<tr>
<td>875</td>
<td>Contemporary and Emerging Issues in Education Policy (3:3:0)</td>
<td>Prerequisites or corequisites: EDRS 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.</td>
</tr>
<tr>
<td>880</td>
<td>Introduction to International Education (3:3:0)</td>
<td>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.</td>
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<tr>
<td>881</td>
<td>Seminar in Bilingual Education: Policy (3:3:0)</td>
<td>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.</td>
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<tr>
<td>882</td>
<td>Seminar in Bilingualism and Second Language Acquisition: Theory and Research (3:3:0)</td>
<td>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.</td>
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<tr>
<td>890</td>
<td>Doctoral Internship in Education (3:3:0) or (1:1:0 to 6:6:0)</td>
<td>Prerequisites: admission to PhD program, and prior approval of advisor and PhD director. Requires 100 credit hours.</td>
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</table>
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 998 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 (1–6:0:0) Prerequisites: admission to PhD program. 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.

For other PhD courses, see EDUC 840, 881, 882; EDRS 810, 811, 812, 820, 895; EDCI 701, 705; EDLE 895; EDCD 895; and EDCI 895.

Education Leadership (EDLE) Graduate School of Education

500 In-Service Educational Development (1–6:0:0) See EDUC 500.

597 Special Topics in Education (1–6:1–6:0) See EDUC 597.

598 Directed Reading, Research, and Individual Projects (1–6:0:0) See EDUC 598.

600 Workshop in Education (1–6:0:0) See EDUC 600.

610 Leading Schools and Communities (3:3:0) Examines critical functions of leadership and management, complex decision-making of school executives, 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.


614 Managing Financial and Human Resources (3:3:0) Prerequisites: admission to program and EDLE 610, 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 program and EDLE 610, 612, 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 program and EDLE 610, 612, 614, 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 Development (3:3:0) Prerequisites: admission to program and EDLE 610, 612, 614, 616, 618; corequisite: EDLE 791. 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 program and EDLE 610; corequisite: EDLE 612. 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) See EDUC 797.

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.

Education Research (EDRS)
Graduate School of Education

531 Educational and Psychological Measurement (3:3:0) Emphasizes techniques and principles used in the construction, administration, and quantification of measuring devices for evaluation purposes. Discusses interpretation of standardized tests of ability, aptitude, achievement, interest, and personality.

590 Education Research (3:3:0) Develops skills, insights, and understanding to perform research, with emphasis on interpreting and applying research results. Critiques research, and uses findings in educational settings.

597 Special Topics in Education. (1–6:1–6:0) See EDUC 597.

620 Quantitative Inquiry in Education (3:3:0) Prerequisite: EDRS 590 or equivalent experience. Examines fundamental concepts and methods of statistics as applied to educational problems, including descriptive and inferential statistics.

621 Qualitative Inquiry in Education (3:3:0) Prerequisite: EDRS 590 or equivalent experience. Focuses on basic application of naturalistic research methods. Examines major theoretical frameworks and qualitative research techniques, which include content analysis, coding, and interpretation of data.

630 Educational Assessment (3:3:0) Examines research theory and practice relevant to assessments. Focuses on assessment strategies for students including developing skills to select, score, and interpret educational assessments.

631 Program Evaluation (3:3:0) Introduces perspectives of existing and emerging issues, theories, and models of program evaluation.

797 Advanced Topics in Education (1–6:1–6:0) See EDUC 797.

810 Problems and Methods in Education Research (3:3:0) Prerequisite: admission to PhD program, or permission of instructor. Advanced course in interpreting and applying education research methods. Emphasizes comparison of alternative philosophies of research, ways of formulating questions and hypotheses, research plans, and analysis procedures. Students evaluate existing studies, and investigate a range of research approaches.

811 Quantitative Methods in Educational Research (3:3:0) Prerequisite: satisfactory completion of EDUC 810 or equivalent, or permission of instructor. Emphasizes advanced methods of conducting research using quantitative methods of data collection, and analysis appropriate for research in education. Includes design of experimental and quasi-experimental research studies, and methods of analysis appropriate to these studies, including analyzing variance and multiple linear regression.

812 Qualitative Methods in Educational Research (3:3:0) Prerequisite: satisfactory completion of EDUC 810 or equivalent, or permission of instructor. Teaches how to apply 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 quasi-experimental 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

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.

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.


820 Teaching, Learning, and Cognition (3:3:0) Prerequisites: 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.

821 Sociocultural Processes in Learning, Instruction, and Motivation (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.

822 Advanced Learning, Motivation, and Self-Regulation (3:3:0). Prerequisites: EDUC 800, 805; EDLE 802; and EDRS 810. Examines development of self-regulatory and motivational processes as they relate to educational practice. Emphasizes how processes influence students’ self-motivation and achievement in various domains.

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) Electrical and Computer Engineering

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.
Courses

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)  Prerequisites: 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 excitation 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, microelectronics and integrated circuits, coding and multiplexing, multivibrators, shift registers, counters, A/D converters, and elementary computer architecture. f,s

303 Digital Design/Intro Assembly Language (4:3:2)  Prerequisites: CS 211 or IT 101, 108, and 212. Not intended for electrical or computer engineering majors. 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/arithmetical 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. f,s,sum

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. s

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. s

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. f,s

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. s

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. f,s

435 Digital Circuit Design Laboratory (1:0:3) Prerequisite: ECE 334; corequisite: ECE 431. Lab experiments for topics covered in ECE 431. f,s

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 metalization, interconnects, packaging, MOS process integration, and bipolar process integration. Laboratory project integral to course. s

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. s

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. f,s,sum

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. f

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 comparative 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. s

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. s

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 effects 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. f,s,sum

462 Data and Computer Communications (3:3:0) Prerequisites: STAT 344 or 346, and ECE 220, and ECE 331 or 303, all with grade of C or better. Introduces modern data communications and computer networks. Topics include overview of power systems, motors, behavior-based programming, sensors, and sensor integration. Design projects conceived, developed, implemented, and presented.

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.
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. f, 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 465. 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. s

469 Microwave Circuit Laboratory (1:1:2)  Prerequisites: ECE 305 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 and ENGL 302. 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)  Prerequisite: 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. 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 305 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, phaselocked 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 density; linear filtering of random processes, and basic ideas of estimation and detection.

535 Digital Signal Processing (3:3:0)  Prerequisites: ECE 320 and 526, 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. s

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 telecom-
Communications 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.

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, multiaccess 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 Introduction to VHDL (3:3:0) Prerequisite: graduate standing. Introduces hardware description language and design through VHDL. Emphasizes understanding of impact and uses through VHDL models of typical digital computers and processors. Requires semester-long project implementing and simulating digital system in VHDL.

548 Sequential Machine Theory (3:3:0) Prerequisite: ECE 531, 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 heterojunctions.

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 combinational 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/TT 838 Fast Algorithms and Architectures for Digital Signal Processing (3:3:0) Prerequisite: ECE 533 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. Arrays 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 description; 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: Hardware and Software Implementations (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(2^n). Provides way of choosing between various hardware algorithms and architectures depending on primary optimization criteria, such as speed, area, and power consumption. Compares, contrasts best algorithms for implementing arithmetic operations in software and hardware.

646 Cryptography and Computer Network Security (3:3:0) Prerequisite: ECE 542 or permission of instructor. Topics include need for security services in computer networks, basic concepts of cryptography, historical ciphers, modern symmetric 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) Prerequisite: 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, communications, 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.


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 through design of an arithmetic processor and its parts, adder, multiplier, register, and memory cells; and aspects of system timing, test and testability. Reviews currently available VLSI CAS tools.

681 VLSI Design Automation (3:3:0) Prerequisites: ECE 545 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 and computer 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, Lebesgue 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 832 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, multirate 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, multiascess 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. Introduces theory and design 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. Introduces theory and design 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.

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 Secure Telecommunication Systems (3:3:0) Prerequisites: ECE 646 or permission of instructor. Discusses integration of cryptographic algorithms with standard and emerging communication protocols. Includes issues related to implementation of security services in different kinds of telecommunication networks and at different layers of network model; and selected cryptographic algorithms, including Advanced Encryption Standard and Elliptic Curve Crypto systems. Offers choice of cryptographic algorithm depending on type of network and implementation medium. Analyzes various means of implementing cryptographic transformations, including smart cards, desktop computers, routers, accelerator boards, and stand-alone devices. Criteria of choice between software and hardware implementations of cryptography.

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, batch time (BTT), adaptive critics, and sensorimotor 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 architectures 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-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.

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. 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

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. School-based field experience required.

490 Student Teaching in Education (6:6:0) Prerequisite or corequisite: completion of licensure and all endorsement course work. Provides intensive, supervised clinical experience in approved school for fall or spring semester.

500 In-Service Educational Development (1–6:0:0) See EDUC 500.

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.

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 Social Studies Methods for the Elementary Classroom (1–3:1–3:0) Prerequisite: admission to elementary education licensure program. Examines integrated curriculum based on knowledge and skills from history and social sciences. Develops interdisciplinary units based on Virginia Standards of Learning and various national social studies standards. School-based field experience 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 the 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.

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.


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) See EDUC 597.

600 Workshop in Education (1–6:0:0) See EDUC 600.

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 preassessment 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,
678 Advanced Curriculum and Methods of Teaching, Elementary (3:3:0) Prerequisite or corequisite: EDUC 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: EDUC 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: EDUC 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: EDUC 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.
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 and representation of technical information, estimation and approximations, and analysis and design. fs

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. fs

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; resultant of a system of forces; equilibrium of a rigid body; dry friction; center of gravity and centroid; moments of inertia, including parallel axis theorem and radius of gyration; kinematics of a particle; and work and energy. fs

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 circuits, chemistry and thermodynamics, engineering economics, and other fundamentals of engineering. s

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) 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 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, Dostoyevski, 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, 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. 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.

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; writing from mid-20th century to present. Engages textual, critical, political, and theoretical issues related to cardinal literary movements, such as 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, James Weldon Johnson, Jean Toomer, Nella Larsen, Margaret Walker, Chester Himes, Richard Wright, and Ann Petry.


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, Jessye 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, Chester Himes, Richard Wright, James Baldwin, Lorraine Hansberry, Amiri Baraka, Alice Walker, Ernest Gaines, Gloria Naylor, August Wilson, and Toni Morrison.

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.


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 396 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
Includes technical exercises in artful creating of nonfiction; evoking senses and use of dialogue. Original student work 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 Technical and Report Writing (3:3:0) Prerequisite: ENGL 360. Intensive study and practice in various forms of technical writing, including formal and informal reports, proposals, and technical 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 the 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 the 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, Youcefvar, 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.


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.

489 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.

490 Special Topics in Film (3:3:0) American and foreign films selected by type, period, or director with emphasis varying from year to year. Required viewings, student discussion, and written critiques. May be repeated with permission of department.

491 Special Topics in Folklore (3:3:0) Exploration of various aspects of folklore and folklife such as folklore and literature, folk arts, folk song, and material culture. May be repeated once for credit when subtitle is different, with permission of department.

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, tragicomedy, 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.

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 502. 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 Editing (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.

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.

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 Form of Nonfiction (3:3:0) Prerequisites: ENGL 489 or equivalent, and permission of instructor; except for MFA 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) See LING 591.
592 Historical Studies of the English Language (3:3:0) Either a chronological survey of development of English from Old and Middle English to Modern English and American English; or intensive study of grammar and syntax of Old English as literary language in representative texts of period. May be repeated for credit with permission of department.
604 Internship in Folklore (1–6:0:0) Prerequisites: undergraduate or graduate course in folklore, which may be taken concurrently. Unpaid, approved work-study positions at specific sites arranged by interested students and their advisor. Under supervision of faculty advisor, student works as intern with site supervisor in agency of student's choosing, given advisor's permission. For 3 credits, students work 120 hours on site and write 3,500 words, or equivalent, given contract with advisor. Contact English Department one semester prior to enrollment.
610 Proseminar in Teaching the Reading of Literature (3:3:0) Methods of teaching literature. Includes study of methods of literary analysis, and ways of developing student responses to literature, with some classroom practice. Does not satisfy Virginia certification requirement in diagnostic or developmental reading.
611 Studies in Rhetoric (3:3:0) Reading and discussion of several major texts that address patterns of discourse, communication, and other issues of rhetoric. Content varies. Recent offerings include 20th century rhetoric, collaborative writing, and computers and rhetoric. May be repeated for credit with permission of department.
612 Cultures of Professional Writing (3:3:0) Students work as ethnographers, studying selected sites where people write professionally, and analyzing ways production and reception of writing contribute to and result from local culture of each site. Lecture and workshop format.
613 Technical and Scientific Writing (3:3:0) Prerequisite: ENGL 565, or permission of department. Intensive study of theory and practice of technical and scientific writing, with emphasis on writing for variety of audiences. Focuses on writing and evaluating formal reports, articles for lay and technical audiences, proposals, theses, manuals, and other forms of technical prose.
614 Internship in the Teaching of Writing (1–3:0:0) Internships provide experience working in teaching program such as school or writing center. Under direction of faculty member, students must secure cooperation of on-site supervisor. Students work minimum 3 hours per week per credit to be awarded, keep a weekly reflective and analytical log, and communicate regularly with faculty director. May not be repeated for credit.
615 Proseminar in Composition Instruction (3:3:0) Methods of teaching expository writing. Includes consideration of planning courses, practice in teaching and grading papers, and study of recent developments in teaching writing.
616 Nonfiction Writing Workshop (1–6:1–6:0) Prerequisites: ENGL 565, which may be taken concurrently, and permission of instructor; except for MFA students in concentration. Intensive practice in craft of nonfiction and study of creative process. Intended for students already familiar with traditional and contemporary nonfiction, and already writing original nonfiction. At discretion of instructor, reading may be required. May be repeated for credit with permission of department.
617 Poetry Writing Workshop (1–6:1–6:0) Prerequisites: ENGL 564, which may be taken concurrently, and permission of instructor; except for MFA students in concentration. Intensive practice in craft of poetry and study of creative process. Intended for students already familiar with traditional 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.
618 Fiction Writing Workshop (1–6:1–6:0) Prerequisites: ENGL 566, which may be taken concurrently, and permission of instructor; except for MFA students in concentration. Intensive practice in craft of fiction and study of creative process. Intended for students already familiar with traditional and contemporary fiction and already writing original fiction. At discretion of instructor, reading may be required. May be repeated for credit with permission of department.
619 Special Topics in Writing (3:3:0) Prerequisite: Two graduate writing courses or permission of instructor, except for MFA students in concentration. Workshop course. Intensive practice in creative writing and study of creative process. Concentrates on specialized literary type other than short story, such as essay, playwriting, film writing, children's literature, travel literature, autobiography, gothic novel, and translation. Concentration is announced in department's Course Description Booklet. Intended for students already writing original creative work. 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 permission 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 permission 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 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 department 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.

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 NVWP 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 Theory of Composition (3:3:0) Prerequisite: ENGL 615, ENGL 695/EDUC 695, or equivalent. 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 Literary Scholarship (3:3:0) Introduces research in English, 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.

798 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 798 for graduation, but no more than 3 may count toward completing literature requirement.

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)

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.

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.

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.

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.

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.

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.

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.

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. Teaches physical and chemical aspects of aquatic systems and life cycles, and adaptations of aquatic organisms. Lectures, field trips, lab exercises.

361 Environmental Politics (3:3:0) 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.

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.

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.

395 Undergraduate Research in Environmental Science and Policy (1–3:0:0) 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.

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.

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 (1–4:0:0) 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 a 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 permission of instructor. Topic depends on instructor’s specialty.

514 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 non-economists. 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 non-economists. 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 systematic 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: course in molecular environmental biology, or
permission of instructor. Applied course covering theory and methodology of molecular environmental biology including analysis of selected case studies in conservation biology of macroorganisms, 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: 8 credits of ecology including BIOI 648, or permission of instructor. Through lectures, case studies, and discussions, examines management of 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 Science and 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.

624 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.

625 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.

626 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 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: 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.

635 Environment and Society (3:3:0)
Prerequisite: graduate standing. 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.
644 Wetland Ecology and Management (4:3:3) Prerequisite: course work in ecology, chemistry and physics; or permission of instructor. Structure and function of wetland ecosystems. Emphasizes biogeochemical and hydrological processes, effects of disturbance, and management implications.

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.

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) 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.

693 Directed Studies in Environmental Science and Public Policy (1–8:0:0) 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 (1–4:1–3:0–6) 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 instructor. 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 (1:1:0) 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.
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 MBA 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.

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 interaction 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 (1–3:1–3:0) Examines interpretation of legal principles of business management and the role of the law as it applies to management issues. Emphasizes understanding legal and ethical issues in business setting.

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.

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.


710 Business, Government, and the Global Economy (1–3:1–3:0) 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.

713 Human Resource Management (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Concentrates on strategic role played by human resource management in maximizing workforce value. Students are introduced to talent management challenges and debate and generate solutions. Topics include alignment of HR systems to strategic objectives; recruitment, selection and retention; the organization’s role in career development; design and implementation of rewards systems; strategies for dealing with “problem” employees; and HR implications of globalization.

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 MBA core requirements or permission of instructor. Examines behavioral science concepts to understand and predict marketplace behavior. Emphasizes applications of product and service strategies, and on market segmentation and targeting.

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 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 MBA core requirements, or permission of instructor. Students explore 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.


735 Special Topics in Decision Science (1–3:1–3:0) In-depth examination of advanced topics in decision science.

745 Special Topics in Finance (1–3:1–3:0) In-depth examination of advanced topics in finance.

751 Corporate Strategy and Policy (1–1–3:1–3:0) 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.

755 Special Topics in Management (1–3:1–3:0) In-depth examination of advanced topics in management.

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

500 Workshop in Exercise, Fitness, and Health Promotion (1–3:0:0) 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 with 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, 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 (1–6:0:0) 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 (1–3:0:0) 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.

606 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.

799 Thesis (1–6:0:0)  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: C or better in ECON 103, ACCT 203 and OM 210; and sophomore standing. Introduction to managing 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 and Forecasting (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, 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, 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.

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.

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

Placement: See Academic Testing section of the Admission chapter.

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. 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.

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 diction 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 dictation. 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.

378 Survey of French Literature: 1800 to Present (3:3:0) Prerequisite: 15 credits of French, or permission of instructor. See FREN 377.

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. Development of 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. Studies prose and poetry from the 17th century. Other writers of second half of century.

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.
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 ingredient 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. Individual-
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-ordination refinements, colinearity equation, resection, relative orientation, and analytic aerotriangulation.

563 Advanced Geographic Information Systems (3:3:0) Prerequisite: 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 components and transfer processes in 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) Prerequisite: 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 space-borne 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.

611 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 585. 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 relevancy of study program to degree requirements.

698 Directed Readings and Research (1–3:0:0) Prerequisite: permission of instructor. Approved study programs with specific employers.

700 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.

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.

Geography (GEOG) • Geology (GEOL) 471

Geology (GEOL) 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, isostasy, 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) 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 GEOG 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/BIOL 309, or GEOG 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/BIOL 309 Introduction to Oceanography (3:3:0) Prerequisite: GEOL 101, and BIOL 103 or 213 or EVPP 110, or permission of instructor. Introduces physical, chemical, biological, and geological aspects of oceanic environment. May include field trip.

312 Invertebrate Paleontology (4:3:3) Prerequisites: GEOL 101, 102; 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. Geologic and hydrologic factors controlling occurrence, distribution, movement, quality, and development of groundwater.

315 Topics in Geology II (1–3:1–3:0) Prerequisites: GEOL 101 and 102. 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 309; 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) Prerequisites: 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) Prerequisites: GEOL 101, and CHEM 211 and 212. 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.

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
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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. 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.

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 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)

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 micronutrients 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 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.

420 Strategies for Nutrition Education (3:3:0) Prerequisite: GCH 295 or permission of instructor. Examines 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 in the community health organization. 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.

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 rehabilitating from disease across lifespan. Particular emphasis on role of exercise therapy in cardiorespiratory, musculoskeletal, and metabolic diseases.

510 Scientific Basis of Pain, Fatigue, and Suffering (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.

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.

585 Care Management of Persons with Alzheimer's Disease and Related Disorders (3:3:0) Focuses on caring for people with dementing illnesses in acute, community, and long-term care settings. Discusses strategies for managing and evaluating care provided by family caregivers and allied health personnel.

590 International Health Organization (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 Issues in Violence and Health (3:3:0) Provides a comprehensive, worldwide view of violence. Examines biological, psychological, and social determinants of violence and its epidemiology. Attention will be drawn to the health plight of refugees, IDPs, and the health consequences related to female circumcision and human trafficking.

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 macrosocial variables, such as socioeconomic status, cultural traditions, lifecycle stages, and circumstantial changes, such as migration and relocation on health and well-being.

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.

712 Introduction to Epidemiology (3:3:0) Introduces epidemiology and health services research as body of knowledge and method for analyzing health problems. Students learn role of health services research and epidemiology in policy and evidence-based management and clinical practice. Students design experiments, analyze secondary data, and evaluate the effect of programs on health outcomes.

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.

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.

798 Practicum in International Health I (3:1:8) Practicum in international health in selected international health agency. Health care programs analyzed using health care systems framework.
799 Practicum in International Health II (3:1:8) **Prerequisite or corequisite:** GCH 798. Practicum in international health in selected international health agency. Health care programs analyzed using health care systems framework.

800/NURS 800 Advanced Quantitative Data Analysis for Health Care Research II (3:3:0) **Prerequisite:** HHS 799/ NURS 799 or equivalent statistics course. Examines multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), and multiple regression (ordinary least squares) and logistic regression. Students apply mathematical calculations and use linear combinations for multivariate tests in health care research.

801/NURS 801 Advanced Multivariate Statistics and Data Analysis in Health Care Research (3:3:0) **Prerequisite:** GCH 800/NURS 800 or equivalent multivariate statistical course. Examines canonical correlation, discriminant analysis, factor analysis, and causal analysis such as path models and structural equation modeling. Students analyze and interpret data.

802/NURS 802 Measurement Theories and Applications in Health Care Research (3:3:0) **Prerequisite:** doctoral-level course in research design and statistics. Completion of GCH 800/NURS 800 or HHS 801/NURS 801 highly recommended. Theories, principles, and techniques presented as foundation for development and evaluation of instruments in health care research. Includes review of statistical techniques for understanding measurement theory, reliability, validity, item, analysis, and instrument construction. Students required to design, construct, administer, analyze, and evaluate instrument in health care research.

**Government and International Politics (GOVT)**

101 Democratic Theory and Practice (3:3:0) **Comprehensive 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.

304 American State and Local Government (3:3:0) **Prerequisite:** GOVT 103. Nature, organization, functions, and problems of American state and local governments. Students may not receive credit for GOVT 204 and 304.

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 306. 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. Studies 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 time of Greek city-state to late medieval Christendom. 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 context 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 polities; 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.

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 legal 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 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.

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.

443 Law and Ethics of War (3:3:0) Prerequisite: GOVT 112. 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.


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 331. 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 hours 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 hours in major. Subject varies. Readings, individual or group projects, and discussions of seminar papers.

496 Directed Readings and Research (1–3:0:0) 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.

540 International Politics (3:3:0) Focuses on changing structure of international politics, post cold war security issues, effect of globalization economy and information technology revolution, enhanced role of global corporations and nongovernmental organizations, and rise of nonsecurity issues in emerging international agenda.

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.

605 Seminar in Congress and the Presidency (3:3:0) Surveys major institutions of public policy formulation and implementation at national level in United States, emphasizing how public preferences are translated into public policy. Politics, procedures, and personnel of Congress, presidency, and executive branch bureaucracies are main focus.

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.

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.

703 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.

706 Federalism and Changing Patterns of Governance (3:3:0) Prerequisite: GOVT 510. Examines broad trends in governance, including theory and practice of key governance choices, 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.

707 Civil Justice (3:3:0) Prerequisite: JLCP 720/GOVT 728, or permission of instructor. Understanding of the civil justice system, rules that govern civil justice, their origins and effects. Strengths and weaknesses of civil law doctrines and processes to understand power of law to order social behavior.

708 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.

709 Politics of Crime Policy (3:3:0) Prerequisite: JLCP 750/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.

713 The Constitution, Criminal Procedure, and Security (3:3:0) Prerequisite: JLCP 720/GOVT 728, or permission of instructor. Explains 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 Statistical Methods in Political Science Research (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.
Government and International Politics (GOVT) 481

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 Issues in International Security (3:3:0) Prerequisites: GOVT 540. Examines nuclear strategy, arms control, U.S. defense policy, ethics and international security, and international terrorism, among other topics.

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.


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 Readings and Research (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. Students take either GOVT 798 or 799.

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. Students take either GOVT 798 or 799. 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, or the application of principal-agency models in public management.

852 Seminar in Political Leadership (3:3:0)
Prerequisite: GOVT 510. Graduate seminar on theories and practices of political and governmental leadership in American and comparative settings. Domestic and comparative cases of leadership in state-building, presidency, and public administration. Primary or secondary research on leaders encouraged.

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.

Health Administration and Policy (HAP)
College of Health and Human Services

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.

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.

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.

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 care 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.

470 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.

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 (3–6:2:2–8) Not repeatable for credit. Prerequisite: open to HAP majors only. Taken in last semester of studies. Capstone course involves a two-hour weekly seminar and a 6- to 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.

501 Business Statistics for Health Services 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 and 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.

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 Electronic Commerce and Online 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 services on patient care and health care organizations. Also reviews examples of successful and bankrupt technology firms in health care. Student groups draft business plan and develop early version of service proposal.

609 Comparative International Health Systems (3:3:0) Comprehensive review of selected national health care systems in the World Health Organization’s designated regions. Health care systems analyzed, compared, and contrasted. Issues discussed in relation to national governments and global health.

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.
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 and risk management indicators; and evaluation of demographic, cultural, and regulatory environments affecting industry.

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.

702 Managerial Accounting in Health Care Organizations (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 Leadership and Management (3:3:0) Analyzes management theory and practice from recently evolving works that identify, analyze, and resolve 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 Services (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 Services (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.

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.

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 and behavior 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.

730 Health Care Decision Analysis (3:3:0) Prerequisite: HSCIT 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.

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.

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.

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.

866/NURS 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.

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 on Contemporary Health Problems (3:3:0) Prerequisite: 90 credits. Provides overview of contemporary and often controversial health issues with analysis of selected problems of current concern to society.

450 Epidemiology and Environmental Health (4:3:1) 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 multisystem agency environment, including population and subpopulation health.
Special Topics (1–3:3:0) Presents selected health issues or problems. Focuses on applying information to education programs.

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 10–12 consecutive weeks. Graded Pass/Fail.

Independent Study in Health Education (1–3:0:0) 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 total credits may be earned.

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 physical education master’s program. Focuses on program development, health content, methodology, and resources for teaching preK–12 health education. Distance learning course.

Health and Human Services (HHS)

Overview of Human Anatomy and Physiology I (3:3:0) Prerequisite: permission of college. Must be taken in sequence with HHS 271. Fast-paced, condensed course covering basics of human anatomy and principles of physiology. Some knowledge necessary in basic biology, chemistry, and cell structure and function. Those lacking this background will be assigned reading during first class to catch up. Successful students are capable of independent work and have many hours to devote to studying anatomy and physiology outside classroom.

Overview of Human Anatomy and Physiology II (3:3:0) Prerequisite: permission of college. Must be taken in sequence with HHS 270. Fast-paced, condensed course covering basics of human anatomy and principles of physiology. Some knowledge necessary in basic biology, chemistry, and cell structure and function. Those lacking this background will be assigned reading during first class to catch up. Successful students must be capable of independent work and have many hours to devote to studying anatomy and physiology outside classroom.

Overview of Microbiology (3:3:0) Prerequisite: permission of college. Introduces students with no knowledge of microbiology. Introduction including grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

Elementary Hebrew I (3:3:1) Prerequisite: admission to PhD program; for non-PhD students, permission of instructor. Designed for students with no knowledge of Hebrew. Introduction including grammar, vocabulary, oral skills, listening comprehension, and reading. Lab work required.

Elementary Hebrew II (3:3:1) Prerequisite: permission of instructor. Continuation of HEBR 101 or equivalent. Continuation of HEBR 101. Lab work required.

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.

Readings in Biblical Hebrew (3:3:0) Prerequisite: permission of instructor. 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.

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.

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.

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: 6 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.


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.

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.

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.

391 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.

406 The Civil War (3:3:0)
Prerequisite: 6 credits of history; or permission of instructor. Course, conduct, and consequences of American Civil War. Emphasizes interconnectedness of political, military, and economic affairs.

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) 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.

555 Problems in Asian History (3:3:0) Subjects announced by instructor. Discussion of readings and historical interpretations and compilation of a comprehensive bibliography on given theme. Course may be repeated when content differs.

565 Problems in African History (3:3:0) Analysis of selected problems in African history. Emphasis on 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) 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.

598 Historical Study Abroad (1–3:0:0) Intended for participation in formally organized course offered by the Center for Global Education during intersession or spring break. Not repeatable.

601 Themes in U.S. History I (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.

602 Themes in U.S. History II (3:3:0) Continuation of HIST 601.

603 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 1914. 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.

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 pro-slavery movements.

619 The Constitution, Civil Liberties, and the Supreme Court (3:3:0) Examines 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.

625 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.

633 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) Prerequisites: 3 credits of applied history in appropriate area and 12 credits in major field, or permission of internship director. All
### 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.

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**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. Because HNRS courses are a part of an integrated program, the courses in one semester are generally prerequisite to courses the following semester. (Exceptions for majors in certain departments have been arranged and are available in the Honors Program Office.)

### 110 Introduction to Research (4:3:1)
Introduces basic research and writing skills required in every course in curriculum: how to select suitable problem or question, formulate argument or thesis, find and select evidence to support argument, organize ideas into coherent essay, and write clearly and elegantly.

### 121 Reading Cultural Sigils (3:3:0)
Uses methods introduced from cultural studies and communication as well as sociology, economics, and psychology. Explores ways in which contemporary arts, advertising and other mass media, cultural events, and social institutions reflect and shape personal and social values.

### 125 A Liberal Arts Approach to Calculus (3:3:0)
Assumes understanding of basic algebra and functions. Develops important mathematics of infinity, and introduces principal transcendental functions.

### 130 Conceptions of Self (3:3:0)
Drawing from appropriate works in social sciences, arts, and humanities, examines different conceptions of the self characteristic of different cultures.

### 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.

### 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. Topics announced in advance. May not be repeated for credit.

### 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.

### 230 Cross-Cultural Perspectives (3:3:0)
Prerequisite: HNRS 110. Enables students to broaden cultural horizons and understand human behavior by studying society different from their own.

### 240 Reading the Past (3:3:0)
Prerequisite: HNRS 110. Considers constructions of historical narratives by examining significant current topics from origins to 21st century. Includes visits to area sites to consider public narratives. Provides context for HNRS 353.
353 Technology in the Contemporary United States (3:3:0) 
Prerequisite: HNRS 110, 240. Analyzes emergence and impact of specific technologies on contemporary culture in United States. Explores television, automobile, newspapers, and Internet from historical, scientific, political, economic, and global perspectives.

Information Security and Assurance (ISA) 
The Volgenau School of Information Technology and Engineering

562 Information Security Theory and Practice (3:3:0) 
Prerequisites: INFS 501, 515, 590, and SWE 510, or permission of instructor. This course is a broad introduction to the theory and practice of information security. It serves as the first security course for the MS-ISA degree and is required as a prerequisite for all subsequent ISA courses (at the 600 and 700 levels). It also serves as an entry-level course available to non-ISA students, including MS-CS, MS-ISE, and MS-SWE students.

564 Security Laboratory (3:3:0) 
Prerequisites: INFS 501, 515, 590, and SWE 510. 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. 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.

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 will study OS-level 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 656 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) 
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.

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 656. 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 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. This course teaches how to conduct security experimentations 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 replicating 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: INFS 614 and ISA 562, or permission of instructor. Science and study of methods of protecting data: 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
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.

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 initialed 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 initialed 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 initialed 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) Information and Software Engineering

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) Prerequisite: 6 credits of undergraduate mathematics. Study of discrete and logical structures for information systems analysis and design including basic set theory and proof techniques, propositional and predicate logic, trees and graphs, finite state machines, formal languages and their relation to automata, computability and computational complexity, formal semantics-operational, axiomatic and denotational approaches. Credit cannot be applied to any graduate degree in IT&E or the BS degree in computer science.

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.
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.

590 Program Design and Data Structures (3:3:0) Prerequisite: undergraduate courses or equivalent knowledge in structured programming in high-level language. 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 in IT&E.

601 Operating Systems Theory and Practice (3:3:0) Prerequisites: INFS 501, 515, 590, and SWE 510, or equivalent. Introduces fundamental concepts including process synchronization and scheduling, interprocess communication, memory management, virtual memory, deadlock, security and access-control, file and disk management, performance analysis, and distributed systems. Examines impact of computer architecture on operating systems. Presents case studies and comparative analysis of operating systems. No substitution can be made for this class.

612: Principles and Practices of Communication Networks (3:3:0) Prerequisites: INFS 501, 515, 590, 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, 590, 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 590, 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 590, 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 590, 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 590; 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 601 and 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: INFS614. 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)  
Pre-requisite: 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.

785 Data Mining for Homeland Security (3:3:0)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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

Graduate courses listed under the Departments of Computer Science; Electrical and Computer Engineering; Civil, Environmental, and Infrastructure Engineering; Information and Software Engineering; Systems Engineering and Operations Research; and Applied and Engineering Statistics are appropriately considered as courses forming an inherent part of this program. Undergraduate IT courses are managed by the Applied Information Technology Department.

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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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)  
Pre-requisite: 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 211 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.

250/STAT 250 Introductory Statistics I (3:3:0) Prerequisite: high school algebra. Elementary introduction to statistics. Topics include descriptive statistics, probability, estimation and hypothesis testing for means and proportions, correlation, and regression. Students use statistical software for assignments.

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 communication 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 1: Introduction to Web Development (3:3:0) Prerequisites: IT 103, 207 and 213. Introduces terms and concepts for successful web design. Covers Internet browsers, user computer configurations, standard protocols, XML compatibility, and accessibility issues. Students learn to develop web pages to display images, tables, forms, and frames with text editor and more powerful WYSIWYG HTML editor. Other topics include introductory Dynamic HTML (DHTML) and cascading style sheets. Graphic development tool enables students to develop graphics files for their projects: png, gif, jpg, and animated gifs.

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.

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, psyops, 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 systems. 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: Intermediate 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 on skills in client and server-side scripting using document object model. Session/cookie management. Privacy and integrity issues discussed.

**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 network-

**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), Network 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 IT (3:3:0)**
Prerequisites: IT 108 or equivalent, IT 223, 341, 366, 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 and 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, 342, 366, 466, 492; 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 108 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 potential possibilities and limitations of such devices. Application of microprocessors to current technologies includes examples such as modern communications, high-speed networks, fiber-optic technologies in communications and biotechnology, robotics, and high-tech manufacturing.
481 Concepts of Multimedia Technology (IT) (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 in 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 faculty panel. Fulfills writing-intensive requirement for BS in information technology.

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 faculty members.

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 IT&E 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 telecommunications principles, telecommunications carrier systems, data communications, local area networks, and wide area network protocols.

657 Advanced Network Science (3:3:0) Prerequisite: IT 557, or permission of instructor. Second of a sequence of two 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 wireless telecommunications, network security, network management, and advanced network protocols.

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.

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.

746/CSI 776 Calculus of Random Signals (3:3:0) Prerequisite: 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 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.

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, attributes, 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 [voice?] verification. Additional topics cover multimodal biometries, 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 IT&E 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 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 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, 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, autonomous 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 perfective 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 application to communication applications. Topics include Neyman-Pearson criterion, detection of signals in AWGN and ACGN, Bayes estimation, ML estimation of signal parameters in AWGN and ACGN, estimation of Gaussian waves 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 network system 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 scale-space, 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) Prerequisite: 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 lifecycle; 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.
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: INF5 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: INF5 760, or permission of instructor. Studies models and techniques that support 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 information; inexact 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 tessellations 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 643 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 invention 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 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.

937/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, multitarget 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: INF5 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 decision theory; 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 658, 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. Prepares students to perform research in optimization, and requires active student participation. May be repeated for credit when topics distinctly different.

983 Advanced Topics in Network Optimization (3:3:0) Prerequisite: 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.

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.

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. 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
Information Technology (IT) • Instructional Technology (EDIT) 507

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 (IETT)
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 (6:3:0) 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 IET 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) Overview of principles and tools used in e-Learning, instructional design and multimedia/hypermedia technologies. Students apply knowledge and skills learned by creating an e-Learning module.

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 understanding of assistive technology and application in instructional programs, career tasks, and life skills for those 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 and output 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 the 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, storytelling, 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) Pre-requisite: 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) Pre-requisite: 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 experiences 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) See EDUC 597.

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
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>701</td>
<td>Advanced Instructional Design and Development (IDD) Portfolio (1:1:0)</td>
<td>3:3:0</td>
<td>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 synthesis of instructional design and development concepts, principles, and competencies learned across program courses at end degree program point.</td>
</tr>
<tr>
<td>704</td>
<td>Instructional Technology Foundations and Theories of Learning (3:3:0)</td>
<td>3:3:0</td>
<td>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.</td>
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<tr>
<td>705/EDCI 705</td>
<td>Instructional Design (3:3:0)</td>
<td>3:3:0</td>
<td>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.</td>
</tr>
<tr>
<td>711</td>
<td>Teaching with Technology I: Telecommunications and Databases (3:3:0)</td>
<td>3:3:0</td>
<td>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.</td>
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<tr>
<td>717</td>
<td>Teaching with Technology IV: Hypermedia and Emerging Technologies (3:3:0)</td>
<td>3:3:0</td>
<td>Corequisite: EDCI 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.</td>
</tr>
<tr>
<td>720</td>
<td>Leadership Issues in Educational Technology (3:3:0)</td>
<td>3:3:0</td>
<td>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.</td>
</tr>
<tr>
<td>725</td>
<td>Technology and Diversity (3:3:0)</td>
<td>3:3:0</td>
<td>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.</td>
</tr>
<tr>
<td>730</td>
<td>Analysis and Design of Multimedia/Hypermedia Environments (3:3:0)</td>
<td>3:3:0</td>
<td>Prerequisites: EDCI 732, and knowledge of authoring tool. Enables design, implementation, and evaluation of technology-based education and training materials using advanced computer-based authoring tools.</td>
</tr>
<tr>
<td>732</td>
<td>Advanced Instructional Design: Constructive Methods</td>
<td>3:3:0</td>
<td>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.</td>
</tr>
<tr>
<td>741</td>
<td>TIP 1 Technology Innovations Project (3:3:0)</td>
<td>3:3:0</td>
<td>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.</td>
</tr>
<tr>
<td>742</td>
<td>Engineering Learning Environments (3:3:0)</td>
<td>3:3:0</td>
<td>Prerequisites: TIP 1. Project-based, hands-on course focusing on technology, science, and engineering. LEGOS, controlled by small microcomputers, used to show principles behind many technological innovations. Other technological advances explored.</td>
</tr>
<tr>
<td>743</td>
<td>Technology and Community Partnerships (3:3:0)</td>
<td>3:3:0</td>
<td>Explores nontraditional community partnerships in role of leadership. Innovations, change, and technology advocacy. Emphasizes implementation of ideas and strategies to influence decisions of policy makers. Explores sources of grant funding, and interaction with professional organizations.</td>
</tr>
<tr>
<td>745</td>
<td>Technology Leadership Issues (3:3:0)</td>
<td>3:3:0</td>
<td>Examines leadership, innovations, change, and technology advocacy. Explores sources of grant funding, and interaction with professional organizations.</td>
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<tr>
<td>746</td>
<td>Educational Technology and Assessment (3:3:0)</td>
<td>3:3:0</td>
<td>Covers fundamentals of educational assessment and measurement, and relates them to current attempts to use technology for educational assessment. Explores use of computer technology to support traditional testing and innovative ways to assess complex learning.</td>
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</table>
747 Technology and Teacher Education (3:3:0)  
**Prerequisite:** EDIT 590 or equivalent. Investigates latest research and issues related to teacher education to include staff development in K–12 in-service as well as university courses. Students paired with preservice teachers who act as online mentors to develop leadership and mentoring skills.

748 TIP 2 Technology Innovations Project (3:3:0)  
**Prerequisites:** EDIT 741 and 590. Continuation of design and development of EDIT 741 technology-enriched learning module. Students conduct action research, and implement advanced action research project.

750 Emerging Educational Technologies (3:3:0)  
*To be taken in final year of course work.* Examines range of educational technologies expected to become important applications in three to eight years. Assesses potential of these emerging technologies to improve practice and alter mission and content of education, and helps students develop skills in strategic planning.

752 Design and Production of Multimedia and Hypermedia Learning Environments (3:3:0)  
**Prerequisite:** EDIT 720, or permission of instructor. Students design and produce multimedia/hypermedia applications based on current theory and research in instructional design and cognitive science. Examines user needs, information models, structure, and media selection and uses to inform design and production of final project.

771 Introduction to Multimedia/Hypermedia (1–3:1–3:0)  
Focuses on developing skills necessary to implement hypermedia/multimedia ideas into production process.

772 Web-Based Instructional Tools (1–3:1–3:0)  
Provides overview of web development tools. Using instructional design principles, students interact with variety of web publishing software programs to develop a project web site.

773 Human Computer Interface Design for Teaching and Learning (3:3:0)  
Provides overview of human-computer interface issues related to instructional design of technology-centered learning environments. Examines continuum of human-computer feedback.

790 Practicum in Instructional Technology (1–6:1–6:0)  
**Prerequisites:** completion of IT track requirements, except for practicum, and permission of advisor. Provides supervised practice in applying knowledge and skills of student’s chosen track through placement in appropriate work setting.

791 Project Development Practicum (6:6:0)  
Designed for students in immersion concentration of Instructional Technology program. Allows students to join design team focusing on analysis and design phase of instructional design process and development process.

792 Project Development Practicum (6:6:0)  
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)  
See EDUC 797.

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)  
**Prerequisites:** 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, two 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 693, 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.

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.

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, products, 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.

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.

758 Global Market Planning Practicum (3:3:0) Provides opportunity to develop international market plan for specific industry or service sector. Students consult with industry experts and use key trade databases to develop strategic plan that recommends market entry strategies. Completed market plan submitted to industry experts for use and dissemination.

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.

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
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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.

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. 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.

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. 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.


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.

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, discrep-
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/PUAD790, 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 extent 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 (1–6:0:0) Prerequisites: JLCP 780, and either STAT 510 and 335 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.

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. 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.

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) Prerequisite: 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.

516 Latin (LATN) • Learning, Social and Organizational (LRNG)

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

492, 592 Special Topics in Social and Organizational Learning (1–3:1–3:0) Covers topics from economic, historical, philosophical, literary, organizational, or information technology perspectives. Courses first appear under this heading. Consult program office and class schedules for descriptions. May be repeated for credit.

572 Taming the Electronic Frontier (3:3:0) Using Internet as primary medium for interactive learning, this innovative course is offered in classroom as well as over cable TV. Establishes dialogue between producers and consumers of information-age goods by exploiting distance-learning technologies such as television in combination with e-mail/FTP/gopher/WAIS and other groupware tools. These provide basis for electronically mediated organizational learning exercises that challenge traditional power relationships between producers and consumers in institutional contexts.

583 Groupware for Organizational Learning (3:3:0) Provides exposure to groupware systems such as Lotus Notes, web, and Folio Views, and ways they can be incorporated to help organizations use knowledge more effectively. Trains students in application development for enhancing organizational learning, and introduces range of diverse software products designed to facilitate coordination and collaborative work.

592 Internet Literacy (1:1:0) Five-week, 1-credit mini-course taught via Internet and video provides Internet competency for distance-learning initiatives across Mason curriculum. Topics include concepts, skills, and software for reading, searching, and writing hypertext for web, participating in e-mail and newsgroups, and any course in Mason curriculum. Uses new campus infrastructure, cable TV, videotape, and Internet as medium of collaborative and experiential learning and demonstration of best practices in distance learning.

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.

676 Comparative Socioeconomic Systems (3:3:0) Studies fundamental alternatives in public policy. Explores systemic, evolutionary pattern of overall socioeconomic institutional arrangements, and examines the manner in which knowledge is discovered, changed, and communicated in social systems. Drawing on field of complex evolving systems, course pays
particular attention to two traditions: Marxism and the Austrian School. Textual material is in Folio Views software, which facilitates close reading and enables collaboration in earlier analysis and interpretation of texts.

692, 792 Special Topics in LRGB (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.

761 Computational Modeling of Social Learning (3:3:0) Explores processes of social interaction and higher-order or macro-emergent phenomena by modeling social interaction on computers. Models are simulations of “virtual worlds” populated by variety of “virtual agents,” and they allow processes to be observed in action through visual representations of economic activity. Modeling language used is Smalltalk V/Windows 2.0, from Digitalk Corp. Course goal is to bring together insights of social scientists and computational scientists, using former’s understanding of social systems and latter’s modeling principles and techniques to produce models in which the entities modeled have both capacity of volition and varying interpretations of and strategies for dealing with their environments.

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.

770 Pricing Strategy and Tactics (3:3:0) Covers techniques of strategic analysis necessary to price more profitably by evaluating the price sensitivity of buyers, determining relevant costs for pricing decision, anticipating and influencing competitors’ pricing, and formulating pricing strategies appropriate for market. Participants learn tactics to implement strategies that enable them to price effectively to different market segments, enhance the perception of product’s value, and coordinate pricing with other elements of marketing. Involves analysis of case and real-world problems, and discussion of current events showing how to apply techniques developed in class.

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.

868 Business, Government, and the International Economy (3:3:0) Provides broad overview of international development and trade since World War II. Covers growth strategies of developed countries as well as developing countries. Gives students broad understanding of modern world’s system of political economy shaped by national policies, international agreements, and business activity. Almost all instruction is by case method.

Linguistics (LING)

English Department


326 General Linguistics (3:3:0) Introduces phonetics, phonology, morphology, and syntax.

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 (1–3:0:0) 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. Explores factors contributing to L2 variation, including linguistic universals, transfer, age, input, and affective considerations.

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.

890 Advanced Phonology Seminar (3:3:0) Prerequisite: LING 692 or permission of instructor. Advanced topics seminar in current phonological theory. Topics vary. May be repeated twice.
Management (MGMT)

School of Management

If a student takes noncore, upper-level business courses before acceptance 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 better 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 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.

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.

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.

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.

431 Organizational Development and Management Consulting (3:3:0) Prerequisites: C or higher in MGMT 301; degree status. Introduces theory and practice of organization 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.

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.

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.

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.

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.

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.

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 firm uses 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 on 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 MGMT 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 MGMT 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 MGMT 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) Prerequisites: C or higher in MGMT 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.
### Management Information Systems (MIS) • Marketing (MKTG)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
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<tbody>
<tr>
<td>450</td>
<td>Internet Architecture and Industry (3:3:0)</td>
<td>C or higher in MIS 301 and MIS 310, degree status.</td>
<td>Overview of elements of Internet architecture. Analyzes economic and regulatory issues. Internet technology and industry trends. Includes lab sessions and exercises.</td>
</tr>
<tr>
<td>491</td>
<td>Seminar in Management Information Systems (3:3:0)</td>
<td>C or higher MIS 301, degree status.</td>
<td>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.</td>
</tr>
<tr>
<td>499</td>
<td>Independent Study in Management Information Systems (1–3:3:0)</td>
<td>C or higher MIS 301, degree status.</td>
<td>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.</td>
</tr>
<tr>
<td>301</td>
<td>Principles of Marketing (3:3:0)</td>
<td>Sophomore standing and C or better in ACCT 203 and ECON 103.</td>
<td>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.</td>
</tr>
<tr>
<td>311</td>
<td>Sales Management (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>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.</td>
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<tr>
<td>312</td>
<td>Consumer Behavior (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>Marketing strategy implications of concepts and propositions that compose consumer decision processes. Emphasizes lifestyle, situation, and information processing. Lecture and case analysis.</td>
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<tr>
<td>313</td>
<td>Integrated Marketing Communications (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>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.</td>
</tr>
<tr>
<td>315</td>
<td>Internet Marketing (3:3:0)</td>
<td>C or higher in MKTG 301 and MIS 301, degree status.</td>
<td>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.</td>
</tr>
<tr>
<td>332</td>
<td>Retailing and E-Commerce Management (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>Comprehensive view of retailing as it relates to total marketing process. Emphasizes retail decision alternatives used when formulating retail strategies, particularly Internet.</td>
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<tr>
<td>333</td>
<td>Business to Business Marketing (3:3:0)</td>
<td>C or higher in MKTG 301 degree status.</td>
<td>Examines unique challenges and opportunities of marketing systems among suppliers, manufacturers, resellers and government.</td>
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<tr>
<td>351</td>
<td>Marketing Research Techniques and Applications (3:3:0)</td>
<td>C or higher in OM 210 and MKTG 301, degree status.</td>
<td>Study of concepts, theories, and principles underlying marketing research process. Focuses on development and evaluation of research designs for gathering marketing information.</td>
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<tr>
<td>407</td>
<td>International Marketing (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>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.</td>
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<tr>
<td>451</td>
<td>Competitive Intelligence and Information Security (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>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.</td>
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<tr>
<td>471</td>
<td>Marketing Management (3:3:0)</td>
<td>Senior standing; C or higher in MKTG 301, 312 and 351, degree status.</td>
<td>Emphasizes managerial aspects of marketing, including developing marketing strategies and plans, and integrating specific elements of marketing process. Emphasizes case analysis.</td>
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<tr>
<td>481</td>
<td>Marketing in the Nonprofit Sector (3:3:0)</td>
<td>C or higher in MKTG 301, degree status.</td>
<td>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.</td>
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<tr>
<td>491</td>
<td>Special Topics in Marketing (3:3:0)</td>
<td>C or higher in MKTG 301, 9 credits of marketing, degree status.</td>
<td>In-depth treatment in seminar format of contemporary topics in marketing. Culminates in preparation of substantial paper and oral presentation.</td>
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<tr>
<td>499</td>
<td>Independent Study (1–3:3:0)</td>
<td>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.</td>
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Master of Business Administration (MBA)
School of Management

603 Managerial Economics and Decisions of the Firm (3:3:0) Prerequisite: admission to MBA 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) Prerequisites: 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 ability to make marketing decisions in wide variety of institutional and competitive situations. Emphasizes technology to aid in analysis, decision making, and communication of decisions to relevant publics. Emphasis on case studies, team work, and projects.

633 Statistics for Business Decision Making (3:3:0) Prerequisite: admission to MBA 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 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 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 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. Introduces contemporary legal and ethical doctrines, and examines how they can be applied to guide and enhance decision-making processes of managers in global economy. 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 core requirements, or permission of instructor. Develops framework for business analysis and valuation using financial statement data. Analyzes management decisions such as equity valuation, creditworthiness, merger valuation, corporate financial structure, and management communication strategy.

702 Corporate Financial Policy (3:3:0) Prerequisite completion of MBA 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. Provides understanding of role of and techniques available to management for effectively utilizing organization’s human resources.

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.

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.

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 market research study. Topics include research design, statistical analysis, data mining and modeling, and using 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 marketplace behavior. Emphasizes applications of product and service strategies, focusing on how information age affects the way consumption occurs.

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. Examines how e-commerce and e-business affect digital economy. Discusses, compares business models, strategies for e-commerce.

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 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.

764 Directed Studies in Business Administration (1–3:0:0)  
Prerequisite: completion of MBA core requirements, or permission of instructor. Approval by faculty member and MBA program director required prior to registration. 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.

700 The New Professionalism: Theory and Practice (3:3:0)  
Experientially explores contemporary and relevant ethical theories and their diverse applications to professional studies field. Examines ethical relationship between professionals and clients, ethical accountability and responsibility, ethics of institutions, and professional's role in sustaining ethical standards. Explores philosophical and pedagogical assumptions to understand professional management issues, and social and individual purposes of being professional. Customized for each track; for detailed course content, contact appropriate program directors.

701 The New Professionalism: Reflective Practitioner (3:3:0)  
Identifies central problems in epistemology. Examines how an epistemology appropriate to professional practice may be constructed, what is meant by "ways of knowing" and the "reflective practitioner," and implications for professional learning. Studies core issues of generalizability; objective knowledge and understanding; and how evidence, truth, and 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, Meckon, 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 practice. 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 participation and describes 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. More challenging version of MATH 113. Functions, limits, the derivative, maximum and minimum problems, the integral, and transcendental functions.

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 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.

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 Foundations of 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 215 or 213. 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 553, 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 EA 1. 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 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 decimal 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. Covers standard topics from Euclidean geometry, and includes discussion of non-Euclidean geometries. Emphasizes informal and explorative approach to geometry, and makes use of geometry sketchpad. Other topics include geometric constructions, and role of proof in 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. 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.

607 Algebraic Structure for Teachers (3:2:1) Open to in-service teachers of mathematics at middle school 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.
528 Mathematical Sciences (MATH)

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 systems, 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, subspaces 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 315 or equivalent. Covers enumerative combinatorics, including partially ordered sets; Mobius 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 355 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 nonlinear dynamical systems illustrated in mathematical models from physics, ecology, and population dynamics. Traditional qualitative analysis of difference and differential equations provides background for understanding 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.

677 Ordinary Differential Equations (3:3:0) Prerequisite: MATH 203 and 351. Qualitative and quantitative theory of ordinary differential equations. Phase portrait analysis of linear and nonlinear systems, including classification of stable and unstable equilibrium states and periodic orbits. Poincare-Bendixson theorem, Lyapunov stability and Lyapunov functions, and bifurcation theory. Optional topics include averaging and perturbation methods, numerical solution techniques, and chaos.

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.
682/641 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.

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 principle, entire and meromorphic functions, analytic continuation, and the Riemann mapping theorem.

763 Functions of Several Complex Variables (3:3:0) Prerequisites: 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 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. Lebesgue measure and integration. Theory of Lp 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 compilatory work evaluated by committee of three faculty members. Graded S/N/C.

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 judicial 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 unit on Tuesdays, 1:30–4:15 p.m. Trains students on a variety of practical military tasks, from drill and ceremonies to small
unit tactics. Upper-class cadets lead training as part of staff leadership experience. Includes field training exercises (FTX) each semester; physical training sessions are conducted every Monday, Wednesday, and Friday, 7–8 a.m., generally at Field House. A professor of military science can authorize waivers to LAB 201 enrollment in certain circumstances, such as scheduling conflicts.

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 studies in the Department of Music for teacher assignment and registration numbers. Private music instruction fee applies.

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 2-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.

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.

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.

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.

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) Prerequisites: 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.

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.

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.

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.

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.

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.

213 Sight Singing and Ear Training III (2:3:0) Prerequisite: MUSI 114, or permission of instructor. Continuation of MUSI 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.

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.
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.

227 PMI Percussion (1:0:0.5) Prerequisite: audition. Private lessons in percussion performance. May be repeated for up to 8 credits.

228 PMI Composition (1:0:0.5) Prerequisite: portfolio of recent compositions. Private lessons in music composition. May be repeated for up to 8 credits.

241 Private Music Instruction II (2:0:1) Prerequisite: audition or portfolio. Private lessons in music performance or composition. May be repeated for up to 16 credits.

242 PMI Keyboard (2:0:1) Prerequisite: audition. Private lessons in keyboard performance. May be repeated for up to 16 credits.

243 PMI Voice (2:0:1) Prerequisite: audition. Corequisite: MUSI 381, 384, or 385. Private lessons in vocal performance. May be repeated for up to 16 credits.

244 PMI Woodwind (2:0:1) Prerequisite: audition. Private lessons in woodwind performance. May be repeated for up to 16 credits.

245 PMI Brass (2:0:1) Prerequisite: audition. Private lessons in brass performance. May be repeated for up to 16 credits.

246 PMI String (2:0:1) Prerequisite: audition. Private lessons in string performance. May be repeated for up to 16 credits.

247 PMI Percussion (2:0:1) Prerequisite: audition. Private lessons in percussion performance. May be repeated for up to 16 credits.

248 PMI Composition (2:0:1) Prerequisite: portfolio of recent compositions. Private lessons in music composition. May be repeated for up to 16 credits.

251 The Art of Teaching Music (3:3:0) Prerequisite: admission to music major or minor program, or jazz studies minor program. Introduces and explores various music teaching professions. Examines philosophical, pedagogical, and practical issues in context of diverse teaching situations and venues that range from private studio and public school to community music schools and commercial establishments. Requires observing professionals in the field.

273 Keyboard Skills III (1:0:3) Prerequisite: MUSI 172. Nonmusic majors must have permission of instructor. Continuation of MUSI 172. Study of techniques of harmonization at the piano keyboard.

300 Recital Attendance (0:0:0) Students attend 10 student recitals to be selected from departmental and music education recitals, and junior, senior, and graduate recitals. Graded S/NC (Satisfactory/No Credit)

301 Music in Motion Pictures (3:3:0) Prerequisite: 30 credits. Intensive study and analysis of using music tracks in motion pictures to introduce the picture, set a scene, create moods, or for musical numbers. From the silent film scores of the 1920s to the present (including electronic music).

302 American Musical Theater (3:3:0) Prerequisite: 30 credits. Intensive study of the musical elements in the American musical theater from its European and later African roots to its evolution between the wars into a native form, and its continual assimilation of external influences such as new forms of jazz and rock to the eclectic form of the present day.

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 concertos, 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.
Courses

383 Symphonic Band (1:0:3) Prerequisite: audition. Performance of works from band repertoire. Public concerts are given. f,s

384 Symphonic Chorus (1:0:3) Prerequisite: audition. Performance of major works from the choral repertoire. Public concerts are given. f,s

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. f,s

387 Symphony Orchestra (1:0:3) Prerequisite: audition. Performance of works from symphony orchestra repertoire. Public concerts are given. f,s

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. f,s

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. f

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. s

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. f,s

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. s

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. s

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. s

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 characteristics as well as sociological function. Lectures, recordings, and video. Learning process enhanced by reading, listening, writing, and analytical assignments. s

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. F

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.

462 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 391. 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.

463 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 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.

464 Instrumental Music Methods II (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 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.

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 III (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 string classes from the beginning levels through performing ensembles (grades 4–12), and explore teaching materials appropriate for individual and class instruction. 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. Student 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) Prerequisite: 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) Prerequisite: 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 methods, standard literature, and musical instruments produced by present-day manufacturers.

555 Music as a Healing Art (3:3:0) 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. Considerers listening examples as they apply to healing with music. Students sing and play instruments in directed improvisatory performance.

563 Orff Schulwerk I (3:3:0) 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.

564 Orff Schulwerk II (3:3:0) 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.

565 Orff Schulwerk III (3:3:0) 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.

571, 572 Techniques of Accompanying I, II (1:0:3) 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.
573 Accompanying and Musicianship III (3:3:0) Prerequisite: MUSE 572. Study of complex accompanying skills including open score reading and orchestral rehearsal. This course is for piano majors or persons with significant keyboard skills.

592 Topics in Music (1–6:1–6:0) 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.

610 Topics in Music Theory (3:3:0) Prerequisites: MUSE 501, 502, and 516, or appropriate score on the graduate placement examination. 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.

611 Analytical Techniques (3:3:0) Prerequisites: MUSE 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.

613 Graduate Orchestration (3:3:0) Prerequisites: MUSE 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.

614 Music Theory Pedagogy (3:3:0) Prerequisite: baccalaureate degree in music, graduate placement exam. Study of materials and procedures in the teaching of undergraduate-level music theory subjects.

621 Graduate Private Music Instruction (1:0:0.5) Prerequisite: audition or portfolio. Private lessons in performance or composition. May be repeated for up to 6 credits.

622 PMI Keyboard (1:0:0.5) Prerequisite: audition. Private lessons in keyboard performance. May be repeated for up to 6 credits.

623 PMI Voice (1:0:0.5) Prerequisite: audition. Private lessons in vocal performance. May be repeated for up to 6 credits.

624 PMI Woodwind (1:0:0.5) Prerequisite: audition. Private lessons in woodwind performance. May be repeated for up to 6 credits.

625 PMI Brass (1:0:0.5) Prerequisite: audition. Private lessons in brass performance. May be repeated for up to 6 credits.

626 PMI String (1:0:0.5) Prerequisite: audition. Private lessons in string performance. May be repeated for up to 6 credits.

627 PMI Percussion (1:0:0.5) Prerequisite: audition. Private lessons in percussion performance. May be repeated for up to 6 credits.

628 PMI Composition (1:0:0.5) Prerequisite: portfolio of recent compositions. Private lessons in composition. May be repeated for up to 6 credits.

629 PMI Conducting (1:0:0.5) Prerequisite: audition. Private lessons in conducting. May be repeated for up to 6 credits.

630 Topics in Music History and Literature (3:3:0) Prerequisites: MUSE 532 and 533, or appropriate score on the graduate placement exam. Examination of a musical style, genre, composer, compositional school, or historical development. Primary and secondary source materials studied in historical and analytical contexts. Repeatable for up to 9 credits as topics change.

640 Topics in World Musics (3:3:0) Prerequisites: baccalaureate degree in music, graduate placement exam. Study of musics from selected cultures. Students will study structural, social, and cognitive foundations of the music. Repeatable for up to 9 credits as topics change.

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 beginning, 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). Prerequisites: 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). Prerequisites: 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) Prerequisites: 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.

**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 ferrimagnetics.

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 Nanotechnologies (3:3:0) Prerequisite: NANO 500 and 510, 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.

530 Nanofabrication (3:3:0) Prerequisite: NANO 500 and 510, or permission of certificate director. Covers pulsed laser deposition, molecular beam epitaxy, controlled vapor deposition, reactive sputtering, and doping and implant isolation.

540 Nanotechnology in Commerce and Government (3:3:0). Prerequisites: NANO 500, and admission into graduate certificate program in nanotechnology and nanoscience. Discusses competitive position of United States and other countries in nanoscience and nanotechnology. Covers business strategies, environmental, and public health aspects of nanotechnology applications. Also introduces students to issues involving legal, economic, social, and political controls over nanotechnology and nanoscience research.

610 Nanoelectronics (3:3:0) Prerequisites: NANO 500, 510, and 520, or permission of instructor. Introduces basic elements of nanoelectronic structures, including quantum layers, quantum wires, and quantum dots. Covers sub-band structure, transport in quantum layers, behavior in the presence of magnetic fields, Coulomb blockades, CMOS nanodevices and nanoelectronics, and SOI multigate device physics and modeling.

620 Computational Modeling in Nanoscience (3:3:0) Prerequisites: NANO 500, 510, and 520, or permission of instructor. Introduction to simulation methods used in nanoscience. Covers computational approaches to modeling molecular and condensed matter at the nanoscale level, including interatomic and molecular potentials, molecular mechanics, molecular dynamics, monte carlo averaging, ensemble distributions, numerical sampling, thermodynamic functions, dynamic structure, and introduction to cellular automata.

Neuroscience (NSCI)

Psychology

210 Introduction to Neuroscience (3:3:0) Prerequisite: completion of 30 credits, including BIOL 213, or permission of instructor. Introduction to basic concepts and information across a broad range of current areas of neuroscience research. Prerequisite to all other courses in neuroscience.

327 Cellular, Neurophysiological, and Pharmacological Neurosciences (3:3:0) Prerequisite: NSCI 210 and PSYC 375 with a grade of B or better, or permission of instructor. Basic concepts of cellular and molecular level neuroscience, including neuronal functions, cellular anatomy and membrane functions, electrical properties of neurons, and cellular basis of plasticity.

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.

Neurosciences (NEUR)

College of Science

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.

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, or permission of instructor. Hands-on training in current techniques of modern neurophysiology. Acquaints students with theoretical basis of each technique and trains the student in the laboratory skills necessary to perform each technique. Includes both intracellular and extracellular recording techniques. Preparations include both vertebrates and invertebrates. Meets once weekly for six hours.

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. Intensive 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 chemical 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 a 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.

999 Doctoral Dissertation (1–12:0:0) Prerequisite: admission to candidate 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 build-
ing 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.

194, 294, 394, 494, Service Learning Experience (1–15:1–15:0) Service-learning courses offer students, faculty, and community partners 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 Mason 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 Program, 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 also 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, mentor 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.

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 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 3.30 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 page and stage.

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 “environmentics,” 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) Immerises 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: 55 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, 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 3.30 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-enriched 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 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.

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 examine 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 literary and film 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 or corequisite: 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. Interdisciplinary 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, interface and navigation studies, and technical constraints on design.

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.

490 Internship See Division III Courses.

491 The Senior Capstone Experience (3:3:0) Should be taken semester before graduation; $5 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 student 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/laboratory 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 integrative studies 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.

195, 295, 395, 495, 595 Experiential Learning (1–18:1–18:0) Prerequisite: minimum 12 credits of experiential learning, including internships, required for BA/BS in integrative studies, with maximum 24 credits toward fulfilling graduation requirements. Students enrolled in BA or BS program required to participate in equivalent of at least 12 hours of course work devoted to experiential learning. Experiential learning sites may change each semester to include study abroad programs, internships, and community service learning opportunities. Students should complete learning contracts for each experiential learning activity undertaken.

Nursing (NURS)

College of Health and Human Services

305 Application of Basic Nursing Techniques (1:0:2) Prerequisite: acceptance into accelerated second degree pathway. 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) Prerequisite: NURS 309. Enrollment restricted to second-degree international 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.

318 Concepts of Health, Groups, and Family (3:3:0) Enrollment restricted to second-degree international students only. Corequisites: NURS 309 and 310. Focuses on small groups and families as participants in health care. Cultural and religious differences and family crises are discussed. Legal and ethical dimensions of nursing practice are also introduced.

319 Pathophysiological Basis for Nursing Care of Individuals and Small Groups I (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.

326 Pathophysiological Basis for Nursing Care of Individuals and Small Groups II (3:3:0) Enrollment restricted to second-degree international students only. Prerequisites: NURS 309, 310, 318, 328, 329, and 425; corequisites: NURS 325, 436, 440, and 455. Focuses on pathophysiological, psychological, sociocultural, and risk-reduction factors related to nursing care of adult clients experiencing acute and chronic medical or surgical conditions.

328 Pathophysiological Basis of Nursing Care for Individuals and Small Groups I (4:4:0) Enrollment restricted to second degree international students only; corequisites: NURS 309, 310, 318, 328, 329, and 425. Focuses on pathophysiological, psychological, sociocultural, and risk-reduction factors related to nursing care for clients with acute medical-surgical and psychopathological conditions.

329 Application of Nursing Care for Individuals and Small Groups (6:0:18) Prerequisites: NURS 309, 310, 328, 334, 425, and 436; corequisite: NURS 328. Enrollment restricted to second-degree international students only. Clinical consists of two full days in clinical areas. Prior to onset, selected technologies presented in campus labs. Students may also have the opportunity to follow clients into the clinic or home environment. Course divided into three, five-week clinical areas: maternity and women’s health, pediatrics, and psychiatric nursing.

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 and vulnerable 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 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. Includes agency and campus labs. 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. Provides opportunities to use nursing process while examining health conditions of clients in geriatric, maternal and infant, pediatriic, or medical and surgical settings. Particular attention to assessing health needs of clients and their families through case studies.

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 NURS 330, 331, 332, and 333; corequisite: NURS 344. 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. sum

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. sum

347 Adult Pathophysiology and Nursing Care (2:2:0) 
Introduces changing health needs of culturally diverse and vulnerable populations. Focuses on nursing care; and pathophysiological, psychological, sociocultural, and risk-reduction implications of frequently experienced health problems in the adult population.

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; corequisites: NURS 351, 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.

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.

357 Medical Surgical I Clinical (2:0:6) Provides the student with an opportunity to perform nursing care to the medical surgical clients, including those who are culturally diverse and vulnerable and experiencing physiological, psychological, and social health problems in a variety of settings.

358 Maternal/Infant Clinical (2:0:6) Provides the student an opportunity to perform nursing care to the maternal/infant client, including those who are culturally diverse and vulnerable, experiencing physiological, psychological, and social health problems in a variety of settings.

359 Pediatric Clinical (2:0:6) Provides the student an opportunity to perform nursing care to the pediatric client, including those who are culturally diverse and vulnerable, experiencing physiological, psychological, and social health problems in a variety of settings.

400 Clinical Nursing Elective (3:0:9) Prerequisites: satisfactory completion of all 300-level requirements. Allows students to synthesize previously learned knowledge and skills, acquire additional clinical experience, and observe and participate in nursing practice.

410 Nursing Care of Clients with Pathological Conditions II (3:3:0) Prerequisite: junior year; corequisite: completion of computer NCLEX review required to fulfill course requirements. Encompasses complex health problems of culturally diverse and vulnerable populations throughout the life span. Focuses on nursing care needs and pathophysiological, psychological, and sociocultural implications of complicated health problems. f

417 Research Appraisal for Evidenced-based Practice (2:0:0) Focuses on the critique of published research reports to enable appropriate research utilization in practice.

419 Pathophysiological Basis for Nursing Care of Individuals and Small Groups II (3:3:0) Prerequisites: completion of NURS 305, 309, 310, 319, and 334. Enrollment restricted to second degree students only. Focuses on pathophysiological, psychological, sociocultural, and risk-reduction factors related to nursing care of childbearing women, infants, children, and adolescents experiencing acute health care problems.

425 Comprehensive Health Assessment (3:2:2) Open only to RNs and LPNs. Introduces systematic health assessment across the life span, and expands that knowledge base to include knowledge and skills necessary to perform comprehensive health assessments with culturally diverse and vulnerable populations. f,s

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.

436 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,sum

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.

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.

453 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 is on critique and use of current nursing and research in clinical practice.


465 Examination and Integration of Professional and Health Care Issues (3:3:0)Additional corequisite for nursing majors: satisfactory completion of NCLEX review testing and study plan for LPN, traditional, and second-degree pathways, other general education requirements, and ENG 302. Course meets Mason requirement as a synthesis course. Capstone seminar course synthesizing varied dimensions of health professional’s role in global society. Examines issues in health care through reflection on natural and behavioral sciences, humanities, and other prerequisite course work. Selected topics examined through reading, writing, and discussion. Content builds on knowledge and skills acquired through course work, and field experience in major and general education, as well as through life experience. Application of literature in professional practice and related disciplines expected in formal, informal writings. Student writings and presentations receive written self-evaluation and formal review by peers and multiple faculty members involved in teaching course. Writing-intensive.

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) Pre- or corequisite: NURS 466. 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.

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) Pre- or corequisite: 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 435. 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.

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.

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.

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.
546/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 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 pharmacologic 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 in Advanced Clinical Nursing (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.

547 Pharmacology (3:3:0) Course is offered through George Washington University as PHARM 207 and is charged at GWU tuition rates. Prerequisite: undergraduate physiology course, admission to NP program, or permission of instructor. Discusses drugs and their actions. Principles of pharmacology and drugs, including their therapeutic and toxic action and their fate in the body are studied.

548 Pharmacology in Disease Pathophysiology (1:1:0) Course is offered through George Washington University as PHARM 208 and is charged at GWU tuition rates. Prerequisite: admission by permission of instructor. Corequisite: NURS 554. Discusses drugs and their application to advanced pathophysiologic, including therapeutic responses to health and health deviations.

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.

552 Advanced Physiology and Pathophysiology (4:3:1) Course is offered through George Washington University as HSC 205 and is charged at GWU tuition rates. Prerequisites or corequisites: NURS 554 and 547. System-focused advanced physiology and pathophysiology analyzing health deviations across life span. Knowledge is applied to interpret changes in normal function that results in symptoms indicative of illness. This systematic assessment is foundational to clinical decision-making and management of health deviations. Lecture, clinical laboratory, and practicum are presented. Taught at George Washington University campus.

554 Practicum in Advanced Health Assessment (2:1:2) Course is offered through George Washington University as HSC 207 and is charged at GWU tuition rates. Prerequisites: admission to NP program or permission of instructor. Applies advanced health assessment skills and clinical decision making with adults of all ages in primary care settings. Skills and techniques needed to collect data for comprehensive health assessment are emphasized in this supervised practicum by nurse practitioner faculty preceptors. Taught at GWU campus.

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.

561 Clinical Decision Making (2:2:0) Course is offered through George Washington University as HSC 206 and is charged at GWU tuition rates. Corequisite: NURS 552, admission to NP program, or permission of instructor. Analyzes various cases using student participation in decision-making formulation. Students learn to correlate pathophysiology with symptom manifestation. Emphasizes historical and physical examination data, laboratory data, and radiographic studies relevant to health promotion problems discussed. Appropriate pharmacologic and nonpharmacologic therapies discussed in conjunction with theoretical basis for selecting specific therapies. Taught at GWU campus.

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.

578/GCH 578 Cultural Competence and Diversity in Health Care (3:3:0) Examines cultural competence and diversity in health care, and explores theories and models. Topics include culture as a system, health and illness beliefs, and practices of various cultures.

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) Prerequisites: 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.

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.

610 Curriculum Development (3:3:0) Uses seminar and discussion forums to analyze and apply theory and principles for planning, developing, and evaluating curriculum. Examines curriculum as technical, political, and social action process.

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 660, 755, and 794. 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.

657 Perspectives in Nursing Education (3:3:0) Prerequisite: admission to graduate nursing program or post-master's studies. Provides overview of nursing education topics including the U.S. university, hallmarks of nursing education, educational philosophies, learning theory and principles, issues and trends in nursing education, and current research.
Courses

658 Practicum and Seminar in Nursing Education (3–6: 2–6:7–14) Prerequisite: admission to graduate nursing program or post-master's status; NURS 657 and 610; or EDCI 701. Utilizes seminars, discussion, and practicum experience to analyze role and functions of the nurse educator. Emphasizes application of teaching strategies, and legal and ethical issues in nursing education.

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.


668 Practicum and Seminar in Nursing Education II (3:2:6) Uses seminar/discussion approach and practicum experience to analyze role, functions of nurse educator in clinical setting. Emphasizes applying research-based teaching and evaluation strategies in clinical setting.

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.

720 Practicum in Family Primary Care Nursing I (4:2:6) Prerequisites: NURS 547, 552, 554, and 561. 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 childhood 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.

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.

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-based 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 Practicum—Clinical Nurse Leader (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.

746 Practicum in Adult Primary Care Nursing (6:2:12) Prerequisite: NURS 547, 548, 552, 554, and 561. 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.

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 application 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) Corequisite: NURS 751. 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: PHARM 207, and HCS 205, 206, and 207. Enables the post-master 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 with medically underserved 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.

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.

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.

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.

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 (3–6:2–6:7–14) Prerequisites: admission to graduate program, and NURS 680. Corequisite: NURS 773. 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.


780 Practicum in Gerontological Nursing I (3:0:3) Prerequisites: NURS 547, 552, 554, and 561. 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-care (practicum of at least 100 clinical hours and case analysis conferences).

799/HHHS 799 Advanced Quantitative Analysis for Health Care Research I (3:3:0) Prerequisite: graduate-level course in statistics. Examines factorial ANOVA, factorial ANCOVA, repeated measures ANOVA< ANOVA, ANCOVA via regression approach, and multivariate frequency analysis. Students apply mathematical calculations and interpret SPSS outputs using health care research data.

800/GCH 800 Advanced Quantitative Data Analysis for Health Care Research II (3:3:0) Prerequisite: NURS 799, or an equivalent statistics course. Examines multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), and multiple regression (ordinary least squares) and logistic regression. Students apply mathematical calculations, and utilize linear combinations for multivariate tests in health care research.
801/GCH 801 Advanced Multivariate Statistics and Data Analysis in Health Care Research (3:3:0) Prerequisite: NURS 800, or equivalent multivariate statistical course. Examines canonical correlation, discriminant analysis, factor analysis, and causal analysis (path models and structural equation modeling). Students analyze and interpret data utilizing these statistical techniques.

802/GCH 802 Measurement Theories and Applications in Health Care Research (3:3:0) Prerequisite: doctoral-level course in research design and statistics. Completion of HSCI 800 or 801 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 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.

855/HHS 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.

866/HAP 866 Health Care Public Policy (3:2:1) Considers structure and process of public health policy formulation, policy analysis, and research methods within scholarship framework of discovery, integration, and application. Examines contextual factors influencing policy development, with particular emphasis on political dynamics, application of ethical principles, and health services research. Analyzes selected state and federal policy issues, and delineates implications for health professionals, health organizations, and the public. Lecture, field experience.

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: at the end of course work; 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.

920 Qualitative Research in Nursing and Health Care (3:3:0) Corequisites or prerequisites: NURS 953. 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.

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.

998 Doctoral Dissertation Proposal (3:0:0) Prerequisite: completion of all course work except NURS 999. 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 hours.

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 in 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 principal aspects of 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 OMribe key planning and control activities.

320 Supply Chain Management and E-Business (3:3:0) Prerequisites: C or higher in OM 301, degree status. Introduces 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. Operations research for business management. Modeling through mathematical programming and probabilistic methods. Specific topics include linear programming, integer programming, transportation problems, goal programming, network flow models, decision theory of games, Markov processes, 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 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 methods for producing predictions of future business operations as aids for 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 understanding of multifaceted nature of quality management by emphasizing issues 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. May be repeated for maximum 6 credits if topics substantially different. f,s

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. 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. f,s

481/MATH 446 Numerical Methods in Engineering (3:3:0) Prerequisites: MATH 203 or 215, and MATH 203 or 322; or equivalent. Modern numerical methods and software. Emphasis on solving problems 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 (13:0:0) 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 operations research. May be repeated for maximum 6 credits if topics substantially different. f,s,summer

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,summer

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, Stackeberg-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, set 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. s

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. f

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. s

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. s
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 660/560, or permission of instructor. Introduces range of current issues in air transportation, including 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.

675/STAT 678/SYST 675 Reliability Analysis (3:3:0) Prerequisite: STAT 544 or 554, or permission of instructor. Introduction 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, Systems Engineering and Computational Modeling (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) Prerequisite: 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, Computers, 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 544. 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 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 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.

754 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, 543, 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.

Organizational Learning—See LRNG

Parks, Recreation, and Leisure Studies (PRLS)
School of Recreation, Health, and Tourism

110 Exploring Outdoor Adventure (2:1:1)
115 Introduction to Fly Fishing (1:1:0)
117 Rock Climbing (2:2:0)
118 Intermediate Rock Climbing (2:2:0) Prerequisite: PRLS 117, or permission of instructor.
119 Trap and Skeet Shooting (2:2:0)
120 Introduction to Backpacking (2:2:0) Fee required.
121 Intermediate Trap and Skeet Shooting (2:2:0) Prerequisite: PRLS 119 or permission of instructor.
170 Introduction to Whitewater Kayaking (1:1:0) Fee required.
173 Introduction Coastal Kayaking (2:2:0) Fee required.
174 Open Water Coastal Kayaking (2:2:0) Prerequisite: PRLS 173, or permission of instructor. Fee required
175 Introduction to Rowing (1:1:0)
180 Whitewater Canoeing (2:2:0)
181 Whitewater Canoeing II (2:2:0)
190 Downhill Skiing (1:1:0)
191 Snowboarding (1:1:0)
195 Introduction to Hot Air Ballooning (2:2:0)
200 Wilderness First Responders (2:2:0)
210 Introduction to Recreation and Leisure (3:3:0) Open to nonmajors. Traces the development of current concepts of leisure and recreation and their implications and consequences. Covers influences of philosophy, religion, science, economics, sociology, and politics on discretionary time and its uses.
220 Experiential Education Theory and Application (3:3:0)
221 Challenge Course Facilitator Field Work (2:2:0) Prerequisite: PRLS 220.
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 10–12 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.
253 Florida Everglades Canoe Expedition (3:2:1)
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 noncompetitive 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 deprecative behaviors, and attitudes toward resource conservation, preservation, and use.

405 Planning, Design, and Maintenance of HFRR 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 HFRR 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 HFRR 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 planning, 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.

502 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 sites, with attention to financial consideration and sustainable use of cultural and visual resources.

533 Visitor Services (3:3:0) Examines motivation of resource-based recreation participants. Covers visitors’ expectations and perceptions, with emphasis on implication for service quality, staff training, and other management responsibilities. Discusses use and user conflicts and placement, information and interpretive service, and human and other interpretive service resources.

535 Evaluating Recreation Outcomes (3:3:0) Covers application of quantitative and qualitative research methods to the evaluation of programs provided to visitors and users of public lands for outdoor recreation. Focuses on needs assessment and application of meaningful measures for formative and summative evaluations.
560 Liability and Risk Management (3:3:0) Examines liability and risk; federal jurisdiction, legal apparatus, and decision-making; and analysis of resource-based recreation case law.

598 Special Topics (1–6:0:0) Prerequisite: 90 credits. Projects related to parks, recreation, and leisure studies. May be repeated for a total of 6 credits.

599 Independent Study (1–3:0:0) Prerequisite: 90 credits. Study of a problem area in parks, recreation, and leisure studies research; theory or practice under the direction of faculty member. May be repeated. No more than 3 credits may be earned.

**Philosophy (PHIL)**

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-Socrates, 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 Medicine and Human Values (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 considered. 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-Marxian socialist theory and practice.

326 Justice, Law, and the Modern State (3:3:0) Investigation into several modern theories of justice through a critical examination of important recent texts. Theories used to critically evaluate central structures of the American system of government and the process of legislation.

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.

335 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 rived only by ancient Greece. Kant, Fichte, Hegel, Kierkegaard, Schopenhauer, and Nietzsche mount a revolt against the rationalism and individualism 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.

358 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 vary but 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 calculus by means of a step-by-step construction of artificial languages. Topics include procedures for constructing a calculus, proof techniques, significant properties of predicate calculus, 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) Limited to philosophy majors with 9 credits of philosophy, but others may be admitted if topic is sufficiently close to their fields of study. Topics vary.

425, 426 Independent Study (3:0:0), (3:0:0) Prerequisites: philosophy majors with 60 credits and 15 credits of philosophy, and permission of department.

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.

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.

510 Seminar in Ethics of Health Care (3:3:0) Prerequisite: 90 credits, graduate standing, or permission of instructor. Examination of 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.

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.

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 Postmodernist 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, coher-entism, 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.

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.
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.

Physical Education (PHED)
School of Recreation, Health, and Tourism

103 Fencing (1:1:0)
105 Aerobics (2:2:0)
107 Social Dance I (1:1:0)
108 Weight Training and Body Conditioning (1:1:0)
110 Beginning Swimming (1:1:0)
113 Latin Dance (1:1:0)
115 Advance Life Guarding (1:1:0)
127 Social Dance I (1:1:0) Prerequisite: PHED 107, or permission of instructor.
128 Fencing I (2:2:0)
129 Introduction to Yoga (1:1:0)
134 Self Defense for Men and Women (1:1:0) Fee required.
135 Self Defense for Men and Women II (1:1:0) Prerequisite: PHED 134. Fee required.
136 Tae Kwon Do (1:1:0) Fee required.
137 Intermediate Tae Kwon Do (1:1:0) Prerequisite: PHED 136, or permission of instructor. Fee required.
138 Brazilian Jiu: Jitsu I (1:1:0) Fee required.
139 Brazilian Jiu: Jitsu II for Men and Women (2:2:0) Prerequisite: PHED 138, or permission of instructor. Fee required.
140 Golf (1:1:0) Fee required
144 Intermediate Golf (2:2:0) Prerequisite: PHED 140, or permission of instructor. Fee required
145 Beginning Judo for Men and Women (1:1:0)
146 Introduction to Badminton (1:1:0)
147 Advanced Tae Kwon Do (2:2:0)
149 Tai Chi (1:1:0)
150 Intermediate Swimming (1:1:0)
151 Introduction to Tennis (1:1:0)
153 Intermediate Tennis (1:1:0) Prerequisite: PHED 151, or permission of instructor.
155 Introduction to Springboard Diving (2:2:0) Prerequisite: PHED 150, or permission of instructor.
156 Intermediate Springboard Diving (2:2:0) Prerequisite: PHED 150, or permission of instructor.
158 Underwater Hockey (1:1:0) Prerequisite: PHED 150, or permission of instructor.
159 Advance Swimming (1:1:0) Prerequisite: PHED 150, or permission of instructor.
165 Introduction to Racquetball (1:1:0)
166 Intermediate Racquetball (1:1:0) Prerequisite: PHED 165, or permission of instructor.
201 Developmental Motor Patterns (3:3:0) Analyzes motor-skill development and prescription of activities from immature to mature stages.
202 Teaching Skillful 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 (2:1:0)
255 Scuba Diving (2:2:0)
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) Prerequisites: 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.
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, 275, 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 (12:0:0) 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 (1–3:0:0) 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 (1–3:0:0) 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; however, 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 non-science 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 I (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) Prerequisite: PHYS 160; corequisite: MATH 213. Motion of a particle in one, two, and three dimensions; systems of particles; non-inertial 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.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>390</td>
<td>Topics in Physics (1–4:0:0)</td>
<td>Selected topics in physics not covered in fixed content courses.</td>
<td></td>
</tr>
<tr>
<td>402/PHYS 502</td>
<td>Introduction to Quantum Mechanics and Atomic Physics (3:3:0)</td>
<td>Prerequisite: PHYS 308, or permission of instructor. Experimental basis of quantum mechanics; the wave function; systems in one, two, and three dimensions.</td>
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</tr>
<tr>
<td>405, 406</td>
<td>Honors Thesis in Physics (3:0:0)</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>407</td>
<td>Senior Laboratory in Modern Physics (3:0:9)</td>
<td>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 Mossbauer Effect. This course meets the writing-intensive requirement.</td>
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</tr>
<tr>
<td>408</td>
<td>Senior Research (2–3:0:0)</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>409</td>
<td>Physics Internship (3:0:0)</td>
<td>Prerequisite: 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.</td>
<td></td>
</tr>
<tr>
<td>416</td>
<td>Special Topics in Modern Physics (1:2:0)</td>
<td>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.</td>
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</tr>
<tr>
<td>417/GEOL 417</td>
<td>Geophysics (3:3:0)</td>
<td>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.</td>
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</tr>
<tr>
<td>428/ASTR 428</td>
<td>Relativity and Cosmology (3:3:0)</td>
<td>Prerequisite: MATH 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.</td>
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<tr>
<td>502/PHYS 402</td>
<td>Introduction to Quantum Mechanics and Atomic Physics (3:3:0)</td>
<td>Prerequisite: PHYS 308, or permission of instructor. Experimental basis of quantum mechanics, the wave function, and systems in one, two, and three dimensions.</td>
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<tr>
<td>510</td>
<td>Computational Physics (3:3:0)</td>
<td>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.</td>
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<tr>
<td>512/CSI 687</td>
<td>Solid State Physics and Applications (3:3:0)</td>
<td>Prerequisite: PHYS 402 or 502. Crystal structures, binding, lattice vibrations, the free electron model, metals, semiconductors and semiconductor devices, superconductivity, and magnetism.</td>
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<tr>
<td>533/CHEM 620</td>
<td>Modern Instrumentation (3:3:0)</td>
<td>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.</td>
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<tr>
<td>540</td>
<td>Nuclear and Particle Physics (3:3:0)</td>
<td>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.</td>
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</tr>
<tr>
<td>575/CSI 655</td>
<td>Atmospheric Physics I (3:3:0)</td>
<td>Prerequisites: PHYS 305, 262, and 260 or equivalent. Introduction to 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.</td>
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<tr>
<td>590</td>
<td>Selected Topics in Physics (1–6:0–6:0)</td>
<td>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.</td>
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<tr>
<td>600</td>
<td>Special Topics in Physics (1–6:0)</td>
<td>In-service course to strengthen and update teachers’ knowledge of physics and astronomy.</td>
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</tr>
<tr>
<td>611</td>
<td>Electro-optics (3:3:0)</td>
<td>Prerequisites: PHYS 502 and 513. Optical modulators, display devices, types and operation of lasers, mode locking, Q-switching, photodetectors, optical fibers.</td>
<td></td>
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</tbody>
</table>
| 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.

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.

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; MATH 313 and 314, or equivalent. Study of the fundamental concepts of atmospheric physics courses. May be repeated for credit as needed.

684 Quantum Mechanics I (3:3:0) Prerequisites: PHYS 305, 308, MATH 313 and 314, or equivalent. Fundamental concepts, including one-dimensional solutions of Schrodinger’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.

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/CHM 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) Prerequisite: 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/CHM 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 computational physics not covered in fixed-content computational 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 rotation, 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) Prerequisites: 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.
Psychology (PSYC)

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 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: 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 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.
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<tr>
<td>327</td>
<td>Psychology in the Community (3:3:0)</td>
<td>Prerequisite: psychology major with minimum 6 psychology credits, and permission of associate chair for undergraduate studies. Individual placements in applied psychology settings. Maximum 6 credits of PSYC 327, 328, 421, 422, 548, and 549 can be applied to the psychology major.</td>
</tr>
<tr>
<td>328</td>
<td>Psychology in the Community Laboratory (1:0:0)</td>
<td>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.</td>
</tr>
<tr>
<td>330</td>
<td>Psychology of Adjustment (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>333</td>
<td>Industrial and Organizational Psychology (3:3:0)</td>
<td>Prerequisite: PSYC 100, 300. Examination of application of psychological principles and methods to problems commonly encountered in business and industry.</td>
</tr>
<tr>
<td>350</td>
<td>Directed Reading and Research in Psychology (1–3:0:0)</td>
<td>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.</td>
</tr>
<tr>
<td>362</td>
<td>Psychology of Women (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>372</td>
<td>Physiological Psychology (3:3:0)</td>
<td>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. Students may earn credit for 372 and either 375 or 376, but they may not earn credit for all three.</td>
</tr>
<tr>
<td>376</td>
<td>Brain and Behavior II (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>379</td>
<td>Applied Cross-Cultural Psychology (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>414</td>
<td>Behavior Disorders of Childhood (3:3:0)</td>
<td>Prerequisites: PSYC 313 and 325, or permission of instructor. Review of the theories, methods, and research dealing with emotional and behavioral disorders of children.</td>
</tr>
<tr>
<td>415</td>
<td>Psychological Factors in Aging (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>418/518</td>
<td>Death, Dying and Grieving (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>421, 422</td>
<td>Undergraduate Practicum in Psychology (3:3:0), (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>423</td>
<td>Group Psychotherapy Techniques (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>435</td>
<td>Personnel Training and Development: A Psychological Perspective (3:3:0)</td>
<td>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.</td>
</tr>
</tbody>
</table>
| 460           | Independent Study in Psychology (1–3:0:0) | Prerequisites: 18 credits of psychology including PSYC 301, with grade of C or better; 2.5 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: admission to Psychology Department honors program. Review of topics and research related to intimate relationships, including romantic relationships and those among family members and friends.

467 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) Prerequisites: 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 527. Functional anatomy of brains of mammals, with emphasis on regional and systems neuroanatomy of humans. Anatomy correlated with material from clinical neurology where possible. Laboratory component includes brain sections and clinical correlations.


541 Survey Research (3:3:0) Prerequisite: PSYC 300 or SOC 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 effects of neurotoxicants, and biological mechanisms underlying addiction. Topics include alcohol, cocaine, marijuana, and other drugs; genetics of addiction; and neural systems underlying addiction and withdrawal.

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 656, 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 530 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, 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.

722 Advanced Child Assessment (4:3:2) Open only to school psychology MA or PhD students. Prerequisites: PSYC 709 and 710 or PSYC 810 and 811, five intellectual assessments at Psychological Clinic, and permission of department. 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 656 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 (3:3:0) 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) Emphasizes current research in developmental psychology. Topics 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.

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. Review 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 interactional skills, including basic therapy skills, psycho-diagnostic 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.

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 one concentration of PhD program. See area coordinator for requirements. 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) 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.

621 Principles and Practices in Government Organization and Management (3:3:0) Prerequisite: PUAD 620. Major management theories applicable to American federal
system. Emphasizes organization, structure, and operations. Explores relationship of theories to management practices in contemporary American administration.

622 Program Planning and Implementation (3:3:0) Pre-requisite: PUAD 620. Practical exploration of implementing public law in American federal system. Studies construction of organizational apparatus, development of operational plans, and systems of control and evaluation necessary to implement government programs. Emphasizes coordinating tasks and resources required for effective program implementation.

623 Managing Government Contracting (3:3:0) Explores unique management and administrative challenges of providing public goods and services through contracts. Examines debates over privatization, and explores tools managers need to address unique accountability challenges associated with this governance tool.

625 Higher Education Law (3:3:0) Analyzes legal issues confronting higher education: governance, faculty matters, and student issues. Examples include due process, freedom of speech, and privacy. Reviews key constituents in higher education—students, faculty, administrators, board of trustees, and parents—and how their roles are changing.

630 Emergency Planning and Preparedness (3:3:0) Provides an understanding of the issues associated in developing plans and policies to prepare for disasters, both natural and man made. Overview of nature of challenges posed by different kinds of disasters; discussion of regulatory requirements, sample plans, equipment requirements, collateral and mutual aid support agreements, and methods for testing and updating plans.

631 Disaster Response Operations and Recovery (3:3:0) Explores the principles and practices that promote effective disaster response operations and management. Examines nature of disasters, models for response operations in the United States and roles and responsibilities of various emergency management-related organizations.

632 Homeland Security: Terrorism, Threat, and Vulnerability Analysis (3:3:0) Examines how terrorism has spurred sharp changes in U.S. strategy, policy and governmental design, and how those changes should continue over the near and long terms. Discusses elements of threat and vulnerability assessments, as well as procedures for assessment.


635 Emergency Preparedness: Interagency Communication and Coordination (3:3:0) Considers complex relationships within 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 environments, particularly in relief and development work. Examines relationship 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) Pre-requisite: 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) 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) Pre-requisite: 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.


651 Virginia Politics, Policy, and Administration (3:3:0) Pre-requisite: PUAD 502. Cultural, demographic, constitutional, and socioeconomic environment of public administration in Virginia. 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) 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) Pre-requisite: 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) Pre-requisite: 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) Pre-requisite: 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
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 annuities, 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 (1–3:3:0)  
Prerequisite: PUAD 660, or permission of instructor. 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, representation, 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)  
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 Security: Transportation Security Administration (3:3:0)  
Examines the terrorist attacks of 9/11, the vulnerabilities in the aviation security system, and reasons
why elected leaders and officials did not act more decisively to improve security. Includes the development of radical Islam and the rise of Osama bin Laden and Al Qaeda. (Previously PUAD 729.)

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, 612, 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.

749 Issues in Public Policy (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Examines significant issues in public policy in contemporary American government. Emphasizes practical applications of theories and analysis to policy problems, and competence in improving policy analysis in selected government settings.

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 various governance choices. Choices include privatization, decentralization of governmental activity, grants-in-aid and growth of mandates, changing role of state and local governments, proposals for reforming federalism, and regulatory reform.

758 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.

759 Issues in Local Government Administration (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Management and policy formulation in American local governments. Addresses environments, institutions, and actors involved. Examines contemporary problems such as education, criminal justice, transportation, land use, economic development, and environmental impact. May be repeated with different topic.

760 Issues in Public Financial Management (1–3:3:0) Prerequisites: PUAD 502, and 9 graduate credits. Current issues in budgeting and financial management in contemporary American government. Emphasizes practical applications of administration and management issues and policy choices at all levels of government.

781 Information Management: Technology and Policy (3:3:0) Prerequisite: PUAD 680, or permission of instructor. Examines challenges that organizations encounter as they move to a more technologically sophisticated information and communication environment. Studies organizational policy issues evolving from new technologies, including privacy, security, authentication, content control, intellectual property, and taxation, focusing on effectiveness of previous policy solutions and analyzing proposed solutions.

790 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.

791 Justice Program Evaluation (3:3:0) Prerequisites: PUAD 611 and 612. Practical exploration of evaluation techniques used to study need for and consequences of justice programs and policies. Covers needs assessments, process, and impact evaluations. Includes design and measurement issues for assessing performance of justice programs, and interpreting and presenting results. Emphasizes designing program evaluation for justice agency.

793 Conduct of Justice Organizations at the Street Level (3:3:0) Prerequisite: JLCP 740/PUAD790 or permission of instructor. Explores how justice organizations behave at lowest levels, where service is delivered and discretion is greatest. Includes suspects, victims, witnesses, police officers, prison guards, parole officers, attorneys, and others who interact with the justice system.

794 Internship (1–6:0:0) Prerequisite: 12 PUAD credits or permission of instructor. Open only to MPA students. Contact internship coordinator one semester before enrollment. Credit determined by the department.

795 Leadership in Justice and Security Organizations (3:3:0) Prerequisite: JLCP 740/GOWT 790, or permission of instructor. Examines leadership theories, and explores fundamental questions about leadership in justice and security organizations today.

796 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.

797 Changing Justice and Security Organizations (3:3:0) Prerequisite: JLCP 740/PUAD790 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 most effective.

799 Issues in Justice Administration (1–3:1–3:0) Prerequisites: PUAD 502 and 9 graduate credits. Examines current issues in justice administration. Considers diverse perspectives on current and emerging issues concerning administration of justice. Emphasizes using theory and evidence to evaluate different viewpoints on issues. Course topics vary, typically focusing on law enforcement, corrections, legal issues and public law, crime control, conflict resolution, victimization experience, technological innovation, public
participation in justice process, or cross-national comparison of justice systems.

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 Affairs (PUAF)
Public and International Affairs

850 Studies for the PhD in Education (variable credit) Prerequisite: admission to PhD in education program to study in public affairs. Program of studies is designed by student’s discipline director and approved by the student’s doctoral committee, which allows the student to participate in the research of the discipline director and results in a paper reporting the original contributions of the student. Enrollment may be repeated.

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 interactive. 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.

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 PUBP720.

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 their 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.

709 Research Design and Writing (3:3:0) Helps students revise a draft scholarly paper into form acceptable in refereed public policy journal. Focuses 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 operations, 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 United States. Teaches legislative, organizational, fiscal, legal 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 transportation. 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, congestion management, 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. Consider 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
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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, peace-keeping 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 transportation since long before industrialization led to the development of steam propulsion, railroads, 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.

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.
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 Geopolitical 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 Tocqueville’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 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 constituencies 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
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. 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 innovation, and geographical clustering drive the development of regional and national economies. Explores these issues through the lens of the three T's of economic growth: technology, talent, and tolerance.

833 Topics in Public Policy (1–4:3:0) Focuses on selected topics in public policy not covered in fixed-content public policy courses.

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.

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.

880 Global and International Public Policy 1 (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
588 Public Policy (PUBP) • Reading Education (EDRD)

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)

Graduate School of Education

300 Literacy and Curriculum Integration (3:3:0) Intended as introduction to educational issues; 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. Requires school-based field experience.

301 Facilitating Literacy in School or Community Settings (3:3:0) Corequisite: 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. Requires school-based field experience.

419 Literacy in the Content Areas (3:3:0) Prerequisites: EDCI 473 and 483. Corequisite: EDCI 490. Assists students in understanding language and literacy process as it applies to teaching 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 (1–6:0:0) See EDUC 500.

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) See EDUC 597.

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 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 instructional strategies to support students' literacy development. Focuses on ways reading, writing, speaking, and listening are developed and used in learning discipline-specific curriculum, including adaptations for culturally diverse and exceptional learners.

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 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 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 admission to the 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 the literacy emphasis; or permission of program coordinator. Provides literacy assessments and interventions
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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 II (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, families and literacy.

797 Advanced Topics in Education (1–6:1–6:0) See EDUC 797.

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.

313 Hindu Religion and Philosophy (3:3:0) Hindu religious and philosophical developments from origins through formative periods.

314 Chinese Philosophies and Religious Traditions (3:3:0) Prerequisite: RELI 212, or permission of instructor. Surveys major religious traditions and philosophical themes of China including Confucianism, Taoism, and Chinese Buddhism and Neo-Confucianism. Examines foundation of Chinese world view and spirituality by investigating diverse religious traditions that have created tensions and harmony among them.

315 The Buddhist Tradition (3:3:0) Prerequisite: RELI 212, or permission of instructor. Surveys Buddhist religious traditions. Includes historical development of Buddhism in India, China, and Japan, examining both Theravada and Mahayana traditions; philosophical and religious significance of Buddhism; and social and political implications of Buddhist traditions in South Asian and East Asian countries.
316 The Christian Traditions (3:3:0) Prerequisite: RELI 211, 251, 252; or permission of instructor. Surveys origins and development of Christian traditions to present. Emphasizes diversity of forms of Christianity in different time periods, societies and cultures.

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 (Christianity, Judaism, Islam) traditions.

341 Global Perspectives on Spirituality and Healing (3:3:0) Prerequisite: 30 credits, 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) Prerequisite: RELI 106, 211, 212, 251 or 252; or permission of instructor. 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 orthodoxy, 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) 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 an 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.

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 foundational 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.

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.

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.

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 credit. Social life, art, economics, education, view of life, and personal aspirations of Russian citizen today. Course work in English.

380, 381 Advanced Russian I, II (3:3:0), (3:3:0) Prerequisite: RUSS 202, 209, or equivalent. Comprehensive study of the more difficult characteristics of contemporary standard Russian in areas of grammar, style, and vocabulary usage. Emphasizes developing facility in oral and written expression.

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)

School of Management

301 Business Models: A Learning by Writing Introduction (3:3:0) Prerequisites or corequisite: 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 UndergraduateInternship (3:3:0) Opportunity to gain practical, professional experience in conjunction with academic development. Internship is an important part of
School of Management (SOM) • Social Work (SOCW)  593

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 (3:3:0)
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)
Prerequisite: SOCW 223 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. Examines 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, 337, 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 a 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 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. f

453 Senior Practicum I (3 credits) Open only to social work majors. Prerequisites: SOCW 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. f

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. s

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. s

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. f

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) Prerequisite: 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.

651 Social Policies, Programs, and Services I (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 Social Policies, Programs, and Services II (3:3:0)
Prerequisite: SOCW 651. Explores various frameworks for analyzing social policy, and introduces current policies in areas including child welfare, juvenile justice, mental health, health care, and disabilities. Initiates consideration of strategies for improving policies through advocacy.

657 Integrative Approaches to Social Work Intervention I (3:3:0)
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 Integrative Approaches to Social Work Intervention II (3:3:0)
Prerequisite: 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 Organizational Leadership (3:3:0)
Prerequisites: SOCW 657 and 30 credits, or permission of instructor. In-depth study of special topics relevant to social work supervision and administration in public, nonprofit, and for-profit human service agencies.

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.

684 Policy Practice for Social Workers (4:3:0)
Prerequisite: SOCW 624, 652, 658 and 673. Explores development and implementation of social welfare policies and services: understanding policy-making process, conducting legislative research, and mastering advocacy skills to shape policy outcomes that reflect social work values.

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 Community Practice for Social Workers (4:3:0)
Prerequisite: SOCW 624, 652, 658, and 673. Explores social work interventions at community level, including organization, planning, and development. Strategies for mobilizing community members, utilizing 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. Program evaluation research using appropriate computer technology. Addresses ethical, pragmatic, and political considerations; needs assessment, qualitative and quantitative approaches, quality control and assurance, client satisfaction, outcome measures and indicators.

690 Concentration Field Practicum (6:0:0)
Prerequisites: SOCW 673, 684, 685, 687, and 688. Supervised social work learning experience for 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 Integrative Seminar (3:0:0)
Corequisite: SOCW 690. Explores 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, 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 thesis committee.

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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: 6 credits of sociology, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: 6 credits of sociology, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. Examines 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 orpermission of instructor. 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) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. 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) Prerequisites: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or permission of instructor. 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) Prerequisite: SOCI 101 or 102, or permission of instructor. 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) Prerequisite: SOCI 101 or permission of instructor. 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) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. 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) Prerequisite: SOCI 101, 3 credits of ARTH, or permission of instructor. 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) Prerequisite: 6 credits of sociology including SOCI 101 or permission of instructor. 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) Prerequisite: SOCI 101 or permission of instructor. 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.

385 Sociology of Religion (3:3:0) Prerequisite: SOCI 101 or 102, or permission of instructor. Studies places of religious consciousness in human action, and institutional and organizational networks created to sustain religious beliefs. Emphasizes comparative and historical analysis of role religion has played in human society. Examines theories of nature of religious experience, religious symbolism, and basis of religious community. Explores changing demographics in relation to older traditional religious faiths and newer nontraditional faiths.

390 Sociology of Health, Illness, and Disability (3:3:0) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. 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 internships 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 relations 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 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.

590 Gender, Race, and the Natural World (3:3:0) Prerequisite: 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.

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. Examines schools in contemporary sociological theory such as structural-functionalism, conflict, exchange, symbolic interactionism, ethnomethodology, humanist sociology, and critical theory. Examines types of social and cultural change, technological change, urban sociology, medical sociology, and rural sociology. May be taken only once for credit.

616 Internship in Sociology (1–6:1–6:0) Prerequisites: graduate standing, or permission of instructor. 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.
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.

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 McDonaldization 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 bureaucracies 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. Theoretical and research literature chosen by student and instructor.

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. DuBois 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.

840 Work Organizations and Social Inequality (3:3:0) Examines the social, organizational, and cultural processes that account for the differential distribution of job rewards along class, gender, and racial and ethnic lines. Topics include the historical evolution of the management worker relationship, job segregation by race and gender, the effect of new technologies on social inequality, the relation between gender...
and professional careers, the efficacy of governmental efforts to ensure equal opportunity, and the effect of organizational change on racial and gender inequalities at work.

844 Youth, Schooling, and Popular Culture (3:3:0) Uses sociological perspectives to understand the various ways in which popular youth culture, schooling processes, and consumer culture intersect in contemporary American cultural life. Examines the social, economic, and political realities of youth as a group and the formation of distinct youth cultures within and outside formal school settings, including schooling and commodity culture, how markets promote and hinder particular educational ideologies, and how consumer markets operate as spaces of cultural learning.

857 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.

Sociology and Anthropology (SOAN)

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)

Information and Software Engineering

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 421. 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.

337 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 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) See CS 631.

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 CS 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.

763 Software Engineering Experimentation (3:3:0) Prerequisite: SWE 621, 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. 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 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 department 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 comprehension, and reading. Lab work required.

201 Intermediate Spanish I (3:3:1)
Prerequisite: SPAN 102, 105, 109, appropriate placement score, or permission of department. Application of skills to reading, composition, and discussion. Lab work required.

202 Intermediate Spanish II (3:3:1)
Prerequisite: SPAN 201, appropriate placement score, or permission of department. Research project completed under supervision of faculty member on a research project on a topic in Hispanic culture resulting in paper or report.

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. Emphasis 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.

321 Introduction to Spanish Culture (3:3:0)
Prerequisite: ENG 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 Spain. Course work in English. Credit may be earned in either SPAN 321 or 461, but not in both.

322 Introduction to Latin American Culture (3:3:0)
Prerequisite: ENG 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 466, 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 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.

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 for credit with permission of department.

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.

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.

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 in the U.S. by discussing demographic aspects and a historical overview of the varieties 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.

461 Spanish Civilization and Culture (3:3:0) Prerequisite: SPAN 452, or permission of instructor. Survey of Spanish culture and civilization from pre-Roman era to the 20th century.

466 Latin American Civilization and Culture (3:3:0) Prerequisite: SPAN 452, or permission of instructor. Introduction to the study of Latin American civilization and culture from the pre-Columbian era to the 20th century.

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 483 studies Spanish literature from 1700 to the present.

488 The Literature of Spanish America (3:3:0) Prerequisites: SPAN 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.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
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<tbody>
<tr>
<td>505</td>
<td>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.</td>
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<tr>
<td>510</td>
<td>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.</td>
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<tr>
<td>520</td>
<td>Studies in Medieval Spanish Literature (3:3:0) Study of a major work or a literary genre of this period.</td>
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<td>525</td>
<td>Studies in Renaissance Literature (3:3:0) Study of a literary movement or selected authors of the Spanish Renaissance.</td>
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<td>530</td>
<td>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.</td>
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<tr>
<td>540</td>
<td>Studies in 20th-Century Literature (3:3:0) Study of a writer, genre, theme, or movement of this period.</td>
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<tr>
<td>545</td>
<td>Studies in Hispanic Literature (3:3:0) Study of major writers in a particular generation or movement.</td>
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<tr>
<td>551</td>
<td>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.</td>
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<td>560</td>
<td>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.</td>
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<td>565</td>
<td>Studies in Spanish American Drama (3:3:0) Study of playwrights who have made a major contribution to the development of the genre.</td>
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<tr>
<td>576</td>
<td>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.</td>
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<tr>
<td>580</td>
<td>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.</td>
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<tr>
<td>635</td>
<td>Seminar in Don Quixote (3:3:0) Study of Don Quixote and major critical approaches to the work.</td>
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<td>650</td>
<td>Seminar in Twentieth-Century Drama (3:3:0) Study of major dramatists in the generation of 1898 and contemporary theater.</td>
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<td>655</td>
<td>Seminar in Twentieth-Century Prose (3:3:0) Study of major writer, theme, or movement in novel or essay.</td>
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<td>670</td>
<td>Seminar in Spanish American Prose (3:3:0) Study of a selected theme, movement, or author in the novel, short story, or essay.</td>
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<td>675</td>
<td>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.</td>
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<td>680</td>
<td>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.</td>
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<tr>
<td>685</td>
<td>Seminar in Literature and Ideas (3:3:0) Study of major ideological-philosophical themes and their artistic expression in literature.</td>
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<tr>
<td>798</td>
<td>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.</td>
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<td>799</td>
<td>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.</td>
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<tr>
<td>800</td>
<td>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.</td>
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**Special Education (EDSE)**

**Graduate School of Education**

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>401</td>
<td>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.</td>
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<td>402</td>
<td>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.</td>
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<td>403</td>
<td>Language Development and Reading (3:3:0) Provides in-depth coverage of reading instruction for students with special needs. Topics include language development and emergent literacy skills, reading sub skills including auditory discrimination and phonemic awareness, decoding and word reading, reading comprehension, and use of technological advances in the teaching of reading.</td>
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<td>415</td>
<td>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.</td>
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</table>
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; 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 Emotional Disturbance and Learning Disabilities (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 (1–6:0:0) See EDUC 500.

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 lifespan. 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) Examines 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 and 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) See EDIT 510.

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.

522/EDIT 522 Assistive Technology for Individuals with Sensory Impairments (2–3:2–3:0) See EDIT 522.


524/EDIT 524 Assistive Technology for Individuals with Learning Disabilities (2:2:0) See EDIT 524.

525/EDIT 525 Software for Individuals with Special Needs (1–2:1–2:0) See EDIT 525.

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 exploration and opportunities to 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 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 Emotional Disturbance and Learning Disabilities (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. Field experience may be required.

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 Adaptive Methods and Transition for Secondary Education (3:3:0) Overview of career, transition, and vocational planning programs for students with special needs. Special consideration to legislative requirements, training and placement options, adapting curriculum content, scheduling, and personal relationships. May require field experience in public schools.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>547</td>
<td>Medical and Developmental Risk Factors for Children with Disabilities (3:3:0)</td>
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<tr>
<td>551</td>
<td>Classroom Management: Theory and Practice (3:3:0)</td>
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<td>Prerequisite:</td>
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<tr>
<td>555</td>
<td>Language Development and Emerging Literacy (3:3:0)</td>
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<tr>
<td>556</td>
<td>Language Development and Communication for Diverse Infants and Toddlers (3:3:0)</td>
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<tr>
<td>557</td>
<td>Language Development and Emergent Literacy for Diverse Learners Ages 3–5 (3:3:0)</td>
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<td>Prerequisite:</td>
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<tr>
<td>558</td>
<td>Physical and Sensory Disabilities: Developmental, Educational, and Medical Aspects (3:3:0)</td>
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<tr>
<td>590</td>
<td>Special Education Research (3:3:0)</td>
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<tr>
<td>597</td>
<td>Special Topics in Education (1–6:1–6:0)</td>
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<td>See EDUC 597.</td>
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<tr>
<td>600</td>
<td>Workshop in Education (1–6:1–6:0)</td>
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<td>See EDUC 600.</td>
</tr>
<tr>
<td>610</td>
<td>Designing Adaptive Environments (2:2:0)</td>
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<td>Prerequisite:</td>
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<tr>
<td>612</td>
<td>Special Needs Students in International Schools (3:3:0)</td>
<td></td>
<td>Prerequisite or corequisite:</td>
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<tr>
<td>615</td>
<td>Early Intervention for Infants and Toddlers with Disabilities (3:3:0)</td>
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<tr>
<td>619</td>
<td>Applied Behavior Analysis: Principles, Procedures, and Philosophy (3:3:0)</td>
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<td>Prerequisite:</td>
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<tr>
<td>620</td>
<td>Managing Severely Challenging Behaviors and Applied Behavior Analysis (3:3:0)</td>
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<td>Prerequisites:</td>
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<tr>
<td>621</td>
<td>Applied Behavior Analysis: Empirical Bases (3:3:0)</td>
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<td>Prerequisite or corequisite:</td>
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<tr>
<td>623</td>
<td>Applied Behavior Analysis: Assessments and Interventions (3:3:0)</td>
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<td>Prerequisites:</td>
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<tr>
<td>624</td>
<td>Applied Behavior Analysis: Applications (3:3:0)</td>
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<td>Prerequisite or corequisite:</td>
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<td>625</td>
<td>Applied Behavior Analysis: Verbal Behavior (3:3:0)</td>
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<td>Prerequisite:</td>
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<tr>
<td>626</td>
<td>The Inclusive Classroom (3:3:0)</td>
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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 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 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.

633 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.

648 Introduction to Psycho-Educational Assessment (3:3:0) Prerequisite: EDSE 340. 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.

649 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.

655 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.

656 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.

659 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: teaching licensure, or enrollment in graduate degree program in education. Provides professionals in special education, regular education, and related fields with knowledge and communications skills necessary for collaborative consultation and technical assistance to other educators and service providers.

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.

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.

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.
Courses

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 and disabilities. Students under the direction of instructor complete individually designed projects addressing major trends and issues in their emphasis area of special education.

790 Internship in Special Education (1–6:3:0) 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 after completion of 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.

794–6 Special Topics (1–6:1:0) Advanced study of selected topics in education for students preparing for doctoral study or who have been admitted to the PhD program in education.

797 Advanced Topics in Education (1–6:1–6:0) See EDUC 797.

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. 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) Investigates moral issues in sport and judgments about right and wrong behavior among athletes, coaches, spectators, and others.

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 RRLS 411, or permission of instructor. Investigates principles and processes in sport marketing and finance. Focuses on research and development, sport promotion, sport sponsorship, advertising, merchandising, and distribution of sporting goods.

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 205, 323, and 350; PHED 209 and 304; PRLS 317, 405, and 410. Paid or voluntary work experience in sport industry settings. Requires minimum period of 10–12 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.
Statistics (STAT)

Statistics

250/IT 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/IT 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/IT 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

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. 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 501. 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) Prerequisite: 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) Prerequisites: course in statistics and experience with Microsoft Windows. 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 MS or certificate programs in statistics. f

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 MS or certificate programs in statistics. f

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 MS or certificate programs in statistics. f

510 Statistical Foundations for Technical Decision Making (3:3:0) Prerequisite: undergraduate course in math or statistics, and computer literacy. Use of statistical methods as scientific tools in the analysis of practical problems.
Topics include descriptive statistics, probability, distributions, sampling, inference, estimation and hypothesis testing; linear regression and correlation; the analysis of variance; multiple regression; and the analysis of association between categorical variables. Credits not applicable to MS in statistical science, but can be used to satisfy the requirements for the certificate in federal statistics. Certificate program students granted credit for only one of STAT 510, 535, or 554.

530 Mathematical Methods for Statistics and Engineering (3:3:0) Prerequisite: MATH 113 or 108. Calculus and probability required for the pursuit of advanced degree in statistics or related field. Cannot be used to satisfy requirements for MS in statistical science. Designed for students who have not completed the MATH 113-114-213 sequence or need a refresher course.

535 Analysis of Experimental Data (3:3:0) Prerequisite: STAT/IT 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 use of appropriate statistical software. Intended primarily for researchers in the natural sciences. Can be used to satisfy requirements for certificate in federal statistics, but not MS in statistical science. Certificate program students granted credit for only one of STAT 510, 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 510, 535, or 554.

574 Survey Sampling I (3:3:0) Prerequisite: STAT 354 or 554; corequisite: STAT 362 or 501. 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 ratio 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 554 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, 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 or 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 multifactor 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, 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 STAT 554. Distribution-free procedures for making inferences about one or more samples. Tests for lack of independence, for association or trend, and for 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, autocorrelation 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 535 or 554, and working knowledge of SAS. 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, sample size and power computation.

662 Multivariate Statistical Methods (3:3:0) Prerequisite: STAT 554 or equivalent and STAT 501, or permission of instructor. Standard techniques of applied multivariate analysis. Topics include review of matrices, Tsquare 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: 300-level course in statistics; STAT 554 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 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 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.

665 Categorical Data Analysis (3:3:0) Prerequisite: STAT 554 or equivalent, 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.

668 Survival Analysis (3:3:0) Prerequisites: STAT 544, 554 or 555, and STAT 501; or 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 comparing two or more groups of survival data are studied. 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 real data from major medical studies using SAS software.

673 Statistical Methods for Longitudinal Data Analysis (3:3:0) Prerequisites: STAT 544, STAT 565, 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.

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.

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.

700 Advanced Quantitative Data Analysis for Health Care Research II (3:3:0) Prerequisite: STAT 544 or 554 or permission of instructor. Introduces 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.

701 Advanced Multivariate Statistics and Data Analysis in Health Care Research (3:3:0) Prerequisites: STAT 700, HSCI 799, or equivalent. Coverage of discriminate analysis, canonical correlation analysis, structural analysis (LISREL and path analysis), and factor analysis. Cannot be used to satisfy requirements for MS in statistical science.

719/OR 719/CSI 775 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. Practical model building experience is provided. Students apply what they learn to semester-long project of their own choosing.

751/CSI 771 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, 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.

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 detection, network monitoring, host monitoring, computer viruses and worms, Trojan programs and covert channels.

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, and working knowledge of a statistical software package. 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 650, CS 687, INF 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.

798 Master’s Essay (3:3:0) 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 534, 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) Prerequisite: IT 776/CSI 778 or MATH 315, or equivalent. 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.

877/IT 877/CSI 703 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, 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 876/IT 876/CSI 876. 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.

972/IT 972/CSI 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/CSI 973 Mathematical Statistics II (3:3:0)  
Prerequisite: STAT 972/IT 972/CSI 972. Concentrates on theory of hypothesis testing. Topics include characterization of 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. 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. s

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. s

**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; corequisites: 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: 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

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,summer

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 is given 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: SIST 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 a mechanism to a specific allocation problem. Analytical and working engineering models of mechanism must be developed.

489 Senior Seminar (3:3:0) Corequisite: SYST 490. Introduces several important topics in systems engineering, providing additional experience in writing and giving presentations, and obtaining feedback on curriculum for BS in systems engineering. Several lectures devoted to ethics; writing and making presentations also covered. Students attend technical lectures and write paper. Students also required to write long paper on new technology. Instructor and guest lecturers present material not part of required course load to expand horizons. Examples are knowledge-based design, enterprise-wide reengineering, electronic commerce, and optimization by “natural analogy” (simulated annealing, neural networks, genetic algorithms). In addition, students work in teams to critique and redesign curriculum. Each group delivers written product, and provides at least one briefing to class. Best critique and redesign presented to faculty.

490 Senior Design Project I (3:2:1) Prerequisites: SYST 335, 371, and 90 satisfactory credits toward BS in systems engineering; corequisites: SYST 470, 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 nature of 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.

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 systems 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.

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.

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.

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.

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.

560 Introduction to Air Traffic Control (3:3:0) Prerequisite: Graduate standing. Introduction for those who plan professions in aviation industry. Surveys 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.

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.

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.

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.)

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.

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.

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.
618 Systems Engineering (SYST)

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.


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.

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.

664/STAT 664 Bayesian Inference and Decision Theory (3:3:0) Prerequisite: STAT 544 or 534, 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.

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 and designing systems to support judgment and decision processes.

677/OR 677/STAT 677 Statistical Process Control (3:3:0) Prerequisites: STAT 510, 534, 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 queueing theory.

683 Modeling, Simulation, and Gaming (3:3:0) Prerequisites: MATH 213, SYST 500 or equivalent, and graduate standing. Develops methods for designing combat models and games. Existing combat models critical to 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 771 Introduction to Enterprise Engineering: Engineering and Policy (4:3:1) Prerequisite: INFS 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 CS+/. 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: SYST 691. Introduction to network and system architectures that support high volume business to consumer web sites and portals. Course provides insight into the structure of the modern web enabled storefront. Critical business and technology issues include Storage Area Networks (SANs), server clustering, load balancing techniques at the server and network level, fault tolerance, and recovery of database and application servers.

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 Infrastructure (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 vs. 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.sum

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.

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.

Technology Management (TECM) School of Management

610 Communications and Leadership (2:2:0) Prerequisite: admission to the technology management program. Focuses on developing skills in vivid, succinct, and memorable professional communications with emphasis on communicating effectively with peer decision makers. Participants create formal and informal presentations, and written executive summaries and proposals. Explores roles of CIO and IT manager.

615 Decision Making Using Accounting and Financial Information (3:3:0) Prerequisite: admission to technology management program. Focuses on valuation of information technology companies, projects, and product lines. Explores value chain analysis and activity-based management as basis for effective financial management. Develops skills and knowledge in the use of coexisting strategic, financial, and information plans.

620 Economics of Technology Management (2:2:0) Prerequisite: admission to technology management program. Economic environments of IT industry, demand models, resource organization and substitutability, measures of efficiency and productivity are illuminated. Includes information economics as it relates to IT companies.

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 IT 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. Leadership, motivation, career development, performance evaluation, and team design, composition and facilitation in professional service environments. Helps students understand themselves and those they manage.

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. Focuses on project scheduling, time-cost tradeoffs, budgeting, cost control, and project monitoring. Special emphasis on cost-management aspects of technology projects in intensive industries. Uses software and case studies.

**730 Telecommunications Management (3:3:0)** Prerequisite: admission to technology management program. Develops knowledge of the status of the IT industry and its companies and segments. Students analyze IT companies using Porter’s Five Forces Model, examine industry segments, and create electronic database with findings and analysis.

**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. Proposal development, bidding, legal issues of contracts and agreements, formation of commercial partnerships, and new business development. Methods and practices for conducting client need assessment and managing deviations of scope. Application of principles of marketing information systems and technology to internal and external customers.

**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)** Prerequisites: 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)** Prerequisites: 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)** Prerequisites: 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 (TECOM)**

**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: grade 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. Relation 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) 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.

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, OSPF, 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 radio wave 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, 551, 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 2G, 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: graduate standing; 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 addressing; 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 multihour 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)

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 acceptance, 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.

546 Financial Models of Telecommunications Systems (3:3:0)
Prerequisite: TCOM 500. Telecommunication properties and systems. Broadcast, cable, and common carrier capitalization. Pricing, acquisition criteria, and forecasting techniques. Economic analysis of regulations and policies affecting telecommunications. Compares policy objectives with actual effects of policies, emphasizing economic
principles. Determining appropriate discount and hurdle rates, life-cycle costing, evaluating technology horizons, and depreciation concerns will be discussed. Studies the economic analysis of regulations and policies affecting the mass media. Compares policy objectives with actual effects of policies, emphasizing economic principles. Uses economic and sociological theories to analyze impact of information technologies on economic organizations, markets, competitive strategies, and communication policy design.

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 networks. Reviews threats and vulnerabilities in distributed systems.

551 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.

552 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, nonrepudiation, and their integration across telecommunications networks. Offers examples of mobile communication systems including pan-European GSM system, North American DAMPS system, and Personal Communication Systems.

553 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.

555 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 (1.5:1.5:0) 
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 sharing, 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; anti-virus 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 (1.5, 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) while the 3-credit course lasts for the full semester.

591 Selected Topics in Telecommunications (1.5, 3.0: 1.5, 3.0:0) 
Prerequisite: permission of instructor; specific prerequisites vary with subject of topic. Selected topics from recent developments and applications in various engineering disciplines in specialty modules 4 and 5 of TCOM program. Designed to help 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: 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 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: 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 body. 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 552. 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, 2.5G, 3G, and future systems, with possible fallback plans.

607 Satellite Communications (3.0: 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 TDM, 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 of 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 as two- to three-person group. 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 second-order 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 nonline 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. Introduc-
tory 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.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisite</th>
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<tr>
<td>230</td>
<td>Introduction to Technical Theater (3:3:0)</td>
<td>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.</td>
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<tr>
<td>235</td>
<td>Fundamentals of Costume Construction (3:3:0)</td>
<td>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.</td>
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<tr>
<td>300</td>
<td>Voice and Speech Fundamentals (3:3:0)</td>
<td>Prerequisite: THR 210 or permission of instructor. Basic techniques in breathing, vocal production, and articulation for the actor.</td>
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<tr>
<td>301</td>
<td>Voice and Speech for the Performer (3:3:0)</td>
<td>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.</td>
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<tr>
<td>303</td>
<td>Movement for the Actor I (3:3:0)</td>
<td>Develops physical side of actor's instrument emphasizing free and responsive expression of impulse and intention.</td>
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<tr>
<td>304</td>
<td>Movement for the Actor II (3:3:0)</td>
<td>Advanced work in techniques established in THR 303.</td>
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<td>305</td>
<td>Stage Combat (3:3:0)</td>
<td>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.</td>
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<tr>
<td>310</td>
<td>Acting II (3:3:0)</td>
<td>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.</td>
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<tr>
<td>314</td>
<td>Lighting Stagecraft (3:3:0)</td>
<td>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.</td>
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<tr>
<td>320</td>
<td>Beginning Modern Acting (3:3:0)</td>
<td>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.</td>
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<tr>
<td>321</td>
<td>Acting Shakespeare (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>329</td>
<td>Directing I (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>330</td>
<td>Seminar in Technical Theater (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>331</td>
<td>Drafting and Model Making (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>332</td>
<td>Seminar in Costume History (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>333</td>
<td>Stage Design (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>334</td>
<td>Lighting Design (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>335</td>
<td>Costume Design (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>336</td>
<td>Advanced Theater Technology (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>340</td>
<td>Directing II (3:3:0)</td>
<td>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.</td>
</tr>
<tr>
<td>342</td>
<td>Makeup Design (3:3:0)</td>
<td>Prerequisite: THR 320 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.</td>
</tr>
<tr>
<td>343</td>
<td>Costume Draping and Drafting (3:3:0)</td>
<td>Pattern development through draping and drafting. Laboratory study and practical experience in construction of stage costumes.</td>
</tr>
<tr>
<td>345</td>
<td>Puppetry: History and Technique (4:2:4)</td>
<td>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.</td>
</tr>
<tr>
<td>350</td>
<td>Script Analysis (3:3:0)</td>
<td>Critical analysis of dramatic literature as preparation for production and performance.</td>
</tr>
</tbody>
</table>
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) Exposure 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, video, 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 theater major. Acquaints upper-division majors with realities of living and working in the theater. Features guest speakers from the profession, and intensive development of students’ portfolio materials specific to the demands of their field.

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.

517 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)

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 and 220. 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. Analyzes 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 or 328, or TOUR 352; or permission of instructor. Focuses on communication processes and practices used by professionals to explain and interpret 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.

412 Tourism and Events Marketing (3:3:0) Prerequisite: TOUR 200, 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 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 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 6 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 in senior year. Capstone educational experience focuses on current issues in tourism and event management, and career development strategies.

480 Special Topics (3:3:0) Prerequisite: 60 credits. Selected topics reflect interest in specialized area of tourism and events management. Announced in advance.

490 Internship (12:0:0) Prerequisites: only TOUR majors with 90 credits completed, of which at least 12 credits are TOUR credits including TOUR 241. 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 10–12 weeks. Includes meetings and assignments before and during the internship. Graded Pass/Fail.

499 Independent Study (1–3:3:0) 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) Prerequisite: 90 credits. 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.

442 Krasnow Seminar (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’s Studies (WMST)  
Women’s 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: 60 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.

400 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.

401 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.

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.
Administration and Faculty

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Dean, College of Science: William F. Reeder, MM
Assistant to the President and Director of Office of Equity and Diversity Services: Camille Hazeur, MA

Academic Affairs
Vice Provost for Academic Affairs: Linda A. Schwartzstein, JD, PhD
Associate Provost for Personnel and Budget: David W. Rossell, DA
Associate Provost for Educational Programs: Marilyn Mobley, PhD
Associate Provost for Education Improvement and Innovation: Laurie Fathe, PhD
Associate Provost for International Programs: Yehuda Lukacs, PhD
Associate Provost for Institutional Effectiveness: Karen Gentemann, PhD
Associate Provost for Institutional Research and Reporting: Kris Smith, PhD

Enrollment Services
Dean of Admissions and Enrollment Development: Andrew Flagel, MA
Director of Admissions: Eddie Kent Tallent, BFA
Director of Graduate Admissions: Daniel J. Robb, MBA, MS
University Registrar: Susan H. Jones, MS, MEd
Director of Student Financial Aid: Jevita deFreitas, BA

University Libraries
University Librarian: John Zenelis, MLS, MA

University Life
Vice President for University Life: Sandra Hubler, EdD
Associate Vice President, University Life: Rose Pascarell MA
Interim Dean of Students: Pam Patterson, MS
Associate Dean, University Life: Patricia Carretta, MA
Associate Dean, University Life, International Affairs: Kathy Trump, MA
Associate Dean, University Life, Academic Initiatives: Mark Kidd, PhD
Associate Dean, University Life and Director, Multicultural Research and Resource Center: Dennis Webster, PhD
Assistant Dean, University Life: Amy Snyder, MEd
Assistant Dean, University Life at Prince William: Charvis Campbell, MA
Executive Director, Student Health Center: Gigi Abdalla, MD
Administrative Director, Student Health Services: Carol Filak, RN, MSN
Director, Development and Community Relations: Colandra Coleman, BA
Director, Mason Portal Technology: Kara Danner
Director, Orientation and Family Programs and Services: Chayla Haynes, MA
Director, Student Activities: Lauren Long, MA
Director, Office of Disability Services: Christopher Moy, MS
Director of Judicial Affairs: David Shaw, MA, SCCT
Director of Leadership Education and Development: Juliet Blank-Godlove
Director, Alcohol, Drug, and Health Education: Susan Stahley, MSW
Director, University Career Services: Janice Sutera, PhD
Director, Early Identification Program: Tensie Cadenas, MA
Director, Counseling Center: Jeff Pollard, PhD, ABPP
Director, Diversity Programs and Services: Vacant
Director, Sexual Assault Services: Connie Kirkland, MA
Director, Student Media: Michele Braithwaite, MA
Director, Women’s Studies Research and Resource Center: Nancy Hannah, PhD
Director, International Programs and Services: Vacant
Director, English Language Institute: John Pope, MA

Faculty

Faculty Emeriti
Victorio G. Aguera, BST, MA, PhD, Professor Emeritus of Spanish
Rita Allinger, BS, MS, MA, PhD, Professor Emerita of Nursing
Vassily P. Aksonov, MD, Professor Emeritus of Russian Literature and Writing
John Allen, AB, MS, PhD, Associate Professor Emeritus of Psychology
Robert A. Anthony, BA, BA, JD, George Mason University Foundation Professor Emeritus of Law
Marjory Brown Azarowicz, BA, MA, PhD, Professor Emerita of Electrical and Computer Engineering
Mary Catherine Bateon, BA, PhD, Professor Emerita of Anthropology and English
Richard Baum, PhD, Professor Emeritus of Information and Software Engineering
Guy O. Beale, BS, MS, PhD, Associate Professor Emeritus of Electrical and Computer Engineering
Barry K. Buyer, BA, MA, PhD, Professor Emeritus of Education
Peter Black, BA, MS, PhD, Professor Emeritus of Anthropology
W. Murray Black, BEE, MSEE, PhD, Professor Emeritus of Electrical and Computer Engineering
John Blaha, BS, MA, PhD, Associate Professor Emeritus of Psychology

Assistant Professor Emeritus of Electrical and Computer Engineering
Jimi Kim, PhD
Assistant Professor Emeritus of Anthropology
Jack H. Fujii, PhD
C. Alan Boneau, BA, MA, PhD, Professor Emeritus of Psychology
John Bonfadini, BS, MEd, EdD, Associate Professor Emeritus of Education
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Brack Brown, AB, MA, PhD, Professor Emeritus of Public and International Affairs
Stephen J. Brown, BA, MA, PhD, Professor Emeritus of English
James Buchanan, BS, MA, PhD, Distinguished Professor Emeritus of Economics
Mary Kay Cabell, BA, MA, PhD, Associate Professor Emerita of Mathematics
Le Cao, BS, MBA, DBA, Associate Professor Emerita of Accounting
Rita Carty, BSN, MSN, DNSc, Dean Emerita, College of Nursing and Health Science
Ernest Cassara, AB, BD, PhD, Professor Emeritus of History
Arthur H. Chickerling, AB, AMT, PhD, Professor Emeritus of Education
Jae W. Chung, BC, MC, MA, PhD, Associate Professor Emeritus of Economics
Virginia Collier, BA, MA, PhD, Professor Emerita of Education
John Henry Cooper, BA, MA, DPE, Chair Emeritus of Health, Sport, and Leisure Studies
Anne Cordero, MA, PhD, Associate Professor Emerita of French
Lloyd M. DeBoer, BS, MBA, PhD, Dean Emeritus of the School of Business Administration
Edward Clark Dobson, BME, MS, PhD, Associate Professor Emeritus of the Graduate School of Education
Stephen Early, BA, MA, PhD, Professor Emeritus of Government and Politics
Albert W. Edgemon, BAE, MA, EdD, Professor Emeritus of Education
Esther Elstun, BA, MA, PhD, Professor Emerita of German
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Carl Ernst, BS, MEd, PhD, Professor Emeritus of Environmental Science and Policy
Edwin A. Fleishman, BS, MA, PhD, DSc (Honorary), Professor Emeritus of Psychology
James Fletcher, BA, MA, PhD, Professor Emeritus of Philosophy
Arnold D. Gabriel, BS, MS, DMus (Honorary), Professor Emeritus of Music
Helen S. Garson, BA, MA, PhD, Professor Emerita of English
Martha M. Giles, BMEd, MMEd, DMEd, Associate Professor Emerita of Music
Robert L. Gilstrap, BS, MEd, EdD, Professor Emeritus of Education
James Godfrey, PhD, Professor Emeritus of Accounting
Louis Golomb, BS, MA, PhD, Associate Professor Emeritus of Anthropology
Thomas Goodale, AAS, BS, MS, PhD, Professor Emeritus of Health, Fitness, and Recreation Resources
Harold Gortner, AB, MPA, MA, PhD, Professor Emeritus of Public and International Affairs
Vernon Gras, PhD, Professor Emeritus of English
Henry Hamburger, PhD, Professor Emeritus of Computer Science
Joseph Harsh, BA, MA, PhD, Associate Professor Emeritus of History
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Evelyn Jacob, BA, PhD, Professor Emerita of Education
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Ronald Jensen, BA, MA, PhD, Associate Professor Emeritus of History
George W. Johnson, BA, MA, PhD, President Emeritus, Professor Emeritus of English
Hazel W. Johnson-Brown, BS, MS, PhD, Professor Emerita of Nursing
Joseph Kanyan, BS, MM, DMA, Associate Professor Emeritus of Music
Don E. Kash, BA, MA, PhD, Emeritus Professor of Public Policy
Irving Kayton, BA, JD, LLM, JSD, Professor Emeritus of Law
Jerome Kernan, BBA, MS, PhD, Professor Emeritus of Behavioral Analysis
Emelia-Louise Kilby, BS, MA, PhD, Professor Emerita of Health and Physical Education
Barbara Knight, BA, MA, PhD, Associate Professor Emerita of Public and International Affairs
Thelma Z. Lavine, AB, AM, PhD, Professor Emerita of Philosophy and American Culture
Raymond G. LePage, BA, MA, PhD, Associate Professor Emeritus of French
Jack Levy, BA, MA, PhD, Professor Emeritus of Education
Seymour M. Lipset, BA, PhD, Eminent Scholar and Virginia E. Hazel and John T. Hazel Jr. Professor Emeritus
Sara Looney, BA, MA, PhD, Associate Professor Emerita of Communication
Catherine Malloy, BSN, MPH, DrPH, Professor Emerita of Health, Fitness, and Recreation Resources
Bruce Manchester, BS, MA, PhD, Professor Emeritus of Communication
Henry G. Manne, BA, JD, JSP, LL.D, LL.D, Dean Emeritus of the School of Law
William R. Martin, BA, MA, PhD, Professor Emeritus of Education
Michael J. McDermott, AB, PhL, Associate Professor Emeritus of Philosophy and Religious Studies and Registrar Emeritus
Gustavo Mellander, AB, MA, PhD, DHL, Dean Emeritus of the Graduate School of Education
Barbara Melosh, BA, MA, PhD, Professor Emerita of English
Henry P. Meyer, BA, MA, PhD, Associate Professor Emeritus of French
Eugenie V. Mielczarek, BS, MS, PhD, Professor Emerita of Physics
Christopher Mitchell, BSc, PhD, Professor Emeritus of Conflict Analysis and Resolution
Mary S. Montebello, BS, MS, PhD, Professor Emeritus of Conflict Analysis and Resolution
Walter Moretz, AB, BD, PhD, Associate Professor Emeritus of Psychology
Collin Owens, BA, MA, PhD, Professor Emeritus of English
Josephine F. Pacheco, BA, MA, PhD, Professor Emeritus of History
James D. Palmer, BS, MSEE, PhD, Professor Emeritus of Information Technology and Engineering
Anthony F. Palmieri, BA, MA, PhD, Associate Professor Emeritus of English
Samuel H. Phillips Jr., BA, MA, PhD, Professor Emeritus of Economics
Conrad Philos, Professor Emeritus of Law
Coleman Raphael, BSE, MCE, PhD, Dean Emeritus School of Business Administration
Georgine Redmond, BSN, MN, EdD, Associate Professor Emeritus of Nursing
David Rine, BS, MS, PhD, Professor Emeritus of Computer Science
Robert Rugel, BA, PhD, Associate Professor Emeritus of Psychology
Mian M. Saeed, BA, MA, PhD, Professor Emeritus of History
Andrew P. Sage, BSEE, SMEE, PhD, DENG, Founding Dean Emeritus, School of Information Technology and Engineering
Ben F. Sands Jr., MBA, DBA, Associate Professor Emeritus of Management
David H. Schaefier, 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 Emerita 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 Emerita 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 Emerita of Nursing and Health Services
William P. Snively, 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, BA, MA, PhD, Professor Emerita of Biology
Eileen Sypher, AB, PhD, Professor Emeritus of English
Stephen R. Taub, AB, PhD, Professor Emeritus of Biology
Nicholas Tavani, AB, BD, MA, PhD, Associate Professor Emeritus of Sociology and Anthropology
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 Tye, PhD, Professor Emerita of Psychology
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 French
William Scott Willis, BA, MA, PhD, Professor Emeritus of French
Norman A. Yance, BS, BD, ThM, MPhil, PhD, Associate Professor Emeritus of Religious Studies
George A. Zaphiriou, Professor Emeritus of Law

Instructional and Administrative Faculty

2007–08

The faculty list reflects appointments as of the end of the fall 2006 semester.

Abdalla, Wagida, Physician and Executive Director, Student Health Services. MD 1972, Alexandria University, Egypt; Diplomate of the American Board of Pediatrics, 1982.

Acs, Zoltan J., University Professor of Public Policy. BA 1972, Cleveland State University; MA 1974, PhD 1980, New School University.

Addleson, Mark S., Associate Professor, School of Public Policy. BA 1972, 1973, Rhodes University; MA 1980, University of Natal, Pietermaritzburg; PhD 1992, University of Witwatersand.


Agnarrson, 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 1988, PhD 1992, Ohio State University.

Aharonov, Yakir, Distinguished Professor of Theoretical Physics. PhD 1960, 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.


Aksoy, 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.

Alberts, David S., Research Associate Professor, Electrical and Computer Engineering. BBA 1964, City College of New York; MS 1966, PhD 1969, University of Pennsylvania.

Aldrich, Margaret, Assistant Registrar, Prince William Campus. BS 1970, University of Vermont; MEd 1996, George Mason University.

Alemi, Farrokh, Associate Professor of Health Administration and Policy. BS 1976, MS 1978, PhD 1983, University of Wisconsin.

Aldrich, Margaret, Assistant Registrar, Prince William Campus. BS 1970, University of Vermont; MEd 1996, George Mason University.

Alemi, Farrokh, Associate 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.

Allgood, Kathleen T., Professor of Mathematical Sciences. BA 1970, George Washington University; MS 1974, PhD 1979, University of Maryland.

Allnutt, Jeremy E., Professor of 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.


Ambegaoankar, Jatin, Assistant Professor of Athletic Training. BS 1998, T. N. Medical College; MS 2003, Springfield College; PhD 2006, University of North Carolina.

Amirch, Amen, Associate Professor, English. BA 1983, Birzeit University, Palestine; MA 1987, PhD 1997, Boston University.

Ammann, Paul E., Associate Professor of Information and Software Engineering. 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; PhD 1983, Virginia Polytechnic Institute and State University.


Anderson, LeKesha N., Advising Coordinator, Department of Communication. BS, University of Virginia’s College at Wise; MA, East Tennessee State University.
Baccus-Hairston, Nilaya D., Associate Registrar for Certification Services. BA 1993, Wake Forest University; JD 1997, University, Maryland Law School.

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-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 and Coordinator of Sport Management. 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.

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 Pedagogy. BPE 1990, MSc 1994, PhD 1998, LaVAL University, Quebec, Canada.

Baranova, Anna, Assistant Professor of Biology. MS 1995, PhD 1998, Moscow State University; DSci 2004, Vavilov Institute of General Genetics, Russian Academy of Sciences.

Barbara, Daniel, Professor of Information and Software Engineering. BS 1975, Universidad Metropolitana, Caracas, Venezuela; MEE 1981, PhD 1985, Princeton University.

Barna, Adrienne M., Assistant Professor; Associate Director, Counseling Center. AB 1970, Drew University; EdM 1972, Rutgers University; MA 1976, PhD 1980, University of Maryland.

Barnes, Ronald, Assistant Professor, Electrical and Computer Engineering. BS 1998, University of Oklahoma; MS 2002, PhD 2005, University of Illinois.

Barnes, Steven, Assistant Professor, History and Art History. BA 1993, Harvard University; MA 1997, PhD 2003, Stanford University.

Barnhart, Melinda N., Director, Finance and Personnel, The Volgenau School of Information Technology and Engineering. BA 1973, Miami University; MEd 1992, George Mason University.

Barreto, Ernest, Associate Professor, Physics and Astronomy. BS 1990, University of Chicago; MS 1995, PhD 1996, University of Maryland.

Bartoldus, Mary, Research Assistant Professor, Environmental Science and Policy. BA 1978, MS 1985, City University of New York; PhD 1990, George Mason University.

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 of Earth Systems and Geoinformation Sciences. BA 1982, California State University; MA 1984, PhD 1990, University of Minnesota.

Beall, James H., Senior Contract Professor of Computational Sciences and Informatics and Space Sciences. BA 1972, University of Colorado; MS 1975, PhD 1979, University of Maryland.

Beck, Cynthia L., Term Assistant Professor of Biology. BS 1980, Michigan State University; MS 1992, PhD 2000, George Mason University.


Becker, Peter A., Professor of Astrophysical, Planetary, and Space Sciences; Associate Dean for Graduate Programs, College of Science. BA 1982, Rutgers University; MS 1985, PhD 1987, University of Colorado at Boulder.

Bedore, Joani, Term Assistant Professor, Communication. BA 1979, St. Leo College; MA 1984, University of Baltimore; PhD 1994, University of Oklahoma.

Behrmann, Michael Mitts, 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 of 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, Tuscon; 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. 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.


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.

Berner, Erika, Assistant Dean, Student Services, Ras Al Khaimah Campus. BA, Thomas Edison State College; MEd, PhD, George Mason University.


Berroa, Reimundo, 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 of 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.

Beever, David L., Associate Professor of Recreation, Health, and Tourism. 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. BMed 1986, Indiana University; MM 1994, University of Missouri-Kansas City Conservatory; DMA 2001, University of Arizona.


Birchard, Geoffrey French, Associate Professor of Biology. BA 1975, Colorado College; MA 1979, University of Montana; PhD 1985, Dartmouth Medical School.

Bishop, Barney, Assistant Professor of Biochemistry. BS 1991, College of William and Mary; PhD 1997, University of North Carolina, Chapel Hill.

Bitter, 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 Avrana, Associate Professor of Computational Sciences and Informatics, Krasnow Institute for Advanced Study. BS 1981, Boston University; VMD 1986, MSE 1987, PhD 1988, University of Pennsylvania.

Blaisten-Barojas, 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.

Boiceu, Mihai, 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 Economics. BA 1980, Ohio State University; MA 1991, College of William and Mary; PhD 1997, University of North Carolina, Chapel Hill.

Bom, Brien, Research Associate Professor of Public Policy. PhD 1998, George Mason University.

Bentley, Callan, Instructor, Environmental Science and Policy. MS 2004, University of Maryland-College Park.
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.

Boybei, Zafer, Associate Professor, Earth Systems and Geoinformation Sciences. PhD 1993, North Carolina State University.

Boyd, Beverly Taylor, Assistant Professor and Director of Academic Outreach, College of Health and Human Services. BSN 1966, MEd 1969, University of Pittsburgh.

Bradburn, Chris, Research Associate, Bioinformatics and Computational Biology. BS 1995, MS 1998, Clemson University; PhD 2006, George Mason University.

Bradshaw, Duane D., Associate Director for Career Development, School of Public Policy. BA 1996, MEd 1998, Clemson University.

Braithwaite, Michele L., Director of Student Media, University Life. BA 1971, University of Minnesota; MS 1975, Brooklyn College of City University of New York.

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Brenkus, Rosemarie, Assistant Dean, Student Affairs and Enrollment Management, College of Health and Human Services; Assistant Professor of Nursing. BS 1964, Wilkes College; MAEd 1976, Virginia Polytechnic Institute and State University.


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Bristol, Joan C., Assistant Professor, History and Art History. BA 1990, Bryn Mawr College; MA 1994, San Francisco State University; PhD 2001, University of Pennsylvania.

Bricic, 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.

Brodsky, Alexander, Associate Professor of Information and Software Engineering. 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 of 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.

Bruno, Irene, Assistant Professor, Applied Information Technology. BS 1994, University of Pittsburgh; MEd 1991, Pennsylvania State University; PhD 2003, Capella University.

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Bublitz, Daniel F., Technical Assistance Specialist. BS 1994, Radford University; MEd 2001, University of Virginia.

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.
Burs, 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.


Butshe, 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.

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