The 2005–2006 University Catalog
Although this catalog was prepared on the basis of the best information available at the time of publication, all information, including statements of tuition and fees, course offerings, and admission and graduation requirements, is subject to change without notice or obligation.

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

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

Organized by Degree Type

Undergraduate Degrees
Accounting BS
Administration of Justice BS
Anthropology BA
Applied Computer Science BS*
Art History BA
Art and Visual Technology BA, BFA
Assisted Living BS
Astronomy BA, BS
Athletic 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
Decision Sciences and Management
Information Systems BS
Earth Science BS
Economics BA, BS
Electrical 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 Technology BS
Integrative Studies BA, BS
Latin American Studies BA
Management BS
Marketing BS
Mathematics BA, BS
Medical Technology BS
Music BA, BM
Nursing BSN
Philosophy BA
Physical Education BSEd
Physics BS
Psychology BA, BS
Public Administration BS
Religious Studies BA
Russian Studies BA
Social Work BS
Sociology BA
Systems and Industrial Engineering BS
Systems and Infrastructure Engineering BS
Theater BA

Undergraduate Certificate Programs
Accounting
Applied Statistics
Child Welfare
Environmental Chemistry
Environmental Management
Gerontology
Information Technology
Leadership Studies
Nutrition
Operations Research and Engineering
Outdoor Adventure
Premedicine (post-baccalaureate)
Professional Development in Piano Pedagogy
Post Bachelor Computer Science
Teaching English as a Second Language

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

*pending SCHEV approval
Global Systems
Islamic Studies
Linguistics
Multimedia
New Europe
Nonprofit Studies
Urban and Suburban Studies
Women's Studies
World Music

Minors
Administration of Justice
American Government
Anthropology
Art and Visual Technology
Art History
Arts Administration
Astronomy
Biology
Business
Chemistry
Chinese
Classical Studies
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
Latin
Latin American Studies
Legal Studies
Mathematics
Mathematics for SOM students
Mental Retardation
Multimedia
Music
Nonprofit Studies
Nutrition
Parks, Recreation, and Leisure Studies
Philosophy

Physics
Psychology
Religious Studies
Russian
Severe Disabilities
Social Work
Sociology
Spanish
Sport Management
Telecommunications
Theater
Tourism and Events Management
World Music

Graduate and Professional Degrees
Advanced Clinical Nursing
MSN
Arts Management MA
Assisted Living Management MS
Applied and Engineering Physics MS
Art and Visual Technology MA, MFA
Art Education MAT
Biodefense MS, PhD
Bioinformatics MS, PhD
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
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, Accelerated MS in Telecommunications, MS, PhD
Conflict Analysis and Resolution MS, PhD
Counseling and Development MED
Creative Writing MFA
Cultural Studies PhD
Curriculum and Instruction MED
Dance MFA

Earth Systems Science MS
Earth Systems and Geoinformation Sciences PhD
E-commerce MS
Economics MA, PhD
Education PhD
Education Leadership MED
Electrical and Computer Engineering PhD
Electrical Engineering Accelerated MS, MS
English MA
• Linguistics
• Literature
• Professional Writing and Editing
• Teaching of Writing and Literature
Environmental Science and Policy MS
Environmental Science and Public Policy PhD
Executive MBA
Exercise, Fitness, and Health Promotion MS
Foreign Languages MA (Spanish, French)
Geographic and Cartographic Sciences MS
Health Science MS
Health Information Systems MS
Health Systems Management MS
History MA, PhD
Information Security and Assurance Accelerated MS, MS
Information Systems Accelerated MS, MS
Information Technology Accelerated MS in Information Security and Assurance, Accelerated MS in Information Systems, Accelerated MS in Software Engineering, Accelerated MS in Telecommunications Information Technology, Engineer Degree, PhD
Interdisciplinary Studies MAIS
Concentrations:
• Anthropology
• Community College Teaching
• Folklore
• Higher Education
• Individualized Studies

• 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
• Organizational Development and Knowledge Management MS
• Peace Operations MS
• Teaching MA
Neuroscience PhD
Nursing MSN, MSN/MBA, PhD
Operations Research Accelerated MS, MS
Philosophy MA
Physical Sciences PhD
Physics, Applied and Engineering MS
Political Science MA

Psychology concentrations:
• Applied Developmental MA, PhD
• Biopsychology MA, PhD
• Clinical PhD
• Human Factors/Applied Cognition MA, PhD
• Industrial Organizational MA, PhD
• School Psychology MA

Advanced Graduate Studies in School Psychology (Postmaster's Certificate)

Public Administration MPA
Public Policy MPP, PhD
Social Work MSW
Sociology MA
Software Engineering Accelerated MS, MS
Special Education MED
Statistical Science Accelerated MS, MS
Study in Statistics PhD
Systems Engineering Accelerated MS, MS

*pending SCHEV approval
Graduate Certificate Programs

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuarial Sciences</td>
<td>MS</td>
</tr>
<tr>
<td>Administration of Justice</td>
<td>MS</td>
</tr>
<tr>
<td>Advanced Graduate Studies in School Psychology</td>
<td>MS</td>
</tr>
<tr>
<td>Advanced Network Protocols for Telecommunications</td>
<td>MS</td>
</tr>
<tr>
<td>Advanced Studies in Teaching and Learning Alternative Education</td>
<td>MS</td>
</tr>
<tr>
<td>Applied Behavior Analysis</td>
<td>MS</td>
</tr>
<tr>
<td>Architecture-Based Systems Engineering</td>
<td>MS</td>
</tr>
<tr>
<td>Artist (Instrumental Performance)</td>
<td>MS</td>
</tr>
<tr>
<td>Artist (Piano Performance)</td>
<td>MS</td>
</tr>
<tr>
<td>Artist (Vocal Performance)</td>
<td>MS</td>
</tr>
<tr>
<td>Assisted Living Administration</td>
<td>MS</td>
</tr>
<tr>
<td>Assistive Technology Association Management Biostatistics</td>
<td>MS</td>
</tr>
<tr>
<td>Biological Threat and Defense Biometrics</td>
<td>MS</td>
</tr>
<tr>
<td>Chief Information Officer Collaboration and Learning in Policy Organizations</td>
<td>MS</td>
</tr>
<tr>
<td>Command, Control, Communications, and Intelligence Communications and Networking</td>
<td>MS</td>
</tr>
<tr>
<td>Community College Education</td>
<td>MS</td>
</tr>
<tr>
<td>Computational Modeling</td>
<td>MS</td>
</tr>
<tr>
<td>Computational Social Science</td>
<td>MS</td>
</tr>
<tr>
<td>Computational Techniques and Applications</td>
<td>MS</td>
</tr>
<tr>
<td>Computer Networking</td>
<td>MS</td>
</tr>
<tr>
<td>Conflict Resolution for Health Professionals Counseling Post-master’s License</td>
<td>MS</td>
</tr>
<tr>
<td>Culture and Values in Social Policy</td>
<td>MS</td>
</tr>
<tr>
<td>Data Mining Database Management</td>
<td>MS</td>
</tr>
<tr>
<td>Discovery, Design and Innovation</td>
<td>MS</td>
</tr>
<tr>
<td>Early Childhood Education Early Childhood Special Education License</td>
<td>MS</td>
</tr>
<tr>
<td>Economic Systems Design Electronic Commerce Emotional Disturbance/Learning Disabilities License</td>
<td>MS</td>
</tr>
<tr>
<td>English as a Second Language License</td>
<td>MS</td>
</tr>
<tr>
<td>Environmental Management</td>
<td>MS</td>
</tr>
<tr>
<td>FAST TRAIN International School Counseling Federal Statistics Foreign Language License</td>
<td>MS</td>
</tr>
<tr>
<td>Gerontology Gifted Child Education Global Medical and Health Policy</td>
<td>MS</td>
</tr>
<tr>
<td>Global Trade Management Governance Systems and Policy License Management Health Care Security and Privacy</td>
<td>MS</td>
</tr>
<tr>
<td>Health Information Systems History (Education) Information Engineering Information Policy and Administration</td>
<td>MS</td>
</tr>
<tr>
<td>Information Security and Assurance Instructional Technology Integration of Technology in Schools Intelligent Agents International Business Planning</td>
<td>MS</td>
</tr>
<tr>
<td>International E-commerce and Telecommunications Policy International Institutional Policy</td>
<td>MS</td>
</tr>
<tr>
<td>International Market Analysis International Health Learning Disabilities, Emotional Disturbance, and Mental Retardation License</td>
<td>MS</td>
</tr>
<tr>
<td>Library Media Literacy (Education) Managing International Commerce</td>
<td>MS</td>
</tr>
<tr>
<td>Mathematics (Education) Mental Retardation License</td>
<td>MS</td>
</tr>
<tr>
<td>Microbial Defense Military Operations Research Multimedia Development Nanotechnology and Nanoscience</td>
<td>MS</td>
</tr>
<tr>
<td>Network Technologies and Applications Nonprofit Management Nursing Administration Nursing Education Nurse Practitioner-Adult Nurse Practitioner-Family Operations Research and Engineering Organizational Informatics and Policy Enterprise</td>
<td>MS</td>
</tr>
<tr>
<td>Professional Development (Piano Pedagogy) Professional Ethics Professional Writing and Editing</td>
<td>MS</td>
</tr>
<tr>
<td>Quality Improvement and Outcomes Management in Health Care Systems Regional Economic Development and Technology Policy Regional Trade Policy and Planning</td>
<td>MS</td>
</tr>
<tr>
<td>Severe Disabilities License</td>
<td>MS</td>
</tr>
<tr>
<td>Teaching of English as a Second Language Telecommunications Forensics and Security Telecommunications Systems Modeling Transportation Policy, Operations, and Logistics</td>
<td>MS</td>
</tr>
<tr>
<td>VLSI Design/Manufacturing Web-Based Software Engineering Wireless Communications Women’s Studies</td>
<td>MS</td>
</tr>
</tbody>
</table>

Organized by Unit

Several interdisciplinary programs, coming from more than one academic unit, are administered by the following divisions of the university. Refer to the listing under the following units to see degrees offered.

College of Arts and Sciences
- Institute for Conflict Analysis and Resolution
- Office of the Provost
- School of Information Technology and Engineering
- School of Public Policy

College of Arts and Sciences
- Chemistry and Biochemistry
- Environmental Chemistry Certificate
- Communication
- Electronic Journalism Minor
- Telecommunications Minor

College of Economics
- Economics Minor, MS
- Environmental Chemistry Certificate

English
- Creative Writing MFA
- English Minor, BA
- English MA:
  - Linguistics
  - Literature
  - Professional Writing and Editing
  - Teaching of Writing and Literature
- Professional Writing and Editing Certificate
- Teaching of English as a Second Language Certificate
College of Arts and Sciences (continued)

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

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

Individualized Study
Individualized Study BIS, BIS/Accelerated MS in Telecommunications
Latin American Studies BA, Minor

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

Molecular and Microbiology
Biodefense MS, PhD
Certificates in Biodefense:
• Biological Threat and Defense
• Microbial Defense
Biology Minor, BA, BS, MS
Biosciences PhD
Medical Technology BS

Modern and Classical Languages
Foreign Languages BA, MA (Spanish, French)
Minors:
• Chinese
• Classical Studies
• French
• German
• Latin
• Russian
• Spanish

Neuroscience PhD

Philosophy and Religious Studies
Philosophy Minor, BA, MA Professional Ethics Certificate
Religious Studies Minor BA

Physics and Astronomy
Applied and Engineering Physics MS
Astronomy BA, BS, Minor
Physical Sciences PhD
Physics Minor, BS

Psychology
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
• School Psychology MA
Advanced Graduate Studies in School Psychology
(Post-master’s Certificate)

Public and International Affairs
Administration of Justice Minor, BS
Government and International Politics BA
Justice, Law, and Crime Policy MA, PhD
Political Science MA
Public Administration BS, MPA

Minors:
• American Government
• International/Comparative Studies
• Legal Studies
Graduate Certificates:
• Administration of Justice
• Association Management
• Information Policy and Administration
• Nonprofit Management

Social Work
Social Work Minor, BS, MSW
Child Welfare Certificate

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

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

Interdisciplinary Programs
Cultural Studies PhD
Community College Education DA, Certificate
Interdisciplinary Studies MAIS

Concentrations:
• Anthropology
• Community College Teaching
• Folklore
• Higher Education
• Individualized Studies
• 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
• Nonprofit Studies
• Urban and Suburban Studies
• Women’s Studies

School of Computational Sciences
Bioinformatics MS, PhD
Climate Dynamics PhD
Computational Science MS
Computational Sciences and Informatics PhD
Computational Techniques and Applications Certificate
Earth Systems and Geoinformation Sciences, PhD

Earth Systems Science MS
Nanotechnology and Nanoscience Certificate
Neuroscience PhD
Physical Sciences PhD
Remote Sensing and Earth Image Processing Certificate

Institute for Conflict Analysis and Resolution
Conflict Analysis and Resolution BA, BS, MS, PhD
Conflict Resolution for Health Professionals Certificate (with CNHS)

College of Education and Human Development
Counseling and Development MEd
Curriculum and Instruction MEd
Education PhD
Education Leadership MEd

Special Education MEd
Teaching (New Professional Studies) MA
Certificates:
• Advanced Studies in Teaching and Learning
• Alternative Education
• Applied Behavior Analysis
• Assistive Technology
• Counseling Post-Master’s Licensure
• Early Childhood Education
• Early Childhood Special Education Licensure
• Emotional Disturbance/Learning Disabilities Licensure
• English as a Second Language Licensure
• FAST TRAIN International School Counseling
• Foreign Language Licensure
• Gifted Child Education
• History
• Instructional Technology
• Integration of Technology in Schools
• Learning Disabilities, Emotional Disturbance, and Mental Retardation Licensure
• Library Media
• Literacy
• Mathematics
• Mental Retardation Licensure
• Multimedia Development
• School Counseling Leadership
• Science
• Secondary Education Licensure
• Severe Disabilities Licensure

Minors (Undergraduate):
• Early Childhood Special Education
• Emotional Disturbance/Learning Disabilities
• Mental Retardation
• Severe Disabilities

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

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

School of Information Technology and Engineering
Applied and Engineering Statistics
Applied Statistics Certificate
Biostatistics Certificate
Data Analysis Minor
Data Mining Certificate
Federal Statistics Certificate
Signal Processing Certificate

Statistical Science
Applicable BS/Accelerated MS, MS
Study in Statistics PhD

Civil, Environmental, and Infrastructure Engineering
Civil and Infrastructure Engineering BS, BS/Accelerated MS, MS

Computer Science
Applied Computer Science BS
Biometrics Certificate
Computer Networking Certificate
Computer Science Minor, BS, BS/Accelerated MS, MS in Telecommunications, MS, PhD
Intelligent Agents Certificate
Post Bachelor 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
Signal Processing Certificate
VLSI Design/Manufacturing Certificate

Information and Software Engineering
Data Mining Certificate
Database Management Certificate
Electronic Commerce Certificate
Information Engineering Certificate
Information Security and Assurance Applicable BS/Accelerated MS, MS
Information Systems Applicable BS/Accelerated MS, MS
Information Security and Assurance Certificate
Software Engineering Applicable BS/Accelerated MS

Software Engineering Certificate
Web-based Software Engineering Certificate
Information Technology Certificate
Information Technology Minor, 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

Systems Engineering and Operations Research
Architecture-Based Systems Engineering Certificate
Command, Control, Communications, and Intelligence Certificate
Computational Modeling Certificate
Military Operations Research Certificate
Operations Research and Engineering Certificate
Operations Research Applicable BS/Accelerated MS, MS
Systems and Industrial Engineering BS, BS/Accelerated MS in Systems Engineering, BS/Accelerated MS in Telecommunications
Systems Engineering Applicable BS/Accelerated MS/MS
Systems Engineering Management MS*

Interdisciplinary Programs
E-commerce MS
Information Technology Engineering Degree, PhD
Network Technology and Applications Certificate
Telecommunications Applicable BS/Accelerated MS, MS
Telecommunication Systems Modeling Certificate
Wireless Communications Certificate

School of Management
Accounting BS, Certificate in BioScience Management MS
Business Minor
Business Administration MBA
Chief Information Officer Certificate
Decision Sciences and Management Information Systems BS
Executive MBA MBA in Finance BS
Management BS
Marketing BS
Technology Management MS

College of Nursing and Health Science
Advanced Clinical Nursing MSN
Assisted Living BS
Assisted Living Management MS
Health Science MS, MS
Health Information Systems MS
Health Systems Management MS
Nursing BSN, MSN, MSN/ MBA, PhD
Nutrition Minor
Certificates:
• Assisted Living
• Biostatistics
• Gerontology
• Post-master’s Nurse Practitioner (Adult and Family)
• Conflict Resolution for Health Professionals
• Health Care Security and Privacy
• Health Information Systems
• International Health
• Nursing Administration
• Nursing Education
• Nutrition
• Quality Improvement and Outcomes
Management in Health Care Systems

School of Public Policy
International Commerce and Policy MA
Knowledge Management (New Professional Studies) MA

*pending SCHEV approval
School of Public Policy (continued)

Organizational 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 Governance and Institutions
• International Institutional Policy
• International Market Analysis
• International E-commerce and Telecommunications Policy
• Managing International Commerce
• National Security and Public Policy
• Organizational Informatics and Policy Enterprise

• 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 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 Management MA

Dance
Dance Minor, BA, BFA, MFA

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

Theater
Theater Minor, BA
Vision for the New Century

The university president developed George Mason’s vision statement after discussions with many others who care about the future of this vibrant institution. Its purpose is to give clarity to George Mason’s fundamental character and aspirations. The vision is forward-looking and identifies the distinctive attributes and strengths of the university that are believed to be most important to its future.

The Innovative University for the Information Society

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.

By Alan G. Merten
President, George Mason University

Distributed University

George Mason University is a distributed university with three campuses in Fairfax, Arlington, and Prince William counties, and two satellite sites in Herndon and Reston. Each campus has a distinctive academic focus that plays a critical role in the economy of its 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. In addition to the campus facilities, the university offers programs at the Herndon Training Center at the Center for Innovative Technology (CITT) and on the Internet.

**Fairfax Campus**
The Fairfax Campus, situated on 677 acres of wooded land, 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 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 presented on campus include music and dance from around the world, Theater of the First Amendment, Mason presented on campus include music and dance from around the world, Theater of the First Amendment, Mason presented on campus include music and dance from around the world, Theater of the First Amendment, Mason presented on campus include music and dance from around the world, Theater of the First Amendment, Mason presents a full gymnasium with elevated track, and recreational and instructional swimming in a 50-meter competition pool.

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. The School of Information Technology and Engineering (IT&E) 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**
The Prince William Campus is located on 124 acres outside the city of Manassas, near the intersection of I-66 and the Prince William Parkway. It 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 programs in biosciences, biotechnology, and bioinformatics. The university’s National Center for Biodefense also is housed at the Prince William Campus. 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. 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 (Randall’s Cafe and Jazzman’s Cart), student lounge space, an inter-campus 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 cocurricular and extracurricular activities.

The 300-seat Verizon Auditorium and the 110,000-square-foot Freedom Aquatic and Fitness Center serve both university and community needs. The Freedom 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.

**Herndon Training Center at the Center for Innovative Technology and Reston Lab**
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 (CITT)
classrooms are fully electronic and include a groupware platform. The School of Management’s Executive Master of Business Administration program and the School of Information Technology and Engineering’s (IT&E) Train to Technology program are located here.

**George Mason, 1725-92**

When George Mason of Gunston Hall 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.

## Highlights of Mason’s History

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

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

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

Eager to support the 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 expand into a major regional university. The first senior class received degrees in June 1968. Graduate programs began in September 1970, with the first master’s degrees conferred in June 1971. The George Mason College Board of Control, supported by citizens of the cities of Alexandria and Falls Church, and Arlington and Fairfax counties, acquired an additional 422 acres. By the end of 1970, the college’s Fairfax Campus reached 572 acres; it is now 677 acres.

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

Since 1972, the university’s development has been marked by rapid growth and innovative planning. In 29 years, enrollment has risen from 4,166 to nearly 29,000 students in 2004. In 1979, Mason was given the authority to grant doctoral degrees and began offering programs at this level. In the same year, the university acquired what became George Mason University School of Law, located on the Arlington Campus.

In 1984, the first Robinson Professors, a group of outstanding scholars committed to undergraduate teaching and interdisciplinary scholarship, joined the faculty as the result of a generous bequest from the estate of Clarence J. Robinson.

Drawing prominent scholars from all fields, Mason’s outstanding faculty includes Pulitzer Prize winners; Nobel laureates; IEEE (Institute of Electrical and Electronics Engineers) Centennial Medalists; and recipients of numerous Fulbright, National Science Foundation, and National Endowment of the Arts grants and awards, among others. More than 30 endowed chairs at the university have also brought many artists and scholars to campus.

In 1985, Mason partnered with area businesses to develop an engineering program geared toward the emerging information technology field and started the School of Information Technology and Engineering (IT&E). Through IT&E, George Mason was the first institution in the country to offer a doctoral degree in information technology.

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

George Mason has expanded its presence to serve the entire Northern Virginia region by employing the revolutionary concept of the distributed university. This concept consists of one university at multiple locations, with each location based on a programmatic theme that reflects the needs of that particular segment of the community. The Prince William Campus was established in partnership with state and county governments and the private sector. A partnership with American Type Culture Collection, the world’s foremost archive of living cultures, led to academic programs focusing on the biosciences, which makes Prince William County a center for biotechnology.
The university is also expanding its presence in Arlington. Arlington I, completed in 1999, is a 132,000-square-foot building and the first in a three-phase plan to develop the 5.2-acre site. Arlington County recently approved a $5 million bond referendum to assist the university with development of the second new building. The Phase II expansion, estimated to cost $42 million, will be a 240,000-square-foot building and public plaza, each with two levels of underground parking. The new building will house an auditorium, art gallery, library, and conference space designed for educational and community use.

On the Fairfax campus, the innovative George W. Johnson Center was dedicated on April 12, 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 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 private and public sectors. It will be an intellectual and cultural nexus between Northern Virginia, the nation, and the world.”

### Faculty and Students

The university’s more than 900 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, and 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 nearly 29,000 students are from Virginia. However, all 50 states and Washington, D.C., as well as 135 countries and regions, are represented in the student body. In fact, in the Princeton Review’s most recent survey of more than 110,000 students at 357 top colleges, Mason ranks number one 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.

### 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.

### George Mason 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.
Admission

Office of Admissions
4400 University Drive, MS 3A4
Fairfax, VA 22030-4444
Phone: 703-993-2400
Fax: 703-993-2392
Web: admissions.gmu.edu

Undergraduate Admission Policies

Admission to Mason is competitive because the number of qualified candidates for admission 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. Application forms are provided on request or are available at www.admissions.gmu.edu/ugrad/onapps.html. A nonrefundable and nontransferable fee of $40 must accompany the application; the international application fee is $75. Catalog information, the Schedule of Classes, tuition information, campus events listings, and departmental information are available at www.gmu.edu.

Application Deadlines

The priority 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. Applications for the 2005–2006 fall and spring semesters may be submitted starting July 1, 2005. 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 decisions for freshmen are usually made after the first-semester grades of the senior year and all appropriate test results have been received by the Office of Admissions. Transfer decisions are made as files become complete. 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 above-average grades, Scholastic Assessment Test (SAT)/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.
Bachelor's/Accelerated Master's Degrees
The university offers a number of combined bachelor’s and accelerated master’s degree programs for academically strong undergraduates with an interest in research, or graduate and professional studies. Admission to these programs is competitive. Information and application packages are available in the individual schools, colleges and institutes.

Admissions Committee
The Admissions Committee reviews undergraduate admission decisions and appeals. Additionally, the Admissions Committee or the Office of Admissions may make other stipulations or recommendations regarding the 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, and foreign language
- Scores from the SAT I, ACT, or Test of English as a Foreign Language (TOEFL)
- Essay
- Secondary school report

The Admissions Office evaluates applications after all required materials have been received. Applicants who apply by the priority deadline date 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.

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<td>4 4 4</td>
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<tr>
<td>Social Studies</td>
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<td>4 4 4</td>
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<tr>
<td>Mathematics*</td>
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<td>4 4 5</td>
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<tr>
<td>Laboratory Science**</td>
<td>2 2 3</td>
<td>3 3 4</td>
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<tr>
<td>Foreign Language</td>
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<td>4 3 3</td>
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<tr>
<td>Other Academic Electives</td>
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<td>5 4 3</td>
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<tr>
<td><strong>Total</strong></td>
<td>17 17 17</td>
<td>24 22 23</td>
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</table>

* Selected from algebra I, algebra II, geometry, trigonometry, analytic geometry, functions, math analysis, calculus
** Selected from biology, chemistry, physics, or other advanced lab science

Test Requirements
Freshman candidates for admission are required to take the SAT I or the ACT. All non-native English speakers are also required to take the TOEFL. Official test scores should be sent directly from the appropriate testing service.

Acceptance of Admission Offer
Mason complies with the national 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 non-refundable after May 1.

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

Readmission after Previous Attendance
Students who have missed two or more consecutive semesters of enrollment (excluding Summer Term) at Mason must apply for re-admission 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 a degree-seeking undergraduate who was last enrolled five or more years ago.
- The student is international with F-1 or J-1 immigration status.
- The student was ever 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.

Re-enrollment after Previous Attendance
Unless any of the conditions requiring readmission apply, students in good academic standing who have missed two or more consecutive semesters of enrollment (excluding Summer Term) at Mason may re-enter by completing a Re-Enrollment Form available through the Registrar’s Office. For graduate students and some undergraduate programs, academic department approval is also required.

Application for a Second Bachelor’s Degree
Application for a second bachelor’s degree following 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 credit hours beyond the first degree. 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. Determination of academic standing will begin anew for the second degree.

Transfer Requirements
Mason accepts qualified students who wish to transfer from other regionally accredited colleges or universities.
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 score or acceptable grades (C or better) in at least two English composition or literature classes taken at another U.S. university or college.

Application for admission as a transfer student is competitive. Successful candidates for admission usually have a minimum of 2.50 on a 4.00 scale. 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 resume may be submitted in lieu of a statement.

**Transfer Credit**

A student transferring into Mason receives a formal evaluation of transfer credit following the admission offer. The student is responsible for seeing that the Office of Admissions receives official 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 that 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 non-accredited institutions.

Forty-five credits of upper-level course work are required for graduation. While lower-level courses taken at previously attended institutions may meet the content requirement of some upper-level courses, they do not reduce the 45-credit requirement.

Students enrolled on a campus of the Virginia Community College System (VCCS) may access transfer information from a computer database located on Mason’s web site at: www.admissions.gmu.edu/ugrad/transguide.

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.

**Admission Requirements**

For degree status, the general university graduate admission requirements are as follows:

- An earned baccalaureate degree from a regionally accredited institution of higher education
- A 3.00 GPA (on a 4.00 scale) or better in the last 60 semester hours of baccalaureate study. For students with post-baccalaureate credits, a separate GPA is calculated for each institution. Note: The minimum GPA may be higher for some graduate programs. The difficulty of the baccalaureate degree and work experience will be considered in making admission decisions

**Graduate Application Requirements**

For full consideration for graduate admission, applicants must submit:

- A completed Application for Graduate Study
- A non-refundable application fee
- The Application for Virginia In-State Tuition Rates, if claiming entitlement to them
- Two official copies of transcripts from each institution attended
- A goals statement
- Letters of recommendation as required by the program
- The official exam scores, such as the GRE or GMAT, reported directly from Educational Testing Service, as required by the program
- Other materials specified by the program, including departmental forms, portfolio, or interview

International applicants should see the “Admission of International Students” section for more information. Specific departmental admission requirements for degree students are listed in this catalog under the relevant discipline, as well as in the graduate program requirements chart in the Application for Graduate Study.

**Graduate Applications**

Graduate applications are available at admissions.gmu.edu. Applications for the School of Law can be accessed at www.law.gmu.edu. For a paper application for any program except the law school, please contact the Office of Admissions, MS 3A4, 4400 University Drive, Fairfax, Virginia 22030-4444; 703-993-2400; fax: 703-993-2392; e-mail: admissions@gmu.edu.

**Graduate Admissions Processing Centers**

The graduate admissions process is decentralized at Mason. Applicants are directed to send their applications and support documents directly to the Graduate Admissions Processing Center assigned to their program. Specific mailing instructions are listed in the Application for Graduate Study. 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 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.

**Graduate Admission Policies**

Admission to graduate programs is competitive. Selection criteria differs by program and is 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 determine the number of admission offers they may extend by the university resources available for their program.
College of Arts and Sciences (CAS)
College Hall, Room 119, MS 2D2
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-3699, fax: 703-993-8714
E-mail: casgrad@gmu.edu

College of Nursing and Health Science (CNHS)
Robinson Hall, Room A380, MS 5A8
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-1736, fax: 703-993-3606
E-mail: nursegrad@gmu.edu

School of Computational Sciences (SCS)
PhD in climate dynamics; MS, PhD in computational sciences and informatics, MS in Earth systems science; PhD in computational neuroscience, PhD in computational social sciences, MS in computational science
Science and Technology I, Room 103, MS 5C3
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-4044, fax: 703-993-1980
E-mail: scs@gmu.edu

School of Computational Sciences (SCS)
MS, PhD in bioinformatics
Prince William Campus, MS 5B3
10900 University Boulevard
Manassas, VA 20110
Phone: 703-993-8449, fax: 703-993-8401
E-mail: binf@gmu.edu

College of Education and Human Development
Robinson Hall, Room A308, MS 4D1
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-2010, fax: 703-993-3363
E-mail: gseadmit@gmu.edu

School of Information Technology and Engineering (IT&E)
Science and Technology II, Room 160, MS 3D5
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-1505, fax: 703-993-1633
E-mail: itegrad@gmu.edu

School of Law
3401 North Fairfax Drive
Arlington, VA 22201
Phone 703-993-8000, fax: 703-993-8088
E-mail: arichar5@gmu.edu

School of Management (SOM)
Enterprise Hall, Lower Level, 038, MS 5A2
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-2136, fax: 703-993-1778
E-mail: somgrad@gmu.edu

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

College of Visual and Performing Arts (CVPA)
Graduate Admissions, MS 3A4
4400 University Drive
Fairfax, VA 22030
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-2400, fax: 703-993-4662
E-mail: cvpagrad@gmu.edu

Institute for Conflict Analysis and Resolution (ICAR)
Graduate Admissions, MS 3A4
4400 University Drive
Fairfax, VA 22030
Phone: 703-993-2400, fax: 703-993-4662

Initiatives for Educational Transformation (IET)*
10900 University Blvd., Suite 217, MS 4E4
Manassas, VA 20110-2203
Phone: 703-993-8320, fax 703-993-8321
* This program requires special permission; please contact the program administration for more information.

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. Please consult the graduate program requirements chart in the Application for Graduate Study for departmental admissions test requirements.

The George Mason University Testing Center offers some computer-based graduate admissions on weekdays and most Saturdays. Students may register for an exam in person at the Testing Center, Krug Hall, Room 101, or by calling the appropriate national registration number listed below. For information regarding the tests given by the Testing Center, call 703-993-2390, or go to the Office of Admissions website at admissions.gmu.edu.

Students who wish to take computer-based graduate admission exams at Mason should indicate George Mason’s Test Center Number 7712 on their registration forms. Information and registration bulletins for all national graduate admissions exams are available at the information desk in the Johnson Center and at the brochure display in front of the Testing Center. To have official test scores sent to this university, list George Mason’s CEEB Code: 5827 on the registration form.

The GRE may be taken in two forms: the general exam and the subject exam. Some departments require official scores for both types of exams. Students may schedule the computer-based GRE general exam on campus in the Testing Center by calling 703-993-2390 or 800-473-2255. Students may register for the GRE subject exam on line at www.gre.org.

The GMAT is required of all applicants seeking an MBA 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 Miller Analogies Test (MAT) is a test of 100 analogies and may be a substitute for the GRE in some graduate programs. To have the official MAT scores sent to George Mason, list George Mason’s MAT Code: 1768. For information about scheduling the MAT, call 800-622-3231 or go to www.tpcweb.com.
The Praxis I is required by the College of Education and Human Development for graduate applicants to initial teacher licensure programs. Students may schedule the Praxis I on campus in the Testing Center by calling 703-993-2390 or 800-853-6773. Passing scores on both Praxis I and Praxis II exams are required for program completion.

The TOEFL exam may be required for graduate applicants for whom English is not their first language. Students may schedule the TOEFL exam at www toefl.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. This 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
An applicant holding one or more graduate degrees may earn an additional graduate degree in another discipline. For admission to a second graduate degree program, the applicant 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 at the university. 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, the category of admission offered, and the 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 enrollment confirmation card. An individual 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 admitted to more than one program, may accept only one offer and pursue only one degree program at a time.

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 time limit specified, the student may be terminated from the program. All applicants admitted provisionally are in degree-seeking status, and the course work taken appears as a part of their regular student record and does not need to be transferred.

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 the prerequisites have been met. Applicants are responsible for furnishing official transcripts confirming 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 permitted to change programs at will. A student who wishes to change from one field of study to another must submit a new application and application fee. Previous acceptance into one graduate program does not guarantee acceptance into another.

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

Records Maintenance and Disposal
All admission documents, including academic records sent from other institutions, become part of the official university file and can neither be returned nor duplicated for any purpose. A student 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 time 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 to Mason by international students holding or seeking F-1 or J-1 visas should be made directly to the Admissions Office. Deadlines for the fall semester are before January 1, for undergraduates, and February 15, for graduates. For the spring semester, the deadline for both groups 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 of $75 for undergraduates and $60 for graduates. Items that must be submitted with the application form are 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 an Exchange Visitor’s Visa (J-1). The student will be notified if financial documents are not complete. If the documentation submitted is satisfactory, the university will issue an immigration document (Form I-20 for F-1 status or DS2019 if financial documents are not complete. If the documentation submitted is satisfactory, the university will issue an immigration document (Form I-20 for F-1 status or 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 nearest U.S. embassy or consulate and apply for a student visa (F-1 or J-1). The basic requirements for obtaining a student visa are a letter of admission, evidence of financial support, an immigration document, a valid passport, and proof of strong ties to the home country. For more information about the visa application process, check with the nearest U.S. embassy or consulate, or go to the Department of State’s web site: www.state.gov.

Students in a nonimmigrant visa category other than F-1 or J-1 must 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 transfer applicants, international transfer students must meet the following standards:

• Freshman applicants must submit certified 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 the ACT.
• Applicants whose native language is not English are required to submit the results of the TOEFL. A minimum score of 230 on the computer-based TOEFL, or 570 on the paper-based TOEFL and 4.5 on the TOEFL essay, are required for an applicant to be considered for admission. Official test scores must be sent directly from the Educational Testing Service. For more information on the TOEFL, contact the Educational Testing Service, CN 6151, Princeton, New Jersey, 08541-6151, USA, phone: 609-921-9000, web site: www.toefl.org. More information can also be found on the George Mason Testing Center’s web site: www.admissions.gmu.edu/testing/asp.

• All transcripts from colleges or universities outside the United States must be translated into English and evaluated by an accredited U.S. evaluation service before an admission decision can be made. The applicant is responsible for the timely translation and evaluation of documents, and for 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 listed on Mason Form I-20. 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:

• Students must complete the Application for U.S. Graduate Study.
• Applicants whose native language is not English are required to submit the results of the TOEFL. A minimum score of 230 on the computer-based TOEFL, or 575 on the paper-based TOEFL and 4.5 on the TOEFL Test of Written English (essay), are required for an applicant to be considered for admission. A TOEFL score of at least 250 (computer-based) or 600 (paper-based) is required to qualify for a teaching or research assistantship. Official test scores must be sent to the Admissions Office directly from the Educational Testing Service.
• All transcripts from colleges or universities outside the United States must be translated into English and submitted for evaluation to the graduate school to which the applicant is applying.
• Graduate students’ documents should show the award of either a bachelor’s degree or equivalent, or a graduate degree.

International Applicants

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

• New federal regulations prohibit students on visitor (B1 and B2) visas from enrolling in school. Students who entered the United States on a visitor visa should not plan to study. For more information, contact OIPS.
• New 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 twelfth 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 in F-1 or J-1 nonimmigrant status must maintain full-time enrollment each semester (12 credits for undergraduate, normally 9 credits for graduate), excluding Summer Term. Because of this
requirement, F-1 or J-1 international students do not qualify for part-time programs.

- Prospective students who are seeking to enter the United States in F-1 or J-1 visa status, or if already in the United States, seeking to transfer to Mason, 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-assistanship 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 must be no older than six months.

- All new students at the university must submit an Immunization Requirements 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. A tuberculosis screening, hepatitis B (series of three), and meningococcal vaccines are also encouraged.

- 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 students’ responsibility to make sure tuition and fees are paid on time.

### Health Insurance

University policy requires all students on an F-1 or J-1 visa to have health insurance that is valid through August 18 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 students who become seriously ill 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 results in cancellation of class registration and financial suspension. Late fees 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 with evidence of an alternative insurance policy that meets the requirements for coverage may be eligible for exemptions.

It is the student’s responsibility to apply for an exemption. 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.

### Special Types of Enrollment

#### Nondegree Status

Nondegree status enables students who have no immediate degree objective, or who 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 post-secondary institutions they have attended. High school guest matriculants must list the Mason courses in which they wish to enroll, as well as provide a high school transcript along with recommendations from their guidance counselor and one teacher.

Nondegree applications and their established deadlines are available online at admissions.gmu.edu/nondeg/onapps.html. Processing procedures require adherence to a strict application deadline for nondegree applications. Application deadlines are posted online with the nondegree application. Nondegree applications may not be accepted after posted deadlines.

#### 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. Nondegree applicants must meet the standards for admission that would apply to the equivalent degree seeking status.

**Graduate Nondegree**

Applicants with a bachelor’s degree seeking to take graduate-level courses or graduate prerequisite courses must meet graduate admission standards. These students will be considered graduate level, even if 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 in nondegree status. All master’s programs require at least 18 credits to be completed 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 graduate students are expected to achieve a semester average of at least a B (3.00) in all courses. Students who do not meet these criteria during a semester average of at least a C (2.00) in all courses. Students who do not meet these criteria during two consecutive periods of enrollment are not permitted to register again through Nondegree Studies.

**Undergraduate Nondegree**

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 advising. Students who later seek to enroll in graduate courses or wish to receive graduate advising must submit a new nondegree graduate application and be reconsidered for admission. Applicants who do not have a bachelor’s degree, but have graduated from high school or received a GED, should meet the standards for admission as a transfer student. High school transcripts may be required for students who have previously attained less than 30 transferable credits. For students who plan to transfer credit back to another institution, it is recommended that consultation with the home college or university take place before attempting to register for classes at Mason. The responsibility for determining the transferability of the course work to the home institution lies with the student.

Nondegree Studies students are allowed to register for up to 10 credits per semester. A maximum of 18 undergraduate credits may be applied to an undergraduate degree program if the program’s dean gives permission. Undergraduate nondegree students are expected to achieve a semester average of at least a C (2.00) in all undergraduate courses. Students who do not meet these criteria during two consecutive periods of enrollment are not permitted to register again through Nondegree Studies.

**High School Guest Matriculants**

Applicants 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 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.

**Academic Advising/Academic 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. Nondegree students can learn the name of their academic advisor by going to admissions.gmu.edu/nondeg/ndadvis.asp. 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 who 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.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 noncredit courses 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. Tuition, however, may be charged for courses designed exclusively for senior citizen groups. Senior citizens must adhere to all registration policies, and must follow normal procedures to add and drop courses within the deadline dates outlined in each semester’s academic calendar.

**Graduate Nondegree Status, IT&E**

Admission for non-degree graduate study is suitable for those who do not want to pursue a degree but are interested in taking graduate School of Information Technology and Engineering (IT&E) courses. IT&E non-degree graduate application forms are available on the web at admissions.gmu.edu/grad/apply/. The following application materials should be submitted for consideration:
• IT&E non-degree application
• Official or unofficial transcripts indicating confirmation of bachelor’s degree
• Nonrefundable application fee

Approval for non-degree status does not guarantee admission for a degree program at a later date. Up to 12 credit hours taken in non-degree status may be transferred to an IT&E 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 IT&E programs and course offerings may be obtained from IT&E departmental offices or the IT&E Graduate Student Services Office, Science and Technology II, Room 100, 703-993-1505.

School of Computational Sciences (SCS)
Non-degree 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 credit hours taken in non-degree status may be transferred to one of the School of Computational Sciences (SCS) academic programs at a later date. Approval for non-degree status does not guarantee admission into an academic program. For admission into non-degree 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:
• SCS non-degree application
• Official or unofficial transcripts
• A nonrefundable application fee
• Resume

The SCS non-degree application can be downloaded from the School of Computational Sciences web site at www.scs.gmu.edu.

Graduate Courses for Undergraduates
Undergraduates may request approval to take a graduate course either for reserve graduate credit or for undergraduate credit. Special circumstances apply. See details in the Academic Policies chapter of this catalog or in the Schedule of Classes.

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.

Academic Testing
Testing Center
Phone: 703-993-2390
Fax: 703-993-3917
Web: admissions.gmu.edu

As a means of assessing students, Mason requires the submission of certain test information. Students may obtain applications from the information desk in the Johnson Center or the Testing Center in Krug Hall. Room 101, for the TOEFL, Graduate Record Examination (GRE), Law School Admission Test (LSAT), Graduate Management Admission Test (GMAT), and Medical College Admission Test (MCAT).

Computer-Based Testing (CBT)
The university, in cooperation with Educational Testing Services (ETS), has established a computer-based testing facility (CBT) in the Testing Center, Krug Hall, Room 101. The CBT offers computer-based GRE and Praxis exams on a daily basis during the academic year. Students should obtain the appropriate information and registration bulletin (available at the information desk in the Johnson Center and at the brochure display in front of the testing center) and indicate George Mason Testing Center Number 7712 as their desired testing location. Space is limited to 15 people during a testing period, so it is to the student’s advantage to register early. For more information, go to the Testing Center web site at admissions.gmu.edu.

Praxis Series
Those seeking an initial teacher license in Virginia are required to satisfy the professional teacher’s assessment prescribed by the Virginia Board of Education. As of July 1, 1996, the Virginia Board of Education requires the Praxis I: Preprofessional Skills Test (either paper-based or computer-based) and Praxis II: Subject Assessment Test.

The Graduate School of Education requires that Praxis I scores become one of the multiple criteria used in making admission decisions.

The Praxis Registration Bulletin is available in Krug Hall, Room 101, and in Robinson Hall, Room A307. To register for the computer-based test version of Praxis I, call 800-853-6773. For the paper-based Praxis I and II tests, register online at www.ets.org/praxis.

Advanced Placement and Credit by Exam
Academic departments frequently revise information regarding credit by exam. The most current information can be found at www.admissions.gmu.edu/ugrad/acbe.html.

Advanced Placement (AP) Program
Students who have completed Advanced Placement (AP) exams in secondary schools can receive academic credit.

Information regarding academic credit to be awarded for AP exam results can be found at admissions.gmu.edu/ugrad/acbe.html. Additional information or requests to have AP scores forwarded to Mason can be obtained from the College Board web site at www.collegeboard.org/ap/students/ or by calling 609-771-7300.
International Baccalaureate (IB) Program
Mason recognizes the International Baccalaureate (IB) curriculum as a strong preuniversity academic program, and encourages applicants to complete the requirements for the IB diploma. Specific information regarding the IB program can be found at: www.ibo.org. Information regarding the academic credit to be awarded for IB exam results can be found at admissions.gmu.edu/ugrad/acbe.html. The International Baccalaureate North America Office must issue official transcripts before credit can be awarded. To request transcripts, contact the office at 475 Riverside Drive, 16th Floor, New York, New York, 10015, 212-696-4464.

College Level Examination Program (CLEP)
Academic credit can be awarded based on successful completion of a number of College Level Examination Program (CLEP) subject exams. Mason does not recognize credit earned by the CLEP general exam. CLEP subject exams are offered in a computer-based format. The policy regarding CLEP credit is posted at the “Credit by Examination” web site: www.admissions.gmu.edu/ugrad/acbe.html.

Mason Departmental Exams
Proficiency exams are offered in a number of courses normally taken during the first two years. Credit is recorded for grades of C or above, but it does not affect the student’s grade point average. 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 three credits for English 101. The three-hour exam 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: mason.gmu.edu/~stremicks/.

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.

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

It is the student’s responsibility to take a placement exam and obtain results before enrolling in a foreign language course. The placement exam is given in conjunction with Orientation. The schedule can be found on the web at www.gmu.edu/departments/fld/LAB/test2.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 will normally grant 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 cas.gmu.edu/math_placement/
Tuition and Fees

General Guidelines and Student Responsibilities

• Students are responsible for maintaining current addresses via Patriot Web (patriotweb.gmu.edu), and for activating and checking their George Mason University e-mail accounts.
• Registration shall not be considered completed unless all outstanding balances from the prior term 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) I, Room 104, on or before 4:30 p.m. on due dates, regardless of postmark if mailed. Visa and MasterCard payments made on Patriot Web must be completed by 11 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. Patriot Web can confirm balance due.
• 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.
Tuition, Expenses, and Financial Aid

2005–06 Semester Tuition Charges
(subject to change)

Approved tuition rates are available June 1. For more information, call Student Accounts at 703-993-2484 (option 4), or go to studentaccounts.gmu.edu. Also, students are charged tuition rates according to their academic level; graduate rates vary.

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<th>In-State Undergraduate</th>
<th>In-State Graduate</th>
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<tr>
<td>Full-time (12-16 credits)</td>
<td>$2,913</td>
<td>N/A*</td>
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<td>Per credit hour</td>
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<table>
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<th>Out-of-State Graduate</th>
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<tr>
<td>Full-time (12-16 credits)</td>
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<td>N/A*</td>
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<tr>
<td>Per credit hour</td>
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<td>$705</td>
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</tbody>
</table>

* Graduate students are charged by the credit hour.

Related Fees
(Applicable to all students; subject to change)

- Application Fee, Undergraduate $40
- Application Fee, Graduate $60
- Lab fee $25
- IT&E Course Fee (per credit hour) $9
- CVPA Course Fee (per credit hour) $10
- Orientation/Undergraduate New Student Fee (nonrefundable) $145
- Graduate New Student Fee (nonrefundable) $60
- International Student Health Insurance Fee $1,075

Other Fees
Undergraduate, graduate new student fees
These are mandatory, nonrefundable fees that are charged to the account of every newly admitted student regardless of orientation attendance or enrollment status.

Penalties
Any student who fraudulently or knowingly provides false information in an attempt to evade payment of out-of-state tuition will be charged out-of-state tuition for each term or semester attended, and may be subject to dismissal from the institution.

Tuition charges, refunds for 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. A refund request form is available via the Student Accounts web site and Student Accounts Office. The university will issue check refunds payable to the student; credit card refunds will be credited back to the originating card.

Special registration fee
Students not enrolled in a credit-bearing course, but whose academic department certifies that they are pursuing an activity related to George Mason matriculation, can retain active status by registering for Special Registration (SREG 200, Section 001) for a $45 fee. 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 fee for international students
Health insurance is required for all F-1 and J-1 visa holders. 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.

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

Eligibility for 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 an 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.

Change of Domicile Classification
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 Registrar’s Office and at registrar.gmu.edu/domicile.

Students whose appeals are denied have the right to seek further review of their status by the Office of the Registrar or the Third Level Domicile Appeals Committee. These requests must be filed in a timely manner as stated in denial letters. Forms are available from the Registrar’s Office and the web site. In addition, students should be aware that university procedures for appealing domicile decisions have been established pursuant to state law and are subject to change.
Out-of-state students with an appeal pending at the time of tuition billing are responsible for payment at that rate. Students subsequently determined to be in-state may request reimbursement of overpayment from the Office of Student Accounts. For more information regarding in-state eligibility, contact Domicile Administration in the Registrar’s Office in North Chesapeake Module, Room 8, phone: 703-993-2464, e-mail: domicile@apollo.gmu.edu.

Payment Methods

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

How to Pay
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 Patriot Web (patriotweb.gmu.edu).

When to Pay
Payment is due the first day of classes. See the payment schedule in the Schedule of Classes. Payments received at the Cash Office by 4:30 p.m Monday to Friday will be considered as that day’s business. Visa and Mastercard payments made on Patriot Web must be completed by 11 p.m. to be considered in that day’s business. To confirm receipt of payment and balance due on account, go to patriotweb.gmu.edu. Allow ample time for processing payments.

Payment Plan Options

Semester payment plan
This option is available for students who need to budget a minimum of $500. Payments for study abroad, global education, and international student health insurance cannot be deferred. A payment contract, available on the Student Accounts web site, must be submitted to the Cash Office with a down payment of one-half of the contract amount plus fee. The contract fee is $25 and is nonrefundable. Failure to pay outstanding balance will result in financial hold, a late fee (up to $250), and normal university collection activity, and may prevent students from being eligible to use this contract to defer payments in future semesters.

Monthly installment plan
Students may budget all or part of their semester tuition, room, and meal expenses in five 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 budget, financial suspension, a late fee up to $250, and normal university collection activity. For more information, call Academic Management Services, 800-635-0120.

Third-party billing authorizations
Students using third-party billing authorization will be charged a $25 processing fee. Students may receive an individual billing statement. Students must provide the third-party billing authorization or government training voucher to the Student Accounts Office before the student’s individual due date, which is based on the registration date. Students are ultimately responsible for any defaults in payments by the sponsoring agency. For a copy of third-party billing requirements, call 703-993-2484, or go to studentaccounts.gmu.edu, select “students” and then “student accounts.”

Financial Penalties

Late registration fee
A late registration fee of $250 will be charged for all initial registrations occurring on or after the first day of classes. This fee is nonrefundable.

Late fee
Failure to make any payment on or before the due date results in a late fee of up to $250.

Returned check fee
A $25 returned check fee will be charged for each unpaid check returned by the bank. If the returned check results in an unpaid account, an additional late fee up to $250 will be charged, and financial suspension will result.

Financial Suspension
All academic service is withheld for students who are not in good financial standing with the university. This means that no transcripts are issued, no diplomas are released, and no registrations are permitted until outstanding obligations have been paid in full. Outstanding obligations include, without limitation, fines owed for traffic and parking violations, and to libraries of institutions and participating public libraries of the Consortium of Universities of the Washington Metropolitan Area.

Collection of Accounts
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.
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 among 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 are traditional-style residence halls in quints, triples, and doubles.

The estimated housing costs for the 2005–6 academic year are approximately $3,000 to $6,500 per year. Housing rates are subject to change; actual rates will be available early in the spring 2005 semester on the Office of Housing and Residence Life web site. All students in housing must provide a prepayment, which is applied to the spring semester rent. Housing assignments, including single rooms, are made on a priority and space-available basis.

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

Dining Services
Student Union Building (SUB) II, Room 1013
Phone: 703-993-3300
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 at the Fairfax Campus include a traditional all-you-care-to-eat dining facility called Ciao Hall, in SUB II; Union Station, in SUB I; and in the Johnson Center, several options including a food court featuring national names such as Charlie Chiang’s, Burger King and Taco Bell Express. Dining Services units are also located at the Arlington and Prince William Campuses.

For the 2005–06 academic year, meal plans for students living on campus range from approximately $2,100 to $3,400 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. The last day to decrease mandatory meal plans, however, coincides with the last day to add classes. Seniors with 90 credit hours, 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.

Motor Vehicle Registration Fee
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 decal. Decals are available for a year, semester, summer, or week. For decal sales, fine payments, special requests, or problems, go to the Sandy Creek Parking Office. Hours are 8:30 a.m. to 5 p.m. Monday through Friday. For more information, read the “Parking Policy” section in the General Policies chapter of this catalog.

Financial Aid

Web: apollo.gmu.edu/finaid
Office of Student Financial Aid
South Chesapeake Module
E-mail: finaid@gmu.edu
Phone: 703-993-3303
Fax: 703-993-2350

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, Wednesday, Thursday, and Friday; and 9 a.m. to 8 p.m. on Tuesday. Financial aid counselors are assigned to students alphabetically based on students’ last names, and are available daily on an appointment basis.

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 Term is generally limited to students graduating at the end of Summer Term or the fall semester. Contact the Office of Student Financial Aid for specifics regarding eligibility. The summer aid application is available on April 1.
All students receiving financial aid must:

- Be enrolled in an eligible degree or the TEAC 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)
- 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, which is detailed in the glossary section of the home page of apollo.gmu.edu/finaid and in the Office of Student Financial Aid.

**Satisfactory Academic Progress Standards for Financial Aid**

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 a detailed explanation of the satisfactory academic progress standards, go to the Student Financial Aid home page at apollo.gmu.edu/finaid or 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 (available in the Office of Student Financial Aid), or go to the Office of Student Financial Aid home page at apollo.gmu.edu/finaid.

**State programs for undergraduate Virginia residents**

Eligibility for all state programs is based on the 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 may be renewable for up to four years.

**Virginia 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 Alumni Association established an emergency loan fund through which students may borrow up to $100; repayment is due within 30 days. The program is available to all students, with priority 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, will result in financial suspension. Students financially suspended for nonpayment of an emergency loan are ineligible for future emergency loans. Application is made through the Office of Student Financial Aid.

**ROTC Scholarships**

Please see the “Reserve Officer Training Corps” section in the Academic Programs and Resources chapter.
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 makes changes in 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 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/pubs/osp/copypol.html and www.gmu.edu/pubs/osp/patpol.html#author.

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, the 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 below).
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 may either decide the appeal or 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, non-voting 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
703-993-3006

The ombudsman for student academic affairs is appointed by the provost to listen to student academic concerns, provide advice and referrals, and assist students with resolving academic conflicts. 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 here.

Further, all academic programs at Mason have student learning goals that are reflected in the curriculum and in 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 Evaluation.”

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.

**Composition of the Committee**

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 grade point average (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.

**Honor Committee Officers**

A chairperson and vice chairperson 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 if 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 that involve faculty, staff, or students as participants must be submitted to the Office of Sponsored Programs (OSP) for review and approval. The form for submission can be found at www.gmu.edu/pubs/osp/compliance.htm. All research activities will be reviewed by the Human Subjects Review Board prior to implementation of the activity. All student research must be supervised by a faculty member. The faculty member will serve as the
principal investigator for the research, and will assume responsibility for the legal and ethical conduct of the work.

ANIMAL USE IN RESEARCH
All work with live animals, whether for research, teaching, or testing, must be approved by the Institutional Animal Care and Use Committee (IACUC) prior to initiation of the work. All care and use of animals at Mason must be carried out under the supervision of a faculty member who is qualified and experienced in the work being conducted, and who assumes responsibility for legal and ethical conduct. The form for submission to the Office of Sponsored Programs (OSP) can be found at www.gmu.edu/pubs/osp/animal.html.

STUDENT WORK, INTELLECTUAL PROPERTY
Copyrightable works, including dissertations and patentable works developed in connection with course work by students who are not Mason employees, are deemed to belong to the student. However, Mason may 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
Preregistration 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 the Patriot Web system 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 the Patriot Web system. However, if a section is closed or if 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 in person to the Registrar’s Office a completed and signed course permit form.

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 names may be removed from the class roll in both lecture and lab.

Students are responsible for registering properly and paying by the deadline. Students should confirm the correctness of their enrollments (including drop and add) via the Patriot Web system. 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 due to suspension, dismissal or termination; the section is canceled; or the course is dropped before the tuition liability begins. See the Schedule of Classes for deadlines.

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

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 enroll 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. Further, registration is not canceled for failure to attend classes unless stated otherwise in the Schedule of Classes. All classes for which a student is enrolled past the drop deadline will remain part of the official academic record. For more information, see the “Additional Grade Notations—Administrative Failure” section of this chapter. After the date listed in the Schedule of Classes for dropping courses, withdrawal approval is granted only for nonacademic reasons by the student’s academic dean. This approval usually is given for all courses at once, constituting withdrawal from a semester. For more information, see the “Withdrawal from a Semester” section of this chapter.

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

Students will not receive written confirmation of schedule changes, and are responsible for checking their schedules via the Patriot Web system before the end of the add or drop period to verify that their schedules are correct and that 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 preregistered should cancel registration using the Patriot Web system before the early registration deadline for payment.

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 begins 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 F’s in all courses. Withdrawal forms are available at the appropriate academic dean’s office.

Upon official withdrawal from a semester after the drop period, the following notation is made on the student’s official transcript: “Withdrawn voluntarily for nonacademic reasons.”

**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 for 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 to 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 summarize drop students who have enrolled in a course for which they have not met the prerequisites. Graduate course prerequisites are normally not 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 credit hours 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.

- Beginning in fall 2004, undergraduate degree students may repeat courses in which they seek a higher grade. The subject code, course number, credit hours, and title must be identical. All attempts must be at Mason. Previous attempts of repeated courses will be identified and excluded from calculation in the cumulative GPA. All attempts of every course and their grades will always appear as part of the student’s academic record and transcript. The grade from the most recent taking of any repeated course counts in the student’s cumulative GPA, even if that grade is lower than the grade in a previous attempt. No adjustment to the cumulative GPA will be made when the grade in
the repeated course is “W,” as the result of an approved withdrawal.

The undergraduate repeat policy does not apply to courses both taken and repeated before the fall 2004 semester. It does apply to courses first attempted before fall 2004 and retaken fall 2004 or later. 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 preregistration process. Dual registration—for example, as a graduate student and as a nondegree enrolled—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 to 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 credit hours and fulfilling all prerequisites. Graduate credits completed with a 3.00 GPA or better will give the student advanced placement in the master’s program. Students in an accelerated degree program must fulfill all university requirements for the master’s degree, including a minimum of 18 applicable graduate credit hours 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, and 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 major field. 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 Southern states, including Virginia. Students who are not legal residents of Virginia, but who 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.

University Consortium
Mason is a member of the Consortium of Universities of the Washington Metropolitan Area, which also includes American University, Catholic University of America, 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.

Information and regulations for both outgoing and incoming Mason consortium students are available in the Schedule of Classes and on the web at registrar.gmu.edu/consortium_policies.html. Information pertaining to all member institutions is available at www.consortium.org/cross_registration.asp. For more information, contact the consortium coordinator in the Office of the Registrar, 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 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
It is Mason’s policy to make every reasonable effort to allow members of the campus community to observe their religious holidays without academic penalty. Absence from classes or exams for religious reasons does not relieve students from responsibility for any part of the course work required during the absence. Students who expect to miss classes, exams, or other assignments as a consequence of their religious observance will be provided a reasonable alternative opportunity to complete their academic responsibilities. It is the obligation of students to provide faculty with reasonable notice of the dates of major religious holidays on which they will be absent. Faculty should take religious observances into consideration when constructing class schedules and syllabi.

FINAL EXAMS
Final exams are usually given at the end of all undergraduate courses. Except in predominantly laboratory courses, exams may not be given during the last week of classes. Exams may not exceed the scheduled length of two hours, 45 minutes. Changes in location or time of in-class final exams must be approved by the appropriate department chair and dean. A professor who is considering assigning a take-home exam or significant end-of-semester paper or project should inform the students at the beginning of the semester. Such assignments should be distributed by the beginning of the last week of classes so that students can coordinate them with preparation for other exams. Students must not be required to submit exams before the date of the regularly scheduled exam for a course. Final re-exams are not permitted.

Absences
Absences from final exams will not be excused except for sickness on the day of the exam or for 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 and Grades” section.

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

A student successfully completing English A/B/C/NC:

Section of this chapter.

Students may also elect to take credit without grade. For courses normally graded S/NC are annotated in the catalog. S and NC have no effect on the grade point average. Entire factory work (C or better for undergraduates, B- or better for graduates); otherwise, the student receives no credit (NC). NC has no effect on the grade point average.

Satisfactory/No Credit (S/NC):

Additional Grade Notations

Satisfactory/No Credit (S/NC): An S grade reflects satisfactory work (C or better for undergraduates, B- or better for graduates); otherwise, the student receives no credit (NC). S and NC have no effect on the grade point average. 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.

A/B/C/NC: A student successfully completing English Composition and Introduction to Literature (ENGL 101) or Composition for Non-Native Speakers of English (ENGL 100) is graded A, A-, B+, B, B-, or C; a student not attaining at least C in these courses receives no credit (NC). NC has no effect on the grade point average.

Incomplete (IN): This grade may be given to a student who is 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. If a cause beyond reasonable control continues, the student must complete all the requirements by the last day of grades. The grade of IN is changed by the registrar to an F. 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 IN’s 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 the IN grade.

In Progress (IP): This 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 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 a student who is 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 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.

Grade Point Average

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 grade point average is computed by dividing the quality points earned by the number of credit hours graded A+ through F (GPA hours).

For undergraduates, the grade point average 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 grade point average 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 to have university honors posted to their record at graduation.

Undergraduates with 90 or more overall earned credit hours before fall 2004 who graduate by May 2006 at the latest will have a degree GPA computed from graded courses completed at Mason and applied toward the degree. For these students, the degree GPA will affect eligibility to graduate as well as eligibility for graduation with university honors.

Current GPA and cumulative GPA do not apply to graduate students. A notation of academic warning is entered on the transcript of a graduate student who receives a grade of C, or F in a graduate course or while a grade of IN 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 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, 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 chair (or other 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), and 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 including 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. The university confers degrees at the bachelor, master, 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 post-baccalaureate 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.
- Track: A second-order component of a degree program approved by the State Council of Higher Education for Virginia.
- 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.
• 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 credit hours must be applied only to that minor and may not be used to fulfill requirements of the student’s major, concentration, 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. 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 their final semester, students who expect to complete degree requirements must confirm their intent to graduate through the registrar’s web site by the end of the fifth week of classes for that semester. August graduates are processed according to the deadlines for the previous spring semester. Some programs require a paper application, which is due in the Office of the Registrar eight to ten weeks after the first day of classes. Paper applications are obtained through the registrar’s web site (registrar.gmu.edu). Separate applications for each degree or certificate are required. Additional majors or minors, available in bachelor’s programs only, also require separate applications and must be earned concurrently with the primary major.

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 noncourse degree requirements including credit-by-exam, oral exams, theses, scholarly papers, and comprehensive exams prior to the conferral (graduation) date. Doctoral students must have met all requirements well before the conferral date. For more information, go to www.gmu.edu/library/specialcollections/dwebguide.htm.

Students must have active registration status the semester or Summer Term of graduation; if all course work has been completed, a special registration must be obtained. (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 use Patriot Web to reserve a place for themselves in the academic procession and reserve tickets for their guests. The system will accept their reservation two business days after the degree application has been filed.

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. Students who have completed all degree requirements except for a required internship may participate if they will have completed the internship by September 10.

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; 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 the 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 to know and fulfill the requirements of a specific baccalaureate degree. To assist in the advising process, Mason provides a computerized analysis of academic progress (a degree audit). 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 who 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 approves 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
Johnson Center, Room 245, MS 2C4
Phone: 703-993-9082
Fax: 703-993-9068
Web: www.gmu.edu/departments/saa

Student Academic Affairs consists of three centers: Freshman Center, Center for University Scholars, and the University Course Office (UNIV 100, 200, 300, and 400). Student Academic Affairs also oversees the Supplemental Instruction and Peer Advisor Programs, and it 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 include:

- Reviewing requirements for the degree and major the student has chosen
- Reviewing the student’s record including any deficiencies, which must be made up
- Discussing 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. These results are a matter of record, and 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 up to date. 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.

Medical Sciences Advisory Committee
Phone: 703-993-2470

The Medical Sciences Advisory Committee reviews qualified candidates for admission to health profession programs in allopathic and osteopathic medicine, dentistry, and podiatry, and writes a composite letter of evaluation in support of the applicant. The committee comprises university faculty and professional advising staff. Committee members also function as premed advisors. Students seeking information about admission to professional medical programs are encouraged to contact the chair of the Medical Sciences Advisory Committee, George Mason University, Student Academic Affairs and Advising, MS 2E6, Fairfax, Virginia 22030-4444.

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

Academic retention is based solely on the cumulative GPA. The significance of the cumulative GPA varies according to the credit level, or cumulative earned credits, which is a combination of GPA credits earned 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. This notation will be placed on the individual’s permanent record.

Good Academic Standing
Students are in good academic standing unless 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 a credit level of at least seven hours and a cumulative GPA of less than 2.00 fall into three categories: warning, probation, and suspension. All notations of academic standing are included in a student’s permanent record. The cumulative GPA range that defines each of the categories varies according to the credit level, as noted below:

<table>
<thead>
<tr>
<th>GPA Retention Levels</th>
<th>Warning</th>
<th>Probation</th>
<th>Suspension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Level</td>
<td>Cumulative GPA range</td>
<td>Cumulative GPA range</td>
<td>Cumulative GPA range</td>
</tr>
<tr>
<td>7–16</td>
<td>0.00–1.99</td>
<td>1.00–1.74</td>
<td>0.00–0.99</td>
</tr>
<tr>
<td>17–29</td>
<td>1.75–1.99</td>
<td>1.10–1.79</td>
<td>0.00–1.09</td>
</tr>
<tr>
<td>30–44</td>
<td>1.80–1.99</td>
<td>1.25–1.84</td>
<td>0.00–1.24</td>
</tr>
<tr>
<td>45–59</td>
<td>1.85–1.99</td>
<td>1.40–1.89</td>
<td>0.00–1.39</td>
</tr>
<tr>
<td>60–74</td>
<td>1.90–1.99</td>
<td>1.55–1.94</td>
<td>0.00–1.54</td>
</tr>
<tr>
<td>75–89</td>
<td>1.95–1.99</td>
<td>1.70–1.97</td>
<td>0.00–1.69</td>
</tr>
<tr>
<td>90–104</td>
<td>1.98–1.99</td>
<td>1.85–1.99</td>
<td>0.00–1.84</td>
</tr>
<tr>
<td>105+</td>
<td>1.95–1.99</td>
<td>1.70–1.97</td>
<td>0.00–1.69</td>
</tr>
</tbody>
</table>
Periods of Academic Suspension
Students 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.

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

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

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

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

Academic Performance and Credit Limit
Undergraduate students on warning, probation, or return from suspension are limited to a maximum of 13 credit hours for following semesters until they achieve good standing. Students preregistered for 14 or more credit hours are responsible for seeking academic advisement and adjusting their enrollment to a maximum of 13 credit hours. The Registrar’s Office will reduce credit hours to a maximum of 13 for students who have not done so before the beginning of the semester.

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, or to compete in any athletic or other activity representing Mason on either an intercollegiate or club level, or to 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.

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.

Transition Clemency
Undergraduates who have 90 or more overall earned hours before the fall 2004 semester, and who complete their degrees by May 2006, will have a degree GPA computed on the courses that apply to the degree. Graduation eligibility and university honors will be computed from the degree GPA.

All students, including those with 90 or more overall earned credit hours mentioned in this section, are eligible to improve their cumulative GPA through the university’s new repeat policy. See the “Repeating a Course” section in this chapter. All students are also subject to the new retention requirements for academic standing. See the “Requirements for Retention” section in this chapter for more information.

UNDERGRADUATE ACADEMIC PROGRAM
To plan a sound academic program, the undergraduate 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, a student should confer with the appropriate advisor or designate of either the new major program or, if undeclared, the Academic Advising Center (in Student Union Building I, Room 304). Students should obtain signatures from both departments in the “Change of Major” section of the Change/Declaration of Academic Program form, available in the Registrar’s Office and in 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
A student 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 more information, see the “Second Bachelor’s Degree” section.

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. 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. A student 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 Second Major” section of the Change/Declaration of Academic Program form. Minors usually require between 15 and 21 credits of study, at least 8 credits of which must be applied only to that minor and may not be used to fulfill requirements of the student’s major, concentration, 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.

Baccalaureate Degree Requirements
To qualify for a bachelor’s degree, a student 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 the catalog for further information.

Note: Seniors who have completed at least 90 overall earned credit hours before the fall 2004 semester began, and who graduate by May 2006, will have a degree GPA computed on all courses applicable to the degree. For these students, the degree GPA will be used to determine eligibility for the degree and for graduation with university honors. For all other students, the cumulative GPA will be used.

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 in 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 must include at least 12 upper-level credits (courses numbered 300 or above) in the major program. For more information, see the “Credit 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.

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 from 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.

Application for a second bachelor’s degree declared after graduation from a first degree must be conducted through the Office of Admissions. Determination of academic standing starts anew for Mason graduates who return for a second bachelor’s degree.

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

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

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 tenure 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 credits per semester, or if they hold a full time assistantship (20 hours a week) and are enrolled in at least 6 credits per semester. Graduate students who are enrolled in dissertation credits (either 998 or 999) 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, 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, 703-993-2441.

Academic Advising
At the time of admission 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 request of the student 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 admission process. Credit transfer requests from students who are admitted provisionally are not considered until they have fulfilled the conditions 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
that can be taken elsewhere. Note that credits accepted for transfer credit, including limits on numbers of credits that may be transferred into their Mason degree program. These credits must be submitted to Mason so that the credits can be subsequently approved by the Graduate Council.

Approval must be secured in writing from the director of the program 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 23 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 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 they have fulfilled the conditions of their admission and had the provisional qualifier removed from their records.

There are no time limits on credits used in reduction of credit, 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 “Enrolling in Consortium Courses” 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>Quality</th>
<th>Graduate Courses</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>Satisfactory / Passing</td>
<td>4.00</td>
</tr>
<tr>
<td>A</td>
<td>Satisfactory / Passing</td>
<td>4.00</td>
</tr>
<tr>
<td>B+</td>
<td>Satisfactory / Passing</td>
<td>3.33</td>
</tr>
<tr>
<td>B</td>
<td>Satisfactory / Passing</td>
<td>3.00</td>
</tr>
<tr>
<td>B*</td>
<td>Unsatisfactory / Passing</td>
<td>2.67</td>
</tr>
<tr>
<td>C</td>
<td>Unsatisfactory / Passing</td>
<td>2.00</td>
</tr>
<tr>
<td>F</td>
<td>Unsatisfactory / Failing</td>
<td>0.00</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 conditions of their admission in the time limits set at admission. Students admitted provisionally 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 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 competence 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 certificate requirements and all requirements established by the certificate program faculty. Individual departmental certificate requirements are listed under the respective certificate programs in this catalog.

- Candidates must earn a minimum of 15 graduate credits.
- Only graduate courses may apply toward the certificate.
- A maximum of 3 graduate credits taken at another institution can be transferred into a certificate program.
- Candidates must have a minimum GPA of 3.00 in course work presented on the certificate application, which may include no more than 6 credits of C. (Grades of C+, C-, and D do not apply to graduate courses.) The GPA calculation excludes all transfer courses and Mason nondegree credits not formally approved for the degree.
- A maximum of two certificates may be conferred as part of a master’s degree.

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 or D do not apply to graduate courses. The GPA calculation excludes all transfer courses and Mason extended or 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 nontesis 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 due to 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. The student 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 three 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 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 both the research and 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/dwguide.htm. Students may register in Thesis (799) 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 who wishes to take an exam, must maintain continuous registration 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. the on 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, without master’s degree; or 42 credits, with master’s degree.
- The 42 minimum 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 degree 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 must be taken in 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 dissertation.
- Candidates must have a minimum GPA of 3.00 in course work presented on the degree application, which may include no more than 6 credits of C. (Grades of C+, C- or D do not apply to graduate courses. The GPA calculation excludes all transfer courses and Mason extended studies or nondegree credits not formally approved for the degree.)

Time Limit

Doctoral students have six years from the time of first enrollment as a degree-seeking student to become advanced to candidacy. Students have five years from the time of advancement to candidacy to graduation. Individual doctoral programs may have stricter time limits, which are published in the 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 due to 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 program 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 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.

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 department or degree program (for programs not in departments). Additional members may be appointed who are not members of the graduate faculty or who 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 999 required by their degree program. Then, they may register for 1 credit of 999 until the dissertation is complete. See the “Full Time Status of Graduate Students” 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 each semester until graduation, excluding summers. Students who defend in the summer must be registered for at least 1 credit of 999
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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 the 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 dissertation coordinator to determine which additional reference manuals are suitable.

Doctoral Defense

As soon as all degree requirements have been satisfied, including the 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 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. UDTS' website, 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, Wing 2C (Special Collections and Archives). For more information, contact the university dissertation and thesis coordinator at 703-993-2222.
Equal Opportunity and Affirmative Action

George Mason University is an equal opportunity and affirmative action institution committed to the principle that access to study and employment opportunities afforded by the university, including all benefits and privileges, be accorded to each person—student, faculty, or staff member—on the basis of individual merit and without regard to race, color, religion, national origin, veteran status, disability, sexual orientation, sex, or age (except where sex or age is a bona fide occupational qualification).

Mason maintains a continuing affirmative program to promote equal opportunity and to identify and eliminate discriminatory practices in every phase of university operations. Furthermore, affirmative action is taken to ensure that opportunities afforded by the university are fully available to those with disabilities, women, disabled and Vietnam veterans, and minorities. The university makes every reasonable accommodation to enable students or employees with disabilities to undertake work or study for which they qualify.

As required by the Civil Rights Act of 1964, as amended, the university is committed to the broad application of Title IX of the Education Amendments of 1972, Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, and the Age Discrimination Act of 1975.

Students and employees should bring problems or questions regarding equal opportunity (EO), affirmative action (AA), or sexual harassment policies to the attention of their supervisors; academic deans or department chairs; the vice president for University Life; the ombudsman; the director of Human Resources; a trusted faculty or staff member; the Women’s Studies Research and Resource Center; or the vice president and university equity officer, Mason Hall, Suite D105, 703-993-8730. Employees with disabilities may contact the ADA specialist in Mason Hall, Room D111, 703-993-8857 or 703-993-8787 (TDD). Students with disabilities may contact the Disability Resource Center in Student Union Building (SUB) I, Room 234, 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 the Judicial Administrator is administratively responsible for supervising student conduct on campus. A system of courts administers nonacademic discipline. In addition to these courts, the student Honor Committee, described in the Academic Policies chapter, is responsible for adjudicating violations of the Honor Code that relate to academic matters. Questions regarding student conduct should be directed to the Judicial Affairs Office, SUB I, Room 302, 703-993-2884.

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.

Student Health Services are offered on all three campuses. The contact information is as follows:

Fairfax Campus: Health and Wellness Center, SUB I, phone: 703-993-2831
Prince William Campus: Occoquan Building, Room 202E, phone: 703-993-8374
Arlington Campus: 3330 Washington Boulevard, Room 150 F and I, phone: 703-993-4863

Immunization Requirements
Immunization policies are determined by legislation enacted by the Virginia General Assembly and by recommendations from the Advisory Committee on Immunization Practice, the Centers for Disease Control (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:
- Measles, Mumps, Rubella (MMR): Two doses, with first 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 booster within past 10 years
- Polio
- Meningitis: First-time, full-time undergraduate students in Virginia’s public, four-year colleges and universities must be immunized against meningococcal disease, and the availability and effectiveness of the vaccine, but have chosen not to be vaccinated. If that student is less than 18 years old, the waiver must be signed by a parent or other legal representative.
- For international students only: Tuberculosis (TB) screening is required for all students at high risk as defined by the CDC.

Not required, but highly recommended immunizations:
- Hepatitis B: Series of three injections

At least one month prior to enrollment, records of immunizations are to be sent to the Immunization Office, Room 215, in care of Student Health Services, SUB I, 4400 University Drive, MS 2D3, Fairfax, Va. 22030. Immunization records can also be faxed to 703-993-4053. The immunization record is included as a tear-out form in the orientation booklet that is mailed to all new undergraduate students when their application for admission to the university has been approved. For more information, call 703-993-2836 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 by 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 Substance Abuse Programs and Services, located on the Fairfax Campus in the Health and Wellness Center, SUB I, Room 219K.

Drugs
- Use or possession of illegal drugs and drug paraphernalia is prohibited on any campus. Violation will be considered a serious offense. Implementation of this policy will be in accordance with established university procedures as contained in the University Judicial Code.
- University Police enforce all applicable local, state, and federal laws in accordance with established standing orders, procedures, and guidelines.
- A judicial review of all reports of drug offenses occurring on campus will be conducted by the university. Actions taken under the auspices of the University Judicial Code will neither prejudice nor be prejudiced by actions taken in the criminal justice system or the management of university housing.
- Students found responsible for violating the law or regulations involving illegal drugs will be required to undergo an evaluation administered by personnel in the office of the university’s Substance Abuse Programs and Services.
- The housing status of a resident student found in violation of a campus drug regulation while in a residence hall will be determined by the appropriate housing official. Guests and visitors found in violation of 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 Mason 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 university suspension for a minimum of one academic semester. However, the judicial administrator may reduce the sanction to one-year probationary status on the basis of mitigating circumstances or recommendations made in conjunction with the evaluation by university personnel in the office of Substance Abuse Programs and Services. Additional educational sanctions may be included in the conditions of probation. Any future violation of drug and alcohol policies will result in permanent separation from the university.
• Students found responsible for a violation involving sale or possession of an illegal substance with intent to distribute will be permanently separated from the university.
• Students 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. To apply for reinstatement after suspension, students must provide evidence of successful participation in a drug-treatment program.

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.
• Students who are 21 years of age or older are permitted to possess alcohol in residence hall rooms except those located in Presidents Park. The quantity of alcohol may be limited by residence hall regulations.
• No alcoholic beverages may be consumed in public areas of a residence hall. These areas include, but are not limited to, hallways, study rooms, and lounges.
• All first-time offenses of this policy by residential students (except those involving severe intoxication or a police 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.
• Discipline sanctions related to housing infractions will be primarily educational but may include a housing assignment change, referral to the university judicial administrator, or removal from housing.
• All cases involving severely intoxicated students or a police or emergency medical response will be referred to both the university judicial administrator for disciplinary action, and to personnel in the Office of Substance Abuse Programs and Services for appropriate evaluation and referral.
• All students referred to the university judicial administrator will be evaluated by personnel in the Office of Substance Abuse Programs and Services. The sanctions imposed in these cases will be designed to offer assistance in overcoming any identified problems. 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 when the first offense indicates a serious problem. This involvement will be in accordance with 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 and 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 state 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 non-licensed, public places or offering a drink to another in a non-licensed, public place is also a violation of Virginia law. The sale of alcoholic beverages to an intoxicated person is prohibited. Additionally, 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 .08 percent or higher. Individuals under age 21 who drive with a BAC of more than .02 percent, but less than .08 percent, risk having their driver’s license suspended for six months, and a fine of up to $500 may be imposed. 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 .08 percent or higher may result in an individual’s driver license being revoked for seven days. There is no longer an option to request a blood test instead of a breath test for an alcohol-related offense.
It is illegal to sell 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 due to 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 dealing with alcohol and other drug problems are encouraged to seek the confidential services of resources 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 Resource Room, SUB I, Room 220, 703-993-3686
Health and Wellness Center, SUB I, Room 214, 703-993-2830
State Employee Assistance Service (SEAS): 804-786-6741
Alcoholics Anonymous: for campus meetings, 703-993-3686; 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 newspapers, Broadside and the Mason Gazette.

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 to 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. Also, 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 (SRP) at stopit@gmu.edu or abuse@gmu.edu. Many local computing systems have similar e-mail reporting addresses.

Definitions
George 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 (SA): 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 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
SA’s have been granted extraordinary powers, which they should exercise with great care and dignity, to override or alter access controls, configurations, and passwords. SA’s manage computers and administer policies, but they do not create policies. Their actions are constrained by this policy and by the policies of local administrative units.

A set of guidelines and standards for all SA’s is created and maintained by the ITU with the review and concurrence of the SRP. These guidelines address job responsibilities, integrity issues, and standard actions that do not violate privacy. Managers of university units who employ SA’s are responsible for ensuring they comply with and enforce the requirements of this policy in the systems for which they are responsible. SA’s who violate this policy or who 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, or unauthorized service or access denials, the SA may take immediate action to stop the threat or minimize the damage. This 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. SA’s 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 information technology unit (ITU) staff member, and one non-ITU system administrator. The vice president for information technology (VPIT) appoints the SRP members. The SRP chair is a faculty member appointed by the VPIT.

SA’s are to 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 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 a George Mason Computer Emergency Response Team (GMU-CERT), which coordinates responses to abuses, provides technical assistance on security matters to SA’s, 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; violating federal or state law or university policy.

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 else offers an account you are not authorized to use, decline. If you discover someone’s password, don’t use it; report the 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 chooses to refrain from inspecting users’ files except in certain well-defined cases (description follows). SA’s 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; 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. Also, SA’s 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 using 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 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 to be 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 that 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 over a year. Mail undelivered for any reason may be copied to the mailbox of a “postmaster” on the sender or recipient computers. 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, system-wide 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, SA’s 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 officials 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 pages (www.gmu.edu) contain public information about the 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 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
The steps of the process are as follows:

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

“Someone using your account did [whatever the offense is].” This is followed by an explanation of why this 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 resecure 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 that 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 are to be reviewed and approved by the Office of the Provost and the Office of the Senior Vice President.

**Effective Date**

The policies herein became effective October 20, 1997, and were revised March 8, 2004. This policy shall be reviewed and revised annually, if necessary, to become effective at the beginning of the university’s fiscal year, unless otherwise noted. Any updates or additions to this information take precedence over any printed matter; they can be found at www.gmu.edu/srp.

**Parking Policy**

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

All faculty, staff, and students who park on property owned or operated by the university must display a valid decal, or must 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 Drive off Patriot Circle. Visitors and guests must park in the deck or at a meter, unless special arrangements have been made through Parking Services.
Decal 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, handicapped 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 decal as soon as they arrive on campus. Three types of parking decals are available: yearly, semester, and summer. Decals 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, Thursday and Friday; and 8:30 a.m. to 6 p.m. Tuesday and Wednesday.

Handicapped parking is available at a number of convenient locations at Mason facilities. A Department of Motor Vehicles (DMV) handicapped permit must be displayed along with a university permit; a DMV permit alone is not sufficient for parking in handicapped spaces in university lots. A visitor with a DMV tag or permit may park in a parking deck at prevailing rates. Parking in or blocking access to a handicapped 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. Complete parking regulations are in the Information Guide available at Parking Services. For more information, call the Parking Services Office at 703-993-2710.

Motorist Assistance Program (MAP)
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 also 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.

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

The Office of University Services assists students who are having difficulty obtaining administrative services or who 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 cchisler@gmu.edu.

Sexual Assault Policy
The following policy applies 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. The university 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 by a stranger, an acquaintance, or an intimate), forced sodomy (forced oral or anal sex), or the forced penetration by a foreign object, including a finger. Nonpenetration sexual assault includes the act of touching an unwilling person’s intimate parts such as genitalia, 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 or through the use of force, threat, 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 these actions will be subject to university disciplinary procedures when the alleged incident has occurred on campus, or when the action 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, imprisonment, or both. 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 post-secondary 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 and employees, and to any applicant who so requests.

The university offers 24-hour assistance through the Office of Sexual Assault Services to those who have been affected by sexual assault.

Sexual Harassment Policy
Sexual harassment is unacceptable conduct and is not condoned in any form. This policy is part of the university’s efforts to maintain learning and work environments free from sexual harassment. While this problem can seriously affect all members of an educational community, sexual harassment can be particularly devastating for the student population. A sexual harassment experience can affect a student’s emotional well-being, impair academic progress, and even inhibit the attainment of career goals. This problem can likewise adversely affect employees and applicants for both employment and admission to the university. The university, therefore, must move to eliminate this problem from the community.
It is generally agreed that what constitutes and defines sexual harassment can vary under particular circumstances and events. Nevertheless, using the definitions of the U.S. Equal Employment Opportunity Commission (EEOC) and the U.S. Department of Education’s Office for Civil Rights, the university defines sexual harassment as follows:

Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute harassment when:

- Submission to or rejection of such conduct is made either explicitly or implicitly a term or condition of an individual’s academic performance or employment.
- Submission to or rejection of such conduct by an individual is used as the basis for decisions about academic evaluation, employment, promotion, transfer, selection for training, performance evaluation, or selection for academic awards or benefits.
- Such conduct has the purpose or effect of creating an intimidating, hostile, or offensive educational or work environment or substantially interferes with a student’s academic or an employee’s work performance.

While this definition reflects the historical fact that the majority of sexual harassment complaints involve a male harasser and a female complainant (or victim), the definition applies equally to female harassers and male victims as well as same-sex harassment.

Mason is committed to eliminating sexual harassment from the campus while ensuring basic protection for all parties. The Office of the Vice President and University Equity Officer (also known as the Equity Office) is specifically charged to assist in the investigation and resolution of allegations of discrimination and harassment including sexual harassment. Further, the office exists, in part, to ensure that members of the campus community understand their responsibility to create and maintain an environment free from discriminatory actions and behaviors.

For more information, contact the Equity Office at 703-993-8730 or 703-993-8787 (TDD).

Stalking Policy

Stalking is prohibited and will not be tolerated. Stalking is defined as any behaviors or activities that, when taken as a whole, cause the victim to reasonably believe that his or her safety is at risk, or that materially affect the learning experience or participation in the university community. This policy applies to students, faculty, staff, contractors, and visitors as well as to behaviors and activities that occur both on and off campus.

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

Stalking may take many forms, including unwanted communication or contact, including face-to-face, telephone, voice mail, e-mail, U.S. mail, and unwanted gifts; use of threatening gestures; pursuing or following; surveillance or other observation; obtaining or tracking private information without permission; trespassing; vandalism; nonconsensual touching of person or property; and use of a third party.

Victims of stalking are encouraged to report incidents to the campus or local police. Some of these behaviors or activities are illegal under Virginia law (Code Section 18.2-60.3) and may be prosecuted as a misdemeanor or a felony. Other options available to stalking victims include utilizing campus judicial processes or seeking a remedy through civil proceedings. Support is available at the University Sexual Assault Services Office, 703-993-4364.

Individuals with Disabilities Policy

The university is committed to complying with the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 by providing reasonable accommodations for disabled applicants for admission, students, applicants for employment, employees, and visitors. Applicants for admission and students requiring specific accommodations for a disability should contact the Disability Resource Center at 703-993-2474, or the Equity Office at 703-993-8730. Applicants for employment and employees should contact Human Resources at 703-993-2600 or the Equity Office. Students and employees are responsible for providing appropriate documentation and requesting reasonable accommodation in a timely manner.

Other Regulations

Weapons

The unauthorized possession, storage, display, or use of any kind of ammunition, firearm, firework, explosive, air rifle, air pistol, or other lethal instrument is prohibited on university property. Any questions regarding this regulation should be directed to 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, or inside university buildings.

Pets

No pets, except those assisting people with disabilities, are permitted in university buildings at any time. In addition, pets that are 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

703-993-2250
Web: library.gmu.edu

Administration
John G. Zenelis, University Librarian and
Associate Vice President, Information Technology
Fenwick Library, A227
Craig Gibson, Associate University Librarian for Public Services
Clyde W. Grotophorst, Associate University Librarian for Library Systems
Ruth Kifer, Associate University Librarian for Distributed Libraries
John C. Walsh, Associate University Librarian for Resources and Collection Management Services

Professional Faculty

Administrative Faculty
Chase, Ercolano, Kelso, 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 1.08 million books and bound journal volumes; more than 11,000 current print serial subscriptions; 2.84 million microform units; more than 350,000 government documents; 212,000 maps; 31,000 multimedia materials; 479 electronic databases, including access to 20,000 electronic journals as well as 44,000 electronic books and proceedings; 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 virtual reference service.
The library liaison program to academic departments and programs 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.

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

- The Virtual Library of Virginia Program (VIVA), a Virginia-funded electronic resources 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, the Chicago-based “research library” for research libraries whose multi-million volume holdings are comprised of specialized and uniquely held materials in North America
- Virtual Library of Virginia (VIVA), a region-wide network for students to use anywhere in the building.

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 through the Consortium Loan Service, interlibrary loan, or commercial delivery services when required.

Expanded academic support services of the University Libraries also include the following:

**Ask A Librarian Virtual Reference Service**

Web: [library.gmu.edu/research/](library.gmu.edu/research/)

This service enables users and a reference staff member to chat online in real-time. The service also allows the reference staff to share web pages and other helpful materials to assist students and faculty with their research, collaboratively and interactively.

**University Copyright Assistance Office**

Johnson Center, Rooms 120, 121
Phone: 703-993-2562, 3158, or 2427
Fax: 703-993-4116
Web: [library.gmu.edu](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.

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**University Dissertation and Thesis Services (UDTS)**

Web: [gmu.edu/library/specialcollections/dtwebguide](gmu.edu/library/specialcollections/dtwebguide)

The University Dissertation and Thesis Services (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.

**Statistical Support Services**

**Fenwick Library Government Documents Microfiche Room**

Phone: 703-993-3417
Web: [library.gmu.edu/srs](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 myriad statistical-analysis software.

**Fenwick Library**

Phone: 703-993-2240

Fenwick is the main research 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. Additionally, 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 comprised of 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 programs. The library also holds designated discipline-based circulating book collections. It is the center for multimedia collections and services for the entire 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 for students to 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:** 703-993-8106  
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’s 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 is an emphasis on providing many of its resources and services online. This library supports a wireless network, and assistive technologies are available for people with disabilities.

Prince William Library  
**Phone:** 703-993-8340  
This rapidly growing library supports faculty and students in the programs and courses offered at the Prince William Campus, including education; biotechnology; computer science; health, fitness, and recreation resources; administration of justice; and biotechnology and biodefense. 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, Director  
**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 and law. The library also provides access to electronic law resources including Lexis, Westlaw, and LegalTrac. This library is open to all members of the university community, and its collections are available for checkout to all faculty, students, and staff.

University Scholars Community  
**Administration**  
Student Academic Affairs  
Johnson Center, Room 245  
703-993-9082  
Erek Perry, MEd  
University Scholars  

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. The University Scholars reside in a common residence hall their first year and share the University Scholars Center. Together, the scholars form 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 academic seminars that appeal to a wide range of majors among undergraduate students. 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 be applied toward the satisfaction of general education requirements.

University Transitions Courses  

The University Transitions courses series 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 to get involved on campus. UNIV 200 topics focus on choosing a major or career. UNIV 300 has two tracks. The first is for new transfer students making the transition to a new university, and the second focuses on career readiness for internships and research assistantships. UNIV 400 emphasizes helping future graduates prepare for the workplace, graduate school, and life responsibilities.

University Interdisciplinary Honors Seminars  

The University Interdisciplinary Honors 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,
Academic Programs and Resources

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. UNIV 301 Great Ideas in Science and UNIV 441 AIDS: Its Impact in Our Society are regularly offered university courses and are each 3 credits.

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 in anthropology
- BA in communication, with a concentration in international and intercultural communication (Communication Department)
- BA, BS in geography (geography and Earth science)
- BA in global affairs
- BA in government and international politics, with a concentration in international and comparative politics (Public and International Affairs Department)
- BA in Russian studies (Modern and Classical Languages)
- BA in foreign languages, with concentrations in French and Spanish (Modern and Classical Languages)
- BA, BS, MA, PhD in conflict analysis and resolution (Institute for Conflict Analysis and Resolution)
- MA in curriculum and instruction, with concentrations in multicultural education, foreign language education, and teaching English as a second language
- MA in foreign languages, with concentrations in French or Spanish, or in Spanish and bilingual-multicultural education (Modern and Classical Languages)
- MA in history, with concentrations in comparative world history and modern European history (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
- MA in telecommunications with a concentration in international telecommunications
- Interdisciplinary minors in ancient Mediterranean art and archaeology, Asia-Pacific studies, global systems, Islamic studies, Latin American studies, linguistics, the New Europe
- Minors in Chinese, French, German, global affairs, international comparative studies, Latin, Russian, and Spanish
- Undergraduate certificate in teaching 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 market analysis; managing international commerce; science, technology, and the global economy; and teaching English as a second language.

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

Study Abroad: Center for Global Education (CGÉ)

Phone: 703-993-2154
Web: www.gmu.edu/departments/cge/

The Center for Global Education (CGÉ) functions as the university’s hub for international educational activities. The CGÉ offers short-term intersession, semester- and year-long exchange and honors programs, and intensive language courses for all members of the academic community and public. CGÉ hosts international visitors to the university and is the repository of all memoranda of understanding concerning educational exchange between the university and institutions abroad.

Center for Field Studies

Phone: 703-993-1740
Web: www.ncc.gmu.edu/Ncc2000/courses/cfs/welcome.html

This center was created to oversee and coordinate field projects, and to promote and facilitate teaching, research, and study outside of the campus community. Its primary site for outreach activities is the Bahamas Environmental Research Center.

Resources for International Students and Scholars

English Language Institute (ELI)

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

Administration

Kathryn Trump, MA, Director
Baotran Nguyen, MA
John Pope, MA

The English Language Institute (ELI) provides quality instruction in English as a second language that is aimed at developing 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 non-native English speaking students newly admitted to Mason, and for 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 (OIPS)

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

The Office of International Programs and Services (OIPS) provides immigration assistance to international students, visiting scholars, faculty, and staff, and offers programs and
activities that focus on intercultural themes for the entire university community.

International Student Umbrella (ISU)
Phone: 703-993-2898
Web: www.gmu.edu/org/isu
E-mail: isu@gmu.edu

The International Student Umbrella (ISU) 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 (OCPE)

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

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

Herndon Office and Training Center
Center for Innovative Technology (CIT)
2214 Rock Hill Road
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 increasingly 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 www.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 Professional Development Office facilitates a variety of open enrollment and contract programs (both noncredit and credit) supporting the strengths of the programs on 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 Herndon Office and Training Center, located in 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, organizational learning, 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, organizational learning, 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 chapter.
Training Corps (ROTC)

Phone: 703-993-2707  
Fax: 703-993-2708

Administration
James S. Overbye  
Director, Military Science Department  
South P.E. Module, Room F27

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

Enrollment

Enrollment in military science (MLSC) courses is open to all students. Freshmen (MLSC 100 and 101), sophomore (MLSC 200 and 201), and junior (MLSC 300 and 301) classes are awarded 1 credit each. Senior classes (MLSC 400 and 401) are 3 credits each. Credit earned in all military science courses count toward degree completion as elective credit. No service obligation is incurred by enrolling in Army ROTC. Courses can be dropped or added, just as with any elective course at Mason. The four-year program is organized into two successive phases: the basic course and the advanced course. For students seeking the opportunity to earn a commission as an officer, several entry methods and participation strategies can be used. A minimum of four semesters must remain in the student’s academic curriculum to complete commissioning requirements; these semesters may be part of either an undergraduate- or graduate-level degree. Course descriptions appear under Military Science (MLSC) in the “Course Descriptions” chapter of this catalog.

Basic Course Curriculum

The basic course curriculum is a four-course series (MLSC 100, 101, 200, 201), usually taken in the freshman and sophomore years. Each class awards 1 academic credit. The basic course trains students in the topics listed above as well as in applied topics including map reading, land navigation, first aid, physical fitness and health, writing, and briefings. 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 when finished. 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 (FTXs) 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 participate in and complete 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 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 most 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 for contracted students. Cadets attend LDAC in the summer between their junior and senior years. Salary, travel expenses, and room and board are all provided during camp. LDAC is a critical part of the ROTC program that students must pass to receive a commission.

There are also professional military education requirements. Contracted cadets must take and pass courses in written communications, computer literacy, and military history. These courses come from the general course offerings of the university and may also 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 have to 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 400 and 401 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.

• A student may complete the four-year program.
• The freshman and sophomore classes may be compressed into the sophomore year.
• A veteran may enter directly into the junior year (when academically aligned as a junior).
• A sophomore student 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 graduation, and resident aliens who become U.S. citizens by a certain...
Course Work
The Global Affairs Program offers all course work designated GLOA in the “Course Descriptions” chapter of this catalog.

UNDERGRADUATE PROGRAM
Global forces are changing people’s lives in dramatic ways, with the intensification of global interconnectedness, rapid capital and trade flows, large-scale social movements, international military actions, and global media markets. The global affairs major provides the tools to understand these processes.

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: politics, economics, culture, peace and conflict, the environment, and more. Majors also study specific regions and languages, and investigate the ways particular parts of the world experience global processes. Study abroad and internships are strongly encouraged; the major advisor will help students work these experiences and academic credits into the program of study. Since the major includes many electives, students can also complement their major with a second major or a minor. With a truly interdisciplinary understanding of global trends, advanced foreign language skills, and possible study abroad, global affairs majors will be strong candidates for international careers and advanced graduate study.

Degree Requirements
In addition to satisfying the university general education requirements, students majoring in global affairs must complete the following:

• 18 credits in core requirements: GLOA 101, CONF 336, CULT 320, ECON 385, EVPP 337, and GOVT 322 (fulfills university global understanding requirements). GOVT 132 or 133 is a prerequisite for GOVT 322.

• 12 credits in one of the following concentrations: global communications and technology, global diplomacy and governance, global economy and management, global inequalities and responses, the environment, world arts, Africa, Asia, Europe, Latin America, North America, Middle East and North Africa, Russia and Central Asia, independent study. (See the global affairs web site or major advisor for requirements for each concentration. Courses must come from at least two different departments or programs. If more than one concentration is chosen, each concentration must have 12 unique credits.)

• 6 credits of language courses beyond intermediate-level proficiency in one foreign language. Intermediate-level proficiency is demonstrated by completion of one foreign language course at the 202 level, or by a satisfactory score on an approved proficiency test. After obtaining intermediate-level proficiency in a foreign language, global affairs majors must complete either two 300-level courses conducted in that foreign language, or any two courses conducted in another foreign language, for a total of 6 credits.

A total of 120 credits are required for the BA, 45 of which must have been at the 300- and 400-levels. Students who major in global affairs are not eligible to earn the global systems 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 global affairs may fulfill this requirement by successfully completing GOVT 322.

Advising
The director of the Global Affairs Program is also the major advisor. Global affairs majors are urged to discuss their programs periodically with the major advisor.

Global Affairs in a Double Major
Students interested in designing a double major are encouraged to discuss their plans with the advisor.

Minor in Global Affairs
This interdisciplinary minor provides students with a global perspective that can enhance many different majors. The minor is not available to students majoring in global affairs. To receive a minor in global affairs, students must complete the following 15 credits of course work:

GLOA 101 Introduction to Global Affairs; CULT 320 Globalization and Culture; ECON 385 International Economic Policy; GOVT 322 International Relations Theory; and one of the following: CONF 336 Globalization, Peace, and Conflict; or EVPP 337 Environmental Policy Making in Developing Countries.

Center for Global Studies
Phone: 703-993-4625
Web: cgs.gmu.edu

Administration
Peter Mandaville, Director and Assistant Professor, Government and Politics

The Center for Global Studies is dedicated to the promotion of multidisciplinary research on globalization. The center coordinates outreach efforts in global affairs, facilitating access for external communities to the university’s full range of global expertise. Ongoing activities include guest speakers, an annual conference, electronic and paper publications, and the award of small grants to support faculty and student research. The center also manages multiacademic unit research projects on an ad-hoc basis.

Krasnow Institute for Advanced Study
Phone: 703-993-4333
Web: krasnow.gmu.edu/

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. These separate disciplines increasingly overlap and promise progressively deeper insight into human thought processes. The institute also examines new insights from cognitive science research that can be applied for human benefit in the areas of mental health, neurological disease, education, and computer design.

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. With an annual budget of $2.4 million, the institute is home to a scientific staff of 50. Cognitive research at the institute spans from molecules to mind. Krasnow scientists have published extensively in the most prestigious scholarly journals, and collectively have brought in more than $17.2 million in sponsored research from federal agencies such as the National Institutes of Health, and private sources such as the Whitaker Foundation.

Center for Social Complexity

Phone: 703-993-1402
Web: socialcomplexity.gmu.edu

Administration
Claudio Cioffi-Revilla, Director
Cindy Roberts, Administrative Assistant

Faculty
Axtell, Beach, Cioffi-Revilla, De Jong, Gentle, Grefenstette, Guillory, Luke, McCabe, Palkovich, Parker, Schintler, Snead, Wagner, Wong

Course Work
The Center for Social Complexity offers all course work designated CSS in the Courses chapter of this catalog. CSS courses are intended for students who are interested in taking individual CSS courses, students seeking a concentration in CSS, and those pursuing a graduate degree in CSS.

Computational Social Science (CSS) is an interdisciplinary field that combines the application of computer simulation and other computer-based methods to the analysis of social systems and processes at all levels or scales of complexity: cognitive, individual, group, society, national, and world systems. Examples of complex social dynamics include the evolution of civilization and technology, warfare and terrorism, economic market dynamics, human organizations, intelligence and early warning, and emergence of language and symbol systems. Every social science includes a computational field: anthropology, ecology, economics, geography, history, linguistics, political science, and sociology. CSS also includes the interaction between artificial human and natural systems.

GRADUATE PROGRAM
A student must maintain a minimum average 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.

◆ Certificate in Computational Social Sciences
This 15-credit program is for students seeking to receive 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 to all students who hold a bachelor’s degree from an accredited university. Interested students not already in a Mason degree program must apply for admission to nondegree status. 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.

Core courses: CSS 600 Introduction to Computational Social Science and CSS 610 Computational Analysis of Social Complexity. Both courses are required.

Electives (three of the following): Students are required to take a minimum of 9 credit hours in elective or other core courses (CSS 605, 620, 692). Students may include a maximum of 3 credit hours of programming courses to meet the 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 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. Since programming and computational technique courses are generally offered for 1 credit hour, students gain flexibility in tailoring the requirements, balancing specific computational methods courses with current programming skills.

Students intending to obtain the CSS certificate must contact the director no later than two semesters prior to completing the required credit hours.

■ Computational Social Sciences, PhD
The core objective of the 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
The application deadline is February 1 of each year for students seeking financial aid, or April 1 for all other students. Only students who need to take prerequisites in areas of deficiency will be admitted in the spring semester (October 15 deadline), and they are expected to join the regular schedule in the fall semester.

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 those 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.

During the program, students are expected to develop significant expertise in the utilization of computational social science resources such as agent-based simulations or other computational tools. The program maintains a simulation environment, the Multi-Agent Simulator of Neighborhoods and Networks (MASON), in collaboration with the Evolutionary Computation Laboratory (EC Lab) of the Department of Computer Science. Mathematics training beyond basic calculus is not required, but it may be useful in some areas of specialization.

Application materials must include the following:

• Completed application form
• Official transcripts for all undergraduate (minimum overall 3.25 GPA) and graduate courses, minimally including one undergraduate course in calculus and knowledge of a computer programming language, preferably object-based
• Updated curriculum vitae
• A statement of purpose (maximum 2,000 words) consistent with the research interests of at least one faculty member in the program
• The names of two Mason faculty members who may be suitable as advisors
The above items must be submitted jointly, as a package. Other mandatory application materials include the following:

• Three letters of recommendations by faculty members or individuals with direct knowledge of the student’s academic or professional capabilities. The letters must arrive directly from the senders and may be submitted electronically as .pdf attachments. Send to ccioffi@gmu.edu, with copy to complex@gmu.edu.
• Graduate Record Examination (GRE) taken within the past five years prior to the date of application submission
• Test of English as a Foreign Language (TOEFL) as per Mason policies

Additionally, but not as a requirement, applicants may submit prior work in computational social science, such as simulation models or publications.

Each application package is reviewed by the program director, who shares them with the faculty members listed by the applicant. The admissions decision is determined by an applicant’s credentials and matching faculty interests. The program may recommend that an applicant delay a year, who shares them with the faculty members listed by the student’s advisor, to provide domain-specific knowledge.

15 credit hours 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, an MS in computer science) but weaker social science training will be required to use all or most of these electives in a substantive social science. Conversely, students with a strong background in social science (for example, a BS in economics) will be required to use most or all of these electives in computing courses.

24 credit hours of dissertation research to demonstrate doctoral-level originality and research excellence.

The 18 credit hours of required CSS courses include several courses (CSS 605, 610, 645, 692) where computational projects are required. Thus, experience in developing computational models is developed early in the program.

The 30 credit hours consisting of discipline-based social science courses, elective courses, independent research, and directed readings must be approved by the student’s advisor and the graduate program director. The director maintains a list of recommended elective courses by discipline. Elective courses may also originate from the cross-registration mechanism offered by the Consortium of Universities of the Washington Metropolitan Area (CUWMA) if a specific necessary course is required for a student’s specialization. As with all non-core courses, CUWMA courses must be approved by the student’s advisor and the CSS graduate studies director.

Up to 30 of the required 48 credit hours may be waived based on prior master’s level training and the specific courses taken. A maximum of 24 credit hours of prior graduate coursework may be credited, provided such credits have not been used for another degree. The combined 30 credit hours of disciplinary and elective courses compensate for the diverse prior backgrounds of students.

The following professional extracurricular activities are also encouraged for advanced students: attending professional lectures and colloquia on campus and in the capital area; writing research grant proposals individually or with faculty or other students, especially proposals addressed to the National Science Foundation; writing and publishing in peer-reviewed journals, including the most competitive disciplinary journals in the social sciences as well as the more specialized computational social science journals; learning the art and science of excellent teaching; presenting papers at professional conferences; and attending summer training opportunities such as those at Santa Fe Institute and the ICPSR (Inter-University Consortium for Social and Political Research) at the University of Michigan, Carnegie Mellon University. Students with a writing deficiency are required to take one or more courses in English as a second language or in technical and scientific writing. The program director

Degree Requirements
The degree requires 72 credit hours, with the following functional distribution and learning objectives:

18 credit hours of required CSS courses to provide a shared knowledge core regardless of prior background:

CSS 690 Introduction to Computational Social Science (the “survey” course) CSS 605 Object-Oriented Modeling for Social Science CSS 610 Computational Analysis of Social Complexity CSS 620 Origins of Social Complexity
Two other core courses from among the following:

CSS 645 Spatial Agent-Based Models CSS 650 Complexity Theory in the Social Sciences CSS 692 Social Network Analysis

15 credit hours 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 credit hours 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, an MS in computer science) but weaker social science training will be required to use all or most of these electives in a substantive social science. Conversely, students with a strong background in social science (for example, a BS in economics) will be required to use most or all of these electives in computing courses.

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The 30 credit hours consisting of discipline-based social science courses, elective courses, independent research, and directed readings must be approved by the student’s advisor and the graduate program director. The director maintains a list of recommended elective courses by discipline. Elective courses may also originate from the cross-registration mechanism offered by the Consortium of Universities of the Washington Metropolitan Area (CUWMA) if a specific necessary course is required for a student’s specialization. As with all non-core courses, CUWMA courses must be approved by the student’s advisor and the CSS graduate studies director.

Up to 30 of the required 48 credit hours may be waived based on prior master’s level training and the specific courses taken. A maximum of 24 credit hours of prior graduate coursework may be credited, provided such credits have not been used for another degree. The combined 30 credit hours of disciplinary and elective courses compensate for the diverse prior backgrounds of students.

The following professional extracurricular activities are also encouraged for advanced students: attending professional lectures and colloquia on campus and in the capital area; writing research grant proposals individually or with faculty or other students, especially proposals addressed to the National Science Foundation; writing and publishing in peer-reviewed journals, including the most competitive disciplinary journals in the social sciences as well as the more specialized computational social science journals; learning the art and science of excellent teaching; presenting papers at professional conferences; and attending summer training opportunities such as those at Santa Fe Institute and the ICPSR (Inter-University Consortium for Social and Political Research) at the University of Michigan, Carnegie Mellon University. Students with a writing deficiency are required to take one or more courses in English as a second language or in technical and scientific writing. The program director
maintains a set of resources for writing and publishing in computational social science.

The length of time required to complete the program varies, depending on a student's time commitment, resources, and academic progress in the course of study. Assuming a student enters the program with proper undergraduate background, has focused research motivation, and full-time enrollment, the PhD could be earned in four years, if all academic requirements are met. Some students arriving with either a master's degree or with prior course work in computational social science could take less than four years. Most students will require five or more years, depending on academic progress, funding, and other factors that are unpredictable. The next section provides an example based on a full-time "normal load." A "light load" would take longer, up to the statutory limit allowed by Mason (11 years). Students with the strongest research capabilities and professional potential will usually be eligible for funding through extramural grants.

**First Year Evaluation, Candidacy Examination, Doctoral Dissertation Proposal**

During the first year, every 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. At least three committee members, including the advisor, must be tenure-line faculty in the School of Computational Sciences (SCS), College of Arts and Sciences (CAS), School of Information Technology and Engineering (IT&E) or Krasnow Institute for Advanced Study. The committee will assist the student in designing a specific plan of study for core and elective courses, evaluate the student's progress by the end of the first year, and issue a recommendation. The plan of study will become part of the student's file and will be reviewed periodically. A student with strong social science background upon entry will be advised to take a prevalence of computational courses as electives. Conversely, a student with strong computational background (such as excellent programming skills in Java or C++) will be advised to focus the elective courses on substantive social science content. The first-year evaluation will be based on a comprehensive assessment of course work including grades, papers, and any other materials the student wishes to submit, including computational modeling projects from CSS 605, 610 or other. Based on the evaluation, the First Year Committee will encourage or discourage further continuation in the program. If continuation is recommended, the student's next goal is to pass candidacy exams. The First Year Committee must be approved by the CSS program director.

Assuming normal progress and continuation, during the second year every student will form a Doctoral Dissertation Committee consisting of the student's dissertation advisor, who serves as chair, plus three or four appropriately qualified individuals. The dissertation committee may simply be an enlarged First Year committee, or it may be a different committee, depending on the evolution of a student's interests. At least three committee members, including the advisor, must be tenure-line faculty in the SCS, CAS, IT&E or Krasnow Institute. The committee must be 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 a student has completed all core requirements and a majority of additional course work (18 plus 15 credit hours). In the "normal load" example above, this corresponds to roughly the fifth semester into the program, or fall semester of the third year. The purpose of the candidacy exam is to assess the student's substantive and methodological knowledge in computational social science 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. Examples of areas of concentrations and potential specializations 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 WWW, 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: multi-agent systems, evolutionary computation, UML, GIS, visualization, sonification, computational epistemology

The candidacy exam will consist of written and oral parts. The written part will contain general as well as specialized questions. It will be prepared by the program director and the student's advisor, who will solicit questions from the faculty. Each question in the written exam will be evaluated in terms of A (high pass), B (pass), or C (fail). A grade of B+ or higher is necessary for proceeding to the oral exam. The oral exam will cover the same or related material as the written exam, for the purpose of assessing the student's ability to respond with knowledge and professionalism to questions of substance or method. The oral exam is public and may be attended by fellow students and interested faculty. Each portion of the candidacy exam may be retaken only one time.

After passing the candidacy exam, each student will prepare and within a year defend a dissertation proposal, written in the form of an extramural research grant proposal. The student will develop this proposal in consultation with the Dissertation Committee. The main criteria of evaluation will be threefold: originality, importance, and feasibility. If successfully defended, the Dissertation Committee may recommend submission to an appropriate funding agency. The committee may also recommend different or additional course work to improve the dissertation project, as well as specific benchmarks that the project must attain. A student becomes a PhD candidate (so-called ABD status) after passing the candidacy exam and successfully defending the dissertation proposal. An ABD PhD candidate student may apply for a position that accepts applicants with an expected date for degree conferred.
Doctoral Dissertation

The PhD dissertation is the detailed written report of an original and significant research contribution to computational social science. The essence of any dissertation in computational social science—as distinct from a dissertation in traditional social science or in computational science—is given by the unique combination of an original and significant substantive research question drawn from one or more of the social sciences; and an approach that is fundamentally computational or based on a complexity-theoretic analysis that involves a computational logic. Another set of examples may be found in the articles published in peer-refereed periodicals such as the Journal of Artificial Societies and Social Simulation, many of the working papers of the Santa Fe Institute, or proceedings of national or international professional conferences where advanced graduate students often present their dissertation research.

Parts of the dissertation should be publishable as refereed articles or refereed conference proceedings. Previously published content may be included in the dissertation, except when the work in question was not produced in a significant way by the student. Since computational social science research is frequently collaborative in nature, it is acceptable for a student to include in the dissertation the products of such collaboration, including work produced in conjunction with the advisor or other members of the Dissertation Committee. A collection of published papers with a common theme may constitute the dissertation. If a doubt arises, the Dissertation Committee will determine the status of any given item.

The dissertation defense will take place upon recommendation of the student’s Dissertation Committee, at a time and place agreeable to all, with a minimum advance notice of two weeks. The defense is open to the public, and fellow students and interested faculty and staff are encouraged to attend. However, only members of the Dissertation Committee may ask questions or make comments following a presentation by the student candidate. The Dissertation Committee recommends that the graduate faculty of Mason accept the student candidate for the PhD after a successful defense and completion of any final revisions. The committee chair will ensure the implementation of any final revisions, if any are requested and agreed upon by the members of the Dissertation Committee. Additionally, the Dissertation Committee may also recommend publication of the dissertation in revised form.
University General Education

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

General Education Requirements

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

General Education Mission

The mission of the General Education program is to educate, liberate, and broaden the mind, and to 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 the skills to ensure a well-rounded and usable education. The program seeks four specific goals:

- Courses should ensure that all undergraduates develop skills in information gathering, written and oral communication, and analytical and quantitative reasoning.
- Courses should expose students to the development of knowledge by emphasizing major domains of thought and methods of inquiry.
- Courses should enable students to attain a breadth of knowledge that supports their specializations and contributes to their education in both personal and professional ways.
- Courses should 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/index.html. 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)**
- AFT 100; CJS 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**

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<tr>
<th>Literature (3 credits)</th>
<th>CHIN 310, 311, 325, 328; CLAS 250, 260, 340, 350, 360, 380; ENGL 201; FREN 325, 329; FR LN 330; GER M 325; PHIL 253; RUSS 325, 326, 327; SPAN 325</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. History (3 credits)</td>
<td>HIST 120</td>
</tr>
<tr>
<td>Western Civilization (3 credits)</td>
<td>HIST 100</td>
</tr>
<tr>
<td>Social and Behavioral Science (3 credits)</td>
<td>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); GEOG 103; GOVT 101, 103; LING 326; PSYC 100, 211, 231; SOAN 190; SOCI 101; WMST 200</td>
</tr>
<tr>
<td>Global Understanding (3 credits)</td>
<td>ADJ 405; ANTH 302, 304, 306, 309, 311, 312, 313, 331, 332, 333, 385; ARTH 203, 219, 320, 380, 382, 383, 384, 385; CEIE 100; COMM 305, 456; DANC 118; ECON 360, 361, 362, 380, 390; ENGL 349, 350; GEOG 103; GLOA 101; GOVT 132, 133, 149; HIST 125, 130, 251, 252, 261, 262, 271, 272, 281, 282, 328, 329, 356, 364, 365, 387, 459, 460, 462; MSOM 305; MUSI 103, 431; RELI 100, 211, 212, 213, 315, 341, 374, 490; RUSS 354; SOCI 120, 320, 332; SPAN 322; THR 359; TOUR 210; WMST 100</td>
</tr>
<tr>
<td>Natural Science (7 credits total)</td>
<td>BIS 490; CAS 313; FREN 476; MUSI 491, 495; SPAN 461, 466</td>
</tr>
<tr>
<td>Non-Lab (3 credits)</td>
<td>CHEM 103, 104, 160, 243, 244, 245, 246, 260, 261, 262, 263</td>
</tr>
</tbody>
</table>

**Synthesis Requirement**

| Synthesis | ADJ 303; ANTH 400; ARTH 394; AVT 497, 498; BINF 354; BIOL 301; CEIE 490; COMM 326, 362, 454; CS 306, 491; DANC 490; ECE 447, ECE 492, 493; ECON 309; ENGL 325; EOS 304; GEOG 304; GOVT 490, 491; HIST 300, 470; IT 492; MUSI 490; NCLC 308; NURS/HSCI 465; PHIL 309, 377, 378; REL 490; RUSS 353; SOCI 377, 384; SOCW 323; SOM 498; SYST 495; THR 440, 496; UNIV 342, 442 |

**Total:** 43 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), 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 will 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 will 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 will 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 will 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. To ensure skills, a basic proficiency established through a test is required before attempting courses that satisfy this requirement. Students who demonstrate a higher proficiency level may...
Core Requirements

Courses foster understanding and provide students with an understanding of natural science. The critical approach of the scientific method, the relation of theory and experiment, the use of quantitative and qualitative information, and the development and elaboration of major ideas in science are addressed.

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.

U.S. history goal: Course enables students to develop an understanding of the institutions and traditions of our society from its founding documents, values, and institutions to the present. Attention to the processes of historical analysis is fundamental to the course.

Required: One required course.

Western civilization 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 in the world.

Required: One required 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 as well as 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 required course.

Social and behavioral sciences goal: Courses provide students with an understanding of the social and behavioral sciences. Students will be 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 required 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.

Information technology (IT) goal: Students will possess a command of basic software and hardware concepts, terminology and functions, and file and data structures, and will be expected to use appropriate electronic tools for data organization and search, including databases, web browsers, and search engines; data analysis, including spreadsheets, GIS, 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 examinations, and modules.

University General Education
Interim Synthesis

All courses in this category fulfill the same requirements as the synthesis requirement. Courses will only satisfy the synthesis requirement through August 14, 2005. Students who enroll in these courses after this date will not receive synthesis credit.

Note: Interim courses may move to permanent status prior to the August 14, 2005, deadline. For updates, go to www.gmu.edu/departments/provost/gened/index.html.

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.
Departments and Colleges

- Biology (see Molecular and Microbiology)
- Chemistry and Biochemistry
- Communication
- Economics
- English
- Environmental Science and Policy
- Geography
- History and Art History
- Mathematical Sciences
- Modern and Classical Languages
- Molecular and Microbiology
- Philosophy and Religious Studies
- Physics and Astronomy
- Psychology
- Public and International Affairs
- Social Work
- Sociology and Anthropology
- New Century College

Interdisciplinary Programs

- African American Studies
- Community College Education, DA
- Cultural Studies, PhD
- Honors Program in General Education
- Individualized Studies (BIS)
- Interdisciplinary Studies, MAIS
- Latin American Studies, BA
- Mason Topics
- Russian Studies, BA
- Women’s Studies

Interdisciplinary Minors

- African American Studies
- Ancient Mediterranean Art and Archaeology
- Asia-Pacific Studies
- Film and Media Studies
- Folklore and Mythology
- Global Systems
- Islamic Studies
- Latin American Studies
- Linguistics
- Multimedia
- The New Europe
- Nonprofit Studies
- Urban and Suburban Studies
- Women’s Studies

Departmental Minors

- Administration of Justice
- American Government
- Anthropology
- Art History
The College of Arts and Sciences (CAS) is the largest and most diverse academic unit at Mason. Teaching and research activities encompass the liberal arts—humanities, sciences, and social sciences. In addition to the degree programs in 16 departments and New Century College, CAS also offers many innovative interdisciplinary minors, majors, and graduate degrees. Undergraduate students in CAS attain breadth, through a broad distribution of courses in general education, and depth, through a major field of study. Special opportunities for students include the Honors Program in General Education, honors programs within selected majors, internships and co-ops, travel abroad, and research experiences. Many undergraduates go on to graduate school and professional schools in medicine, law, and the ministry; 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. Through its programs, CAS exposes students to principles of sound reasoning and judgment, while providing skills for understanding and using information and technology.

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; they will be able to adapt to an ever-changing world.

### Administration
Daniele C. Struppa, dean
Dee Ann Holisky, senior associate dean
Doris A. Bitler, associate dean for undergraduate academic affairs
Vikas Chandhoke, associate dean for research
Janette Muir, associate dean for New Century College
Walter Rankin, deputy associate dean for undergraduate academic affairs
Donna Fox, assistant dean for undergraduate academic affairs
Jamie Cooper, director of graduate academic affairs
Mary Zamon, director of undergraduate academic programs
Leslie Dyre, director of finance and human resources
Beth Secrist, coordinator, Technology Across the Curriculum
Tere Linehan, director of development
Susan Swett, director of CAS graduate admissions

### Graduate Degree Programs
CAS offers 22 master’s degrees, including a master of public administration and a master of fine arts in creative writing, and 11 doctoral degrees. The requirements for each degree are described in the sections that follow.

### Undergraduate Degree Programs
The undergraduate degree consists of course work in university-wide general education, course work in a major area of study, and electives. CAS offers 20 bachelor of arts (BA) degrees, 15 bachelor of science (BS) degrees, and a bachelor’s of individualized study (BIS). 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 “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 both 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. Except where

- Astronomy
- Bioinformatics
- Biology
- Chemistry
- Chinese
- Classical Studies
- Earth Systems Science
- Economics
- Economic Systems Design
- Electronic Journalism
- English
- French
- Geographic Information Systems
- Geography
- Geology
- German
- History
- International and Comparative Studies
- Latin
- Legal studies
- Mathematics
- Math for Undergraduates in the School of Management
- Philosophy
- Physics
- Psychology
- Public Policy and Management
- Religious Studies
- Russian
- Social work
- Sociology
- Spanish
- Telecommunications
- Telecommunications
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).

• Literature: 3 credits in addition to the university-wide requirement, for a total of 6 credits of literature. Fulfilled by any course in literature at the 200 level in English, by designated courses at the 300 level or above in Modern and Classical languages, or by PHIL 253.

• Philosophy or religious studies: 3 credits. Fulfilled by any course in philosophy or religious studies (PHIL, RELI).

• Social science: 3 credits for majors in mathematics and science, in addition to the university-wide requirement for a total of 6 credits of social science; 6 credits for majors in humanities and social science, in addition to the university-wide general education requirement for a total of 9 credits of social science, of which not more than 6 may be in a single discipline. Fulfilled by any course in ADJ, ANTH, ECON, GEOG (except GEOG 102 or 309), GOVT, PSYC, or SOCI.

• Natural science: 1 credit in addition to the university-wide requirement 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.

• Foreign language: intermediate-level proficiency in one foreign language. Fulfilled by completion of one foreign language course at the 202 level or above, or by a satisfactory score on an approved proficiency test. International students should consult the CAS Student Academic Affairs Office about a possible waiver of this requirement.

• Non-Western culture: 3 credits. 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 fulfill any other requirements (university-wide general education requirements, college-level requirements, or requirements for the major). May be fulfilled by any of the following courses.

  ANTH 114, 300, 301, 302, 304, 305, 306, 311, 313, 330, 332, 396
  ARTH 203, 319, 320, 380, 381, 382, 383, 384, 385, 482
  CHIN 318, 320, 325
  DANC 118
  ECON 361, 362
  FREN 451
  GEOG 101, 316, 325, 330, 399
  GOVT 328, 332, 333, 432
  MUSI 103
  RELI 211, 212, 313, 314, 315, 337, 374, 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 CAS 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 therefore 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. Students pursuing a BS in CAS 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, or by EVSC 205 and 206.)

Requirements for each 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 CAS. Students may take non-activity PHED courses for the elective credit for CAS degrees.

Teacher Licensure
Students who wish to become teachers should consult the CEHD 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.

Biology
See the “Molecular and Microbiology” section of this chapter for information.

Chemistry and Biochemistry
Phone: 703-993-1070
Web: gmu.edu/departments/chemistry

Faculty
Professors: Blaisten-Barojas (School of Computational Sciences), Cozzens, Davies, Foster (chair), Mose, Mushrush
Associate professors: Chen, Davis (associate chair), Honeychurch, Hussam, Schreifels, Slayden, Weatherspoon
Assistant professors: Born, Bishop, Hatton, Kort

Course Work
This department 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
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 exceptionally good science background through this concentration.

In addition to satisfying the university-wide general education requirements and the requirements for the BA degree in CAS, 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 221, 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 to 12 credits of physics: PHYS 243–246 (8 credits) or PHYS 160, 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 the university-wide general education requirements for the BS degree, students majoring in chemistry with a concentration in biochemistry must present 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 to 12 credits of physics: PHYS 243–246 or PHYS 160, 260–263.
- 8 credits of biology: BIOL 213, 305, 306
- 9 credits of approved science electives chosen from chemistry or biology courses at the 302-level or above. Courses from other disciplines may be submitted as electives, subject to approval of the coordinator.

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 the 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, 305, 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, and Preveterinary Students

Students planning medical, dental, or veterinary careers may meet the requirements of these professional schools by majoring in chemistry. Students should consult with the premedical advisor for chemistry.

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 CEHD chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadm@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 can enroll in graduate courses when they have successfully completed the 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.

GRADUATE PROGRAM

The department offers an MS in chemistry with a research project (thesis option), or an all-course-work program (nonthesis option). The PhD in all branches of chemistry is available through the degrees in environmental science and policy, bioscience, and physical sciences, while an area of concentration in computational chemistry is available through the PhD in computational sciences and informatics program offered in conjunction with the School of Computational 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.

Admission Requirements

To be considered for admission to degree status, student must have a bachelor’s degree in chemistry 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 resume. Students must present evidence of computer literacy before completing 12 graduate credits.

Degree Requirements

Students may elect to complete a thesis or a project. The thesis option is for students planning to pursue a doctoral degree or a career in chemical research. The nonthesis option is for those seeking to go on to professional school, teach chemistry in secondary schools, or pursue other careers in which advanced work in chemistry is necessary or advantageous.

Students in the thesis option are required to complete 30 credits of graduate work, including 6 credits of thesis CHEM 799. The thesis is based on research that must be preapproved by the thesis or advisory committee, appointed during the first semester of registration in CHEM 799. Students who select the thesis-option must defend the thesis at an oral exam (following submission of the first approved draft of the thesis) and present an exit seminar. Students in the nonthesis option are required to complete 32 credits of graduate work.

All students must complete 12 credits in core courses in chemistry (physical chemistry and one in each of three different areas chosen from analytical, biochemical, environmental, inorganic, and organic chemistry) and at least 3 credits of Graduate Seminar CHEM 690. Minimum credits for each option are as follows:

<table>
<thead>
<tr>
<th>Thesis Option</th>
<th>Nonthesis Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core curriculum</td>
<td>12</td>
</tr>
<tr>
<td>Electives in chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Electives in chemistry or related fields</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 670</td>
<td>–</td>
</tr>
<tr>
<td>CHEM 690</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 799</td>
<td>6</td>
</tr>
<tr>
<td>Total credits</td>
<td>30</td>
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</tbody>
</table>

Core courses (CHEM 513, 521, 614, 624, 633, 646, 651, 663, and 732) may also be taken as electives beyond the 12-credit requirement. 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.

Communication

Phone: 703-993-1090
Web: gmu.edu/departments/comm

Faculty

Professors: Boileau, Botan, Decker, Friedley, Kelley, Kreps (Eileen and Steve Mandell Professor of Health Communication; chair), Lichter, Lont, McAuley, Pober, Rowan (associate chair), Sesno (University Professor)
Emeritus professors: Looney, Manchester
Associate professors: Akwule, J. Muir, S. Muir, Sparks
Assistant professor: Gibson
Term assistant professors: Bedore, Kimble, C. Smith
Term instructors: M. Dickerson, Fahema, Garcia, Klein, Nadler, R. Smith, Tomasovic, Wright

Affiliate Faculty
Burton (professor, Heritage Chair in Music), 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 fields such as international and intercultural communication, 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 the requirements for the BA degree in CAS, students majoring in communication must complete 36 credits in communication:

- 15 credits of required communication courses: COMM 250, 300, 301, 302, 305
- 12 credits selected from an approved concentration (see below). A list of courses in each concentration is available on the department web site. With the approval of their advisor and the associate chair, students may construct an individualized concentration. Students must declare a concentration before they earn 90 or more credits. Transfer students with 60 or more credits are encouraged to declare a concentration by the end of their first semester at Mason.
- 9 credits of communication electives

Of the 21 credits in the second and third bullets, 12 must be at the 300–400 level, and the total 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. Also, the total may include no more than 6 credits of internship (COMM 450). No more than 9 credits of internship (COMM 450 or GOVT 450) may be applied toward the 120 credits required for graduation.

Communication majors must earn a C (2.00) or better in all communication courses applied to the major in fulfilling the above requirements. Students declaring the major in the fall of 2005 and thereafter must meet this requirement.

Approved Concentrations

Interpersonal and organizational communication

Journalism

Media production and criticism

Persuasive and political communication

Public relations

Individualized concentration

All students are encouraged to participate in one of the communication activities: Broadsides, 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

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 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 the presentation intensive requirement: COMM 100, 104, 210, 260, 310, 320, 356, or 399 (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 enter the departmental honors program. Candidates for the honors program must have successfully completed or be enrolled in COMM 250, 300, 301, and 302. 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 499 Independent Study in Communication and an honors section of COMM 420, maintaining a minimum GPA of 3.50 in these courses and an overall minimum GPA of 3.50. For more information, contact the director of the honors program in Communication.

Minors

The department coordinates the minors in electronic journalism and telecommunications (see below) and participates in several interdisciplinary minors: 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 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: COMM 303, 351, 361, 475
- Two electives (six credits) chosen from COMM 203, 352, 353, 370, 399*, 435, 450*, 454, 455 (**if topic or internship is approved by department)
◆ Minor in Telecommunications

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 Introduction to Computing
  - IT 212 How Computers Work
  - CS 105 Computer Ethics and Society
  - COMM 104 Presenting with Technology
  - COMM 202 Mass Communication and Communication Systems

- Two additional required courses (6 credits):
  - TELE 350 Telecommunications Systems
  - TELE 450 The Structure of the Telecommunications Industry

- Two electives (six credits) chosen from:
  - COMM 320 Business and Professional Communication
  - COMM 435 Computers and Communication
  - COMM 450 Internship (in a telecommunications-related organization)
  - COMM 554 Telecommunications Policy and Regulation
  - ENGL 410 Technical and Report Writing
  - GOVT 359 Computers in Public Management
  - MIS 201 Introduction to Computer-Based Management Information Systems

- Ten credits of internships (6 credits) in a field of study related to telecommunications.

This minor is not available to communication majors who have 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 CEHD 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

Phone: 703-993-1090
Web: www.gmu.edu/departments/comm

■ Communication, MA

The Department of Communication offers a 33-credit graduate degree in the study and practice of health, risk, and crisis communication, which is defined as the study of physical harm, and its shared meaning and alleviation. Applications and approaches to studying these contexts include public relations and strategic, organizational, political, international, and intercultural communication. The program prepares students for increasingly complex public and private communication environments, particularly as they relate to our location near Washington, D.C.

Students gain a strong theoretical foundation to examine the important critical role humans perform in both interpersonal and mediated communication in health, risk, and crisis communication environments. Faculty pursue scholarship examining health, risk, and crisis communication, education and promotion in consumer-provider relationships, communication organizations, policy, campaigns, and interventions. Specific context areas include government, organizational life, health care, media systems, and education. Courses explore important communication issues such as communicating bad or frightening news, censorship, accuracy of the media, the digital divide, public advocacy, intercultural sensitivity, media literacy, and the quality of interpersonal relationships. Research presented within this department stems from a wide range of theories and methodological approaches while examining a broad number of health, crisis, and risk contexts. The faculty welcome students in the beginning stages of their careers as well as those who are more established but interested in exploring and applying other theoretical perspectives to health, risk, and crisis communication contexts.

Assistants

The Department of Communication 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

Applicants should hold a baccalaureate degree from an accredited institution, with a GPA of 3.00 or better on the last 60 credit hours. Applicants should supply transcripts as well as the following:

- Three letters of recommendation from people directly knowledgeable of professional and academic competence, with at least one from an academic source
- Evidence of GRE taken within the last five years
- 500-word essay addressing the communication area in which the applicant is interested.

Review of applications will begin in the spring; late applications will be considered on a space-available basis. Because the number of students admitted is limited, meeting the following minimum requirements does not guarantee admission.

Degree Requirements

Candidates for the degree must successfully complete 33 credits of graduate course work, including the following:

- 15 credits of core: COMM 634, 635, 650, 654, and 798
- 12–15 credits of specialized content (electives): COMM 504, 506, 530, 590, 601, 602, 605, 620, 621, 631, 636, 637, 651, 655, and 656. With approval of the graduate director, students may take up to 6 credits of specialized content in courses outside the department.
- 3 credits of practicum: COMM 694, 655, 696, or 697
- 3 credits of thesis (optional; requires permission of advisor)

*Students who choose to write a thesis take 12 credits of specialized content; others take 15 credits.
Telecommunications

See the School of Public Policy section of this catalog.

Cultural Studies

Phone: 703-993-2851
Web: gmu.edu/departments/cultural

Faculty

Course Work
The Cultural Studies program offers all course work designated CULT in the Course Descriptions chapter of this catalog.

GRADUATE PROGRAM

Cultural Studies, PhD

This doctoral program, the first of its kind in the United States, unites selected faculty members from 10 departments 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 in 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 in crafting this linkage, 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 one of five departments that have established feeder programs in cultural studies: English, Sociology and Anthropology, History and Art History, Philosophy and Religious Studies, and Modern and Classical Languages. All these feeder programs culminate in CULT 802 as a capstone seminar. Students may, if they choose, apply simultaneously to the PhD in cultural studies so that faculty members may review their academic promise and the 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.

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 812 Visual and Performatve Culture
  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.
Economics majors can fulfill the university-wide general education synthesis requirement with ECON 309.

Economics, BS
The BS degree program is designed for those 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 in more quantitative business administration programs.

In addition to satisfying the university-wide general education requirements and the requirements for a BS degree in CAS, students must complete the following:

- 39 credits of economics courses, including ECON 103, 104, 306, 311, and 345; and 24 credits of economics electives at the 300 and 400 level. (ECON 103 and 104 fulfill 6 credits of the university and CAS general education requirements in social science.)
- STAT 362 or ACCT 203
- DESC 210, or STAT 250 and 350
- MATH 113 and 114 (fulfills the university-wide general education quantitative reasoning requirement)
- IT 103 (fulfills the university-wide general education information technology proficiency requirement)
- 8 credits of a laboratory science sequence (fulfills the university-wide general education natural science requirement)

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

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
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 economics fulfill this requirement by successfully completing ECON 320, 345, 350, 360, or 365.

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

Minor in Economics
The minor consists of 21 credits in economics with a minimum GPA of 2.00: ECON 103, 104, 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 coordinator, 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.

◆ 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 both 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 interdisciplinary 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 CEHD chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmit@gmu.edu, or go to gse.gmu.edu.

◆ Bachelor’s/Accelerated Master’s Program
The five-year bachelor’s/accelerated master’s degree program leads to a research-based MA degree following satisfactory completion of 144 credits. Graduates are exceptionally well-prepared for a professional school or a PhD program in economics or a related discipline. Well-prepared undergraduates are encouraged to apply as they near completion of 90 credits. Admitted students can 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 fulfillment of requirements for the undergraduate degree. Upon 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. See the department for further details.

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 to conduct their own, either individually or as members of research teams in government or business. 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 as well as MATH 108 or equivalent. Also, students must complete 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 GPA of 3.00 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. The application deadlines are May 1 for the fall semester, and November 1 for the spring semester. Students are strongly encouraged to begin the program in the fall; beginning in the spring limits course selection for that semester.

Degree Requirements
- 30 graduate credits in economics distributed as follows:
  - Three required courses (9 credits): ECON 611, 615, 812
  - Seven elective courses (21 credits) in economics; ECON 630 Mathematical Economics and ECON 535 Survey of Applied Economics are strongly recommended.
  - The 21 credits of electives may be chosen from any of the fields offered by the department. 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 offered twice each year)**

Although Mason 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 615, and 812, 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
The Economics Department offers the certificate in economic systems design, 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 MA and PhD in economics. The primary purpose is to provide a well-defined target for students who want to advance 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 Mason degree program should apply for admission to nondegree status.

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 and one year of statistics, and one semester each of matrix algebra and econometrics. They also should have earned a GPA of 3.00 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).

Applicants must submit two letters of recommendation and a brief personal statement explaining their interest in the program. The application deadline for students desiring financial aid is February 1. The deadline for all other students for the fall semester is April 1. The department accepts doctoral students only for the fall semester.

Degree Requirements
Students are required to pass 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 the university library. 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 discretion of the department. Credit is not given for comprehensive and field exams from other universities.

All doctoral students must take a year of microeconomic theory (ECON 611 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 611, 630, and 715 in the fall; ECON 637, 812, and 816 in the spring; and micro and macro 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 to 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
- Public finance

The department also offers a concentration 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 (ICES) for program details and requirements.

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: gmu.edu/departments/English

Faculty

Professors: Bausch, Baxter, L. Brown, Cheuse, D’Andrea (Robinson Professor), Forche, Foster, Goodwin, Hodges, Irvine, Jann, Kelley, Klappert, Lathbury, Nadeau, Pankey, Thaiss

Associate professors: Albanese, Burr, Clark, Foreman, Fuchs, Gallehr, Henry, Holisky, Irving, Jones, Kaplan (chair), Kaufmann, Keaney, Kaebrich, Lowry, Matz, McKenzie, Radner, Rutledge, Tichy, Trafton, Weinberger, Yocom

Assistant professors: Amireh, Eisner, Harvey, Hawk, Reid, Roan, Sample, Shuttika, Yadav, Zawacki

Term assistant professors: Anderson, Atkinson, Behmand, Berg, Bondurant, DeNys, Green, King, Koch, Melito, Michals, Miller, Nanning, Nichols, Reding, Samuelian, Saunders, Scott, Taciuch, Thompson, Vogt, Williams, Young
Term instructors: Beach, Matthews, Patterson, Raffel
Adjunct assistant professors: Callanan, Carter, DeFazio, Dreisonstok, Fischer, Fowler, Guss, Humbertson, Jacobs, Julka, Kuhta, Moody, Pabich, Redondo, Rubin, Wright
Adjunct instructors: Casal, Cooper, Grogan-Barone, Gulshan, Holcomb, Jackson, Johnston, Leeker, McKinney, Scolaro, Surette, Whitlock

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 the university-wide general education requirements and college-level requirements for the BA degree in CAS, 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):
  Contemporary world literature
  Creative writing
  Cultural studies
  Development of modern literature
  Drama
  Fiction
  Film and media studies
  Folklore, mythology, and literature
  Linguistics
  Medieval and renaissance literature
  Nonfiction writing and editing
  Poetry
• 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, of 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.
  3 credits of an elective above ENGL 302

Students should consult with 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 Departments of English and Modern and Classical Languages 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: ENGL 325, FREN 381, or SPAN 311, as appropriate for the student’s focus
• 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, 436, 437, and 439; various 300-level CLAS courses; FRLN 330 courses; and appropriate special topics courses in ENGL, FREN, GERM, RUSS, SPAN, or other language.
• CL 514 Theories of Comparative Literature
Students should consult with their advisor to design a program of study that best suits their particular set of 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, receive a 3.50 GPA in all courses counted toward the major (including honors courses), and have the written work judged of distinguished quality by a faculty committee. 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 413 Honors Thesis Writing Seminar, submitting only the honors thesis for consideration.

See the English Department for application procedures and other information.

◆ Accelerated Master’s Program in Linguistics

Qualified undergraduates may be admitted to an accelerated master’s program and obtain both a BA and an MA in English: linguistics. Students admitted to this program may take selected graduate courses during their senior year, and up to 6 credits of graduate work may be used in partial satisfaction of the requirements for the undergraduate degree. Students admitted into the accelerated master’s program must then complete an additional 24 credits to receive the master’s degree. All other master’s degree requirements must be met. Academically strong undergraduates may apply for acceptance to the accelerated program after completing 90 credits, and enroll in graduate courses when they have completed LING 326. Two letters of recommendation are required.

◆ 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 for the individual interests. Prerequisites for the minor in English are the 6-credit, university-wide general education requirement in literature, and 18 credits above ENGL 302, with a minimum GPA of 2.00. Students must take ENGL 325 (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.

◆ 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.

◆ Certificate in the Teaching of English as a Second Language (TESL)

The TESL certificate prepares undergraduate students to teach non-native speakers of English in the United States or abroad. It is an 18-credit program that combines linguistic theory, second-language acquisition theory, and ESL teaching methods.

Admission Requirements

Undergraduates interested in the TESL certificate must complete 3 credits of LING course work in the English Department, and apply before they have completed 6 credits of LING course work. Students must apply to the English Department by filling out a Change/Declaration of Academic Program form. This request must be approved by one of the linguistics faculty members. Applicants must also submit a 1,000-word writing sample, a one-page goals statement, and a recent Mason transcript.

The TESL certificate may be pursued concurrently with any undergraduate major. With the approval of an advisor in the major, some courses taken as part of the TESL certificate may apply toward the undergraduate major. Courses taken as part of the TESL certificate and also used to complete the requirements for an undergraduate degree cannot be applied at a later time toward any graduate certificate or degree.

Certificate Requirements

Certificate candidates must complete the following LING courses:

LING 326, 521, 522, 523, 582

One elective (A list of approved electives is available from the English Department.)

Undergraduates in Graduate Courses

The English Department permits qualified undergraduates to enroll in its graduate courses numbered 500 through 599, either for undergraduate or for reserve graduate credit. See the department for details on how to enroll.

Teacher Licensure

Students who wish to become teachers should consult the CEHD chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseeadmit@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 available free of charge 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 by stopping by the center at Robinson Hall, Room A116, 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, these teachers 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.
GRADUATE PROGRAMS

The Department of English offers graduate programs in the study and practice of writing and literature, 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 concentration 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 fiction, poetry, and nonfiction. In addition, the department offers a certificate in the teaching of English as a second language (TESL, 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 on the GRE when they believe those scores will lead to a clearer presentation 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. With the approval of the department, up to 6 graduate credits in courses in related disciplines may be substituted for 6 credits in English. 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 202 or 209, or by passing a translation test administered by the Department of English.

• 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
  - 15 credits of literature
  - 9 credits of electives
  - Thesis optional: 6 credits of thesis may substitute for 6 credits of literature
  - Foreign language proficiency as described in degree requirements above

• Concentration in Professional Writing and Editing
  - 6 credits in ENGL 501 Introduction to Professional Writing and Editing
  - 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 hours
  - Foreign language proficiency as described in the degree requirements above

• Concentration in Linguistics

The linguistics track of the English MA 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 track must successfully complete 30 graduate credits, distributed as follows, and demonstrate foreign language proficiency (see above).
  - Core courses (18 credits): LING 690, 691, 692, 785, 786, 787
  - Graduate electives (12 credits), chosen in consultation with an advisor, which reflect one or more areas of language study. Electives can be in such areas as linguistics, the teaching of reading or writing, literary criticism, bilingual education, or a foreign language, and may include 6 credits of thesis.

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:
  - 6 credits in critical theory, 3 credits of which must be filled by ENGL 676
  - 3 credits in CULT 802

84 College of Arts and Sciences
Creative Writing, MFA

This 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 at a future date to the MFA program are welcome to apply to take classes as extended studies students. However, extended studies enrollments are allowed only with the permission of the instructor. Regular applicants to the MFA program who are denied admission may not take courses through extended studies. Students interested in taking a course through extended studies 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, including the following:

- 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. Only with permission of the thesis committee may thesis credits be taken in the summer term.
- 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 MFA faculty and the program director, 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 do 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 202 or 209 must do so or demonstrate proficiency by passing a translation test administered by the English Department.

Certificate in Teaching English as Second Language (TESL)

The TESL certificate prepares students to teach non-native speakers of English in the United States or abroad. Certificates 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 through extended studies. Students who initially enroll in the certificate program through extended studies 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 the following series of graduate English courses, earning a grade of 3.00 or better in each.

- LING 520, 521, 522, 523, and 582 (LING 507 may be substituted for LING 521.)
- One elective

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 through extended studies. Because only 6 credits earned as an extended studies student may be applied to the certificate, students who initially take courses through extended studies 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 CAS. 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 504 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.

Environmental Science and Policy
Core Faculty
Professors: Diecchio, Hazen (Robinson Professor), R.C. Jones (chair), Lawrey
Term professor: Talbot
Associate professors: Birchard, Bradley, Jonas, Kelso, McBride, Rockwood, Torzilli
Term associate professor: Stewart
Assistant professors: Balint, Crate, Edwards, Gillevet, Harlan, Krekler, Parker
Term assistant professors: Cressey, Kysar-Mattietti, Largen, Verardo
Research assistant professor: Bartoldus
Emeritus professors: Ernst, Shaffer, Skog
Affiliated Faculty
Professors: Foster, Haack, Houck, Mose, Mushrush, Oates, Willett, B. Wright
Associate professors: Beach, deMonsabert, Fryxell, Gifford, Guagnamo, Gunn, Honeychuck, Kozlowski, Mahler, Meyer, R. Paden, Palkovich, Regan, E. Rodgers, Royt, Wan, Wong
Assistant professors: T. Wood

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, BA, BS
The undergraduate program in biology is jointly 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. For details, see the MMB section of this chapter.

Geology, BA
In addition to the university-wide general education requirements and the requirements for a BA degree in CAS, candidates for a degree in geology must complete the following with a minimum GPA of 2.00. (Through the course work below, geology majors satisfy the university-wide requirements in natural science and quantitative reasoning.)
• 38 credits in geology and geography, including GEOL 101, 102, 302, 304*, 308*, 312, 317, 401, and 404**
• MATH 110, 111, or 113
• CHEM 211, 212
• GEOL 316 or a computer science course (may fulfill the university information technology requirement)
• 9 credits of degree-related course work in a coherent program designed in coordination with advisor and approved by department chair

* Students must achieve a grade of 2.00 or better in GEOL 302 before taking GEOL 304 or 308.
** Not offered on a regular basis; 6-credit geology field camp recommended as substitute.

Teacher Licensure
Students who wish to become teachers should consult the CEHD 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.

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 the earth and environmental sciences, and will select a specialty concentration.

In addition to university-wide general education requirements, students must complete the following course work with a minimum GPA of 2.00. Through the course work below, earth science majors satisfy the university and college requirements in natural science and quantitative reasoning.
• 40 credits in core science and mathematics, including:
  CHEM 211, 212
  GEOG 309
  GEOL 101, 309 (BIOL 309), 406
  MATH 113, 114
  PHYS 160, 260, 261 or 243, 244, 245, 246
  STAT 250
• 34 to 35 credits in one of the following concentrations:
  Earth Surface Processes: GEOL 102 OR EVPP 110; GEOL 302, 303, 306, 316 or CS 112**; GEOL 317; and four of the following: GEOL 304*, 305, 313, 315, 363, 403, 417; GEOG 311, 412, 416
Environmental Science: BIOL 307; EVPP 110, 111, 336, 377; GEOG 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
*** Not offered on a regular basis; 6-credit geology field camp recommended as substitute.

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 GEOG 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.

◆ Certificate in Environmental Management
Environmental science and policy offers an undergraduate certificate in environmental management 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 503; ECON 103; GOVT 351 or 357; a course in statistics
• Physical perspective (one or two courses*): BIOL/GEOL 309; BIOL 535; EVPP 550; EVPP/BIOL 577; GEOG 102, 309; GEOL 313, 317, 403, 405; USE 440
• Biological perspective (one or two courses*): BIOL 307, 309, 344, 345, 371, 375, 440, 446, 449, 471, 532, 535, 536, 537, 543, 547; EVPP 318, 350, 550; EVPP/BIOL 546, 577; HEAL 450
• Social perspective (one course): ANTH 305, 365, 370, 440; CONF 501; ECON 350, 360; EVPP 336, 337, 361; GEOG 301, 304, 305, 306, 316, 325, 406; GOVT 318, 357, 364, 366; MGMT 312; NURS 543; PHIL 555; PRLS 300, 402, 526; PUAD 502
• Environmental methods (one course): DESC 301, 352; GEOG 310, 411, 412, 416, 550, 553, 579, 580, 585

* Biology majors are required to complete two courses in physical perspective; geology and geography majors are required to complete two courses in 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 currently 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 in the program, which should include the concentration to which they are applying, potential areas of emphasis, research skills option preferred, and an explanation of career goals. Prospective students are encouraged to contact potential faculty advisors appropriate to their interests. The availability of an advisor in the student’s area of interest is one of the criteria for admission. Based on this availability and on interests, students are assigned an advisor upon 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 Concentration
This degree encourages an independent and creative approach to the development of curricula that reside within 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, 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 will consist 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. 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, 10 of which must be from at least one course from each of the following areas: 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; EVPP 503, 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 upon 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 PUAD 620 Organization Theory and Management Behavior
- PUAD 640 Public Policy Process (with sections tailored to environmental science and policy)
- PUAD 749 Issues in Public Policy: Environmental Policy and Management

Environmental science: At least 12 credits are required, including the following:
- 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 546 Estuarine and Coastal Ecology (if not already taken)
- EVPP 550 Waterscape Ecology and Management (if not already taken)
- 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 644 Wetland Ecology and Management (if not already taken)
- EVPP 650 Environmental Analysis and Modeling
- EVPP 675 Environmental Planning and Administration
- EVPP 741 Advanced Topics: Environment and Society
- EVPP 741 Advanced Topics: Ecological Economics
- EVPP 741 Advanced Topics: Development of U.S. Environmental Policies
- EVPP 741 Advanced Topics: Overview of Biodiversity Conservation
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 School of Computational Science.

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 desiring admission to the MS or PhD programs in environmental science and policy (ESP) who do not currently meet admission requirements can demonstrate their ability to do degree work through successful completion of the certificate with excellent academic achievement.

The curriculum provides a substantive appreciation of 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, except that the GRE and undergraduate GPA targets are more flexible. Prospective students must have the following minimum requirements:

• Undergraduate (baccalaureate) degree, preferable 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
• Exceptions are considered on a case-by-case basis.

Requirements
The certificate is awarded after satisfactory completion of six graduate courses (a minimum of 18 semester credits) as specified below:

• Environmental certificate core (three courses):
  EVPP 677 Applied Ecology and Ecosystem Management
  GEOG 503 Conservation and Natural Resources

One of the following:
  EVPP 641 Environmental Science and Public Policy
  EVPP 675 Environmental Planning and Administration
  SOCI 635 Environment and Society
• Three electives (one from each of the following areas):
  Natural sciences
  BIOL/EVPP 546 Estuarine and Coastal Ecology
  BIOL/EVPP 577 Biogeochemy: 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 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
  SOCI 635 Environment and Society

Environmental methods
  EVPP 650 Environmental Analysis and Modeling
  GEOG 550 Introduction to Geographic Information Science
  GEOG 553 Advanced Geographic Information Science
  GEOG 579 Remote Sensing
  GEOG 580 Digital Remote Sensing
  GEOG 585 Quantitative Methods
  SOCI 531 Statistical Reasoning

Environmental Science and Public Policy, PhD
This interdisciplinary program draws on faculty and expertise from the Environmental Science and Policy core faculty as well as from the departments of Molecular and Microbiology, Public and International Affairs, Chemistry, Economics, Geography, and Sociology and Anthropology; and the schools of Computational Sciences, Public Policy, Information Technology and Engineering, and College of Education and Human Development.

This program provides training to 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. 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 resume
- Substantial statement of interest that includes a description of a potential focus—environmental science or environmental public policy—and an explanation of career and research goals as well as area of proposed dissertation research

Also, it is recommended that applicants schedule an interview with the graduate coordinator or an environmental faculty member in the chosen research focus. 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 requirement.
- 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.

On 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 by petition to the program director and the CAS 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 which 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 coordinator.

On completion of all or nearly all course work, students may request to take the qualifying or candidacy exam. The qualifying exam has both oral and written parts. The written portion consists of questions submitted by each member of the dissertation committee. Successful completion of the written exam should be followed by the oral portion within one month. The qualifying exam may be repeated once at the discretion of the student's committee. On completion of all course work, passage of the qualifying exam, and submission of the program of study, the student is recommended for advancement to candidacy by the graduate coordinator. Students must advance to candidacy within six years of admission to the program.

Dissertation

Students must complete a dissertation (12 to 24 credits) by registering for credit in a combination of EVPP 998 and 999. No more than half the credits specified for dissertation credit on the student's program of study may be taken as EVPP 998 Doctoral Dissertation Proposal. The dissertation is an original written work, demonstrating mastery of subject matter, methodologies, and conceptual foundations on a specific problem in the general field of environmental science and public policy. The dissertation generally involves collection and analysis of original data, or the substantially new analysis and reinterpretation of existing data.

Before students may enroll in dissertation research, they must have advanced to candidacy and have a dissertation proposal approved by the dissertation committee, 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), Gortner (Public and International Affairs), Haack, Haynes (Dean, School of Public Policy), Stough (School of Public Policy), Wong
Associate professors: Andronikov, Beach, Pilon
Assistant professors: Kronenfeld, Parker, Schintler (School of Public Policy)
Instructors: Boudinot, Dillon, Grymes, Hallden, Hirsch, Kim, Sheers, Ward, Wheeler, Young
Adjuncts: DeCola, Dillon, Hirsch, Michaelson, Mobley, Rennick, Sheers, Shipley, Ward, Wheeler, Young, 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 CAS, 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 GEOL 101, 102, and 317 (12 credits), or BIOL 103, 104, and 377 (11 credits, fulfills the university general education requirement in natural science); MATH 113 and 114 (8 credits; fulfills the university quantitative reasoning requirement); STAT 250 (3 credits); and IT 103 (3 credits; fulfills the university information technology proficiency requirement).

◆ Minor in Geography
To receive the minor, students must complete 18 credits in geography 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 (non-lab 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 (GIS)
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 to 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 CEHD 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
■ Earth Systems Science, MS
The interdisciplinary master’s program in Earth systems science (ESS) is offered jointly by CAS (Department of Environmental Science and Policy, Department of Geography), and the School of Computational Sciences (SCS). 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; CSI 656/EVPP 652/GEOG 570; and CSI 657/GEOG 671
- **Earth observation courses (3 credits):** CSI 753 or GEOG 579
- **Quantitative techniques courses (3 credits):** CSI 754 or GEOG 585
- **Human and biological perspectives courses (3 credits):**
  - 3 credits of CSI 750, 759; EVPP 577, 636, 741; GEOG 575, 590, 670 (see an advisor for course options)
  - 3 credits of colloquium/seminar CSI 899/EVPP 791/GEOG 791 and CSI 792/EVPP 792/GEOG 792
  - 3 to 6 credits of research: CSI 798/EVPP 798/GEOG 750, or CSI 799/EVPP 799/GEOG 799
- **General electives (see an advisor for course options)**

> **Geographic and Cartographic Sciences, MS**

This program provides courses for students interested in the techniques of collection, analysis, and display of spatial data. Students are prepared for careers in geography, GIS and remote sensing, and cartography with federal agencies, state and local government agencies, private corporations, and educational institutions.

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.

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 non-thesis option is selected, students are required to take 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 to 6 credits of thesis (thesis option)
  - Comprehensive exam (non-thesis 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.

**Certificate in Geographic Information Sciences**

Admission Requirements
Applicants should submit an application for graduate studies, 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. The certificate coordinator may recommend or require other preparatory courses, depending on the student’s background.

Certificate Requirements
Students must successfully complete 18 graduate credits, distributed as follows:

- 12 credits of required core courses: GEOG 553, 563, 653, 590/EOS 771
- 6 credits of electives chosen from GEOG 590; EOS 772, 773; CEIE 510

Other courses may be used as electives with prior written approval of the certificate coordinator.

**Higher Education**

Phone: 703-993-2310
Web: highered.gmu.edu

**Faculty**
Fathe, Kettlewell, Kidd, Kuhta, Lyne, Muir, O’Connor, Rossell, Salmon

**Course Work**
This program offers all course work designated CTCH in the Course Descriptions chapter of this catalog.

**GRADUATE PROGRAMS**

**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
Students participate in two, 3-credit internships to learn skills applicable to college-based teaching and higher education. Internships design and assessment. All courses emphasize leadership, concentration on scholarship and practice in teaching and learning, both in and out of the classroom. These courses 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 to 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 as well as course work in the history and philosophy of the community college and in 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 the 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 have 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 the 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.

Candidacy Exams
Students must pass candidacy exams to demonstrate breadth and depth of knowledge in both the knowledge area and education core. To be eligible to take a candidacy exam, students need to have completed all course work in the specific area, be in good standing (minimum cumulative GPA of 3.00); and be registered for at least 1 credit. The competency exam for the education core is a written exam administered by the DACCE 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 fall semester.) Students who do not retake the exam by this deadline or who 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, pass candidacy exams, 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 the 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 both 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). They must have at least 12 credits of 998 and 999 combined; no more than 12 credits of 998 and 999 combined may be applied to the doctoral degree. Once enrolled in 999, students must maintain continuous enrollment each semester until the dissertation is completed. Unless the student is on leave, students should not need to be registered during the summer sessions.

Please see the master of arts in interdisciplinary studies section of this catalog for information about master's degree in higher education and student services, or community college teaching.

Certificate in College Teaching
The certificate is designed for graduate students who are planning a career in undergraduate education. The program offers courses that enhance pedagogical skills, explore pedagogical scholarship and the use of technology in instruction, and explain the history and philosophy of the two-year college.

Admission Requirements
Admission requirements for the certificate are the same as for the doctoral program, except that certificate applicants do not need a master's degree and do not need to specify a knowledge area in their goals statement. Deadlines for receipt of all admission materials are April 15 for fall admission, and November 1 for spring admission.

Certificate Requirements
Students must complete 18 credits distributed as follows.
• 12 credits of CTCH 601, 602, 603, 604
• 3 credits of an elective, chosen in consultation with an advisor and with the approval of the program director
• 3 credits of internship (CTCH 885)
* Please see MA in interdisciplinary studies in this chapter for information about master's degree in higher education and community college teaching.

History and Art History

Phone: 703-993-1250
Web: chnm.gmu.edu/history

Faculty
Professors: Bakhash (Robinson Professor), J.R. Censer (chair), J.T. Censer, Holt, Horton, Levine, Petrik, Rosenzweig (Fried Professor), Stearns (provost), Stewart, Wade, Wilkins (Robinson Professor), Zagarri
Associate professors: Carton, Copelman, Deshmukh, Hamdani, Karush, Lytton, O'Malley, Platt, Smith
Assistant professors: Barnes, Bristol, Chang, D. Cohen, M. Cohen, Hawkes, Kelly, Landsberg, Manuel-Scott, Schrag, Scully
Term professors: Garabedian, Greenberg, Leon, McCord, Orens, Scheinfeldt, Schrum,
Postdoctoral teaching fellows: Gardner, Giandrea, Harris, Ostwald, Polrack, Strong, Tulchin

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 the university general education requirements and requirements for the BA degree in CAS, 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 are distributed as follows:
• 6 credits of U.S. history (3 credits fulfilled by the university-wide requirement HIST 120)
• 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 (6 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 bullet points. Students should see an advisor before registering 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
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 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 may be accepted into the program.

To graduate with honors in history, students must complete HIST 490 and 491, which are linked, individualized courses normally 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 GPA of 2.00. The program must be approved by the undergraduate coordinator 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 courses. See the interdisciplinary minors section of this chapter for a description.

Advising
The undergraduate coordinator advises majors and minors. History majors are urged to discuss their programs periodically with the coordinator.

Teacher Licensure
Students who wish to become teachers should consult the CEHD 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
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 the admission requirements for graduate study and for the Department of History and Art History. These include satisfactory scores on the GRE, and two letters of recommendation from history professors with whom the applicant has studied, or from 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 who hold another graduate degree.

Degree Requirements
Within the first three concentrations listed below, students must specialize in American history, modern European history, or comparative 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 21 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 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 comparative 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 outside the area of specialization, not including applied history courses (HIST 690, 691, 692, 693)
- 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.

Cultural History Emphasis
This emphasis is for students with a particular interest in cultural history as well as for 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 comparative 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 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 comparative 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 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 comparative 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 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

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 both conventional historical methods and web-based technologies. Major fields include U.S. history, European history, and comparative world history; minor fields include 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 at Mason, 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 Mason’s doctoral program in history, and ultimate career goals
• Writing sample consisting of a history essay, research paper, or professional paper

Admission decisions are ordinarily 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. 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.

• 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 a 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 may 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 the university library.

Students will be terminated from the program if they receive more than one unsatisfactory grade (defined as C or F).

UNDERGRADUATE PROGRAMS

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 the university-wide general education requirements and the requirements for a BA degree in CAS, students must complete 33 to 34 credits with a minimum GPA of 2.00. These include 30 credits of ARTH: 3 to 6 credits at the 100 to 200 level, 18 to 21 credits at the 300 level, and 6 at the 400+ level, plus 3 to 4 credits of studio art (AVT). Specific requirements are as follows:

• 3 to 6 credits in ARTH at the 100 or 200 level, including 3 credits from ARTH 200, 201, or 203 (203 fulfills the university general education requirement in global understanding. All other 100- or 200-level courses, excluding 204, fulfill the university general education requirement in fine arts).

• ARTH 394 or 594 (fulfills the university synthesis requirement)

• 18 to 21 credits of ARTH at the 300 level (may include ARTH 394)

• 6 credits of ARTH at the 400 level or above, including 3 credits from ARTH 400, 420, 430, 440, 471, or 482

• 3 to 4 credits in the Department of Art and Visual Technology in the College of Visual and Performing Arts: AVT 103, 104, 392, or others with permission of that 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 coordinator.

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 or German.

Students contemplating museum or arts administration careers should consider taking electives from the following: AVT 370, COMM 330, ENGL 410, ENGL 503, and PUAD 505.

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 art history fulfill the university’s writing-intensive requirement by successfully completing any 400-level ARTH course.

Honors Program in Art History
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 3.50 GPA in art history are eligible to apply to the art history honors program. Eligible students should apply to the undergraduate coordinator 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. Selection is made by the Art History Committee.

To graduate with honors in art history, students must complete ARTH 492 and 493, which are linked, individualized courses that culminate in a research paper. Students must have completed at least one course in the field (or with the professor) chosen for these honors courses. ARTH 492 should be taken before 493, but they may be taken concurrently. These 6 credits must be passed with a minimum 3.50 GPA, and the overall art history GPA presented for graduation must be a minimum of 3.50. These 6 credits may be counted toward the 33- to 34-credit major requirement in art history, but they do not replace the 6 required credits in ARTH 400, 420, 430, 440, or 471.

◆ 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 to 6 credits of 100- or 200-level art history courses
- 12 to 15 credits of 300- or 400-level art history courses

ARTH 394 is not required for the minor, but is strongly encouraged.

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.

Courses in Support of Graduate Programs

Although a graduate degree program in art history is not available, the following courses are offered in support of other graduate programs: ARTH 593, 594, 596, 599, and 699. See the Course Descriptions chapter of this catalog.

Honors Program in General Education

Phone: 703-993-1110
Web: honors.gmu.edu

Faculty


Honors Program

The honors program in general education provides highly qualified students with an integrated foundation for future studies. The program consists of a challenging interdisciplinary curriculum that satisfies university-wide general education requirements for graduation, and prepares students for their majors. Although administered by CAS, 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 their high school curricula, GPA, standardized test scores, and leadership qualities as identified through their application portfolios. 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. Requirements of the individual departments for their majors are updated annually and are available in the offices of the honors program and the departments. To receive honors recognition on their transcript, students must earn a minimum GPA of 3.00 in all HNRS courses as well as all non-HNRS courses substituted for HNRS to complete the honors program (for example, MATH 113 substituted for HNRS 125). 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 transferred out of 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 for any other conduct that reflects adversely on the Honors Program.

Students who leave the program before completion must meet the general education 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 their general education requirements.

**Transfers**

*Within George Mason*: Because of the sequential and integrated nature of the program, honors courses do not correspond exactly to other courses used to fulfill general education requirements. A list of equivalencies is available in the Honors Program office.

*Outside George Mason*: The honors program may meet the general education requirements of other universities. As in all transfer situations, however, the general education requirements of one institution may not precisely match those of another.

**Individualized Study**

- **Individualized Study (BIS)**

Since 1975, the bachelor of individualized study (BIS) degree program has offered adult students an alternative to traditional baccalaureate degrees. With the guidance of a faculty advisor, BIS students develop an individualized, interdisciplinary program of study that meets their academic needs and interests. The BIS program accepts liberal transfer of traditional and nontraditional credit from other institutions. Also, recognizing that college-level learning may be acquired through varied professional, service, and personal experiences, the BIS degree provides mechanisms to translate experiential learning into academic credit.

Adult students enter this program for many different reasons. Some are preparing for graduate study and professional programs. Others seek a gateway for professional advancement or career transition and validation. Still others want to incorporate into their Mason course work to achieve their educational goals.

**Eligibility Requirements**

Applicants must be admitted to Mason, have completed high school at least seven years prior to admission, and have accumulated at least 30 credits with a minimum GPA of 2.00. At least 15 of the 30 credits required for BIS program acceptance must have been earned through conventional classroom instruction.

**Application and Acceptance**

BIS program information is available through the office, 703-993-4556, or online at bis.cas.gmu.edu. Anyone interested in the program must attend a BIS information session. The BIS application process is free, but an application is considered only after the applicant has gained admission to Mason. The BIS application is available online at bis.cas.gmu.edu.

Acceptance is based upon eligibility requirements (see above) and an assessment of responses to essay questions posed on the BIS application. Initial acceptance into the program is provisional. After students obtain a faculty advisor and receive all necessary approvals for their educational contract, they become full BIS degree-seeking students (see the Individualized Concentration section).

It is university policy that students who are inactive for two years or more must reapply, or be readmitted (as appropriate) before continuing their studies. If readmission to Mason is necessary, students must also reapply to the BIS program.

**University Requirements**

BIS students must complete a minimum of 120 credits of course work. At least 45 credits must be in upper-level courses (numbered at the 300 and 400 level or above), and at least 30 credits of resident credits from Mason must be completed. All BIS students also must complete basic general education requirements, either through appropriate transfer equivalencies or Mason course enrollment.

**Individualized Concentration**

Working with the support of BIS staff and a faculty advisor, BIS students develop a concentration to meet their academic needs and interests. BIS students may incorporate into their concentrations previously earned college credits, non-traditional credit, and courses from Mason.

The concentration is 34 to 46 credits, which must have a minimum GPA of 2.00. At least 25 credits must be upper-division work (300, 400, or up to 6 credits at the 500 or 600 level), 19 or which must be completed at Mason. No more than 6 credits of unsatisfactory (C- or D) grades may be included in the concentration. Courses in the concentration may not be counted toward general education requirements or minor requirements. Students are encouraged to pursue a minor. Minors normally require between 15 and 21 credits of study, at least 15 of which must be applied to only that minor and not to the BIS concentration.

As part of the BIS concentration, students complete four BIS courses in order: BIS 300 Understanding Multi-Disciplinary Studies (3 credits), BIS 390 The Research Process (3 credits), BIS 490 Senior Project (3 credits), and BIS 491 Senior Project Presentation (1 credit; taken concurrently with BIS 490). Students are encouraged to include BIS 489 Directed Readings in the concentration. Students must have a minimum GPA of 2.00 in this set of courses. BIS 390 is designated writing intensive (see below). A grade of 2.00 or better in BIS 390 is required.

BIS 490 and BIS 491 are taken when no more than 6 credits remain in the concentration. The type of final project conducted in BIS 490 varies according to the student’s program. It may be an investigative, participatory, or creative project, and it must be appropriate to the student’s concentration regardless of the project type. BIS 490 requires a significant written component. A grade of 2.00 or better in BIS 490 is required to graduate with a BIS degree. A committee consisting of the student’s faculty advisor and at least one other faculty member or qualified professional evaluate the project.

The initial draft of a BIS concentration is assembled as a proposal and developed into a formal educational contract. Proposals are typically developed as a part of BIS 300 with the feedback and support of BIS staff. The BIS director reviews and approves the proposal. The faculty advisor is responsible for reviewing the proposal with the student, providing appropriate feedback and suggestions, and helping the student develop the proposal into the formal educational contract. The contract must be approved by the faculty.
advisor and BIS director, at which time the student’s status is changed from provisional to degree-seeking.

All BIS students are encouraged to obtain a faculty advisor and submit an educational contract after completing BIS 300. Degree-seeking status is required for enrollment in certain courses. Though earlier development of a contract is advised, the final deadline for submitting a BIS contract is the last day to add a class in the term prior to the student’s anticipated graduation date. For example, a student planning to graduate in May must submit a contract to the BIS office by the course-add deadline for fall. The same deadline applies for contract amendments, which are required whenever changes to the contract are necessary.

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. BIS students fulfill this requirement by successfully completing BIS 390.

Credit for Nontraditional Modes of Learning
The BIS program allows students to receive college credit for learning acquired through a variety of nontraditional methods. The maximum allowable credits are indicated in each of the following categories:

- Nationally recognized exam programs such as the College Level Examination Program (CLEP) and the Defense Activity for Non-Traditional Education Support (DANTES), when the particular exam has been approved for Mason credit. For an approved list, go to admissions.gmu.edu/ugrad/acbe.html (45 maximum credits).
- Industry, government or military training, if indexed and recommended as college-level credit by the American Council on Education (ACE). To receive credit, training or course specifics must exactly match what is in the ACE guide (45 maximum credits).
- Experiential learning demonstrated by portfolios may be accepted (30 maximum credits).
- College-level credit earned at institutions accredited by bodies other than recognized regional accrediting organizations will be considered only if the institution is listed in Accredited Institutions of Postsecondary Education, published by the American Council on Education (30 maximum credits).
- Total combined credit for exams and ACE-approved training cannot exceed 60 credits. For example, if 45 credits are accepted by exam, a maximum of 15 credits can be accepted for ACE-approved training.
- College-level credit earned at institutions accredited by bodies other than recognized regional accrediting organizations will be considered only if the institution is listed in Accredited Institutions of Postsecondary Education, published by the American Council on Education (30 maximum credits).
- Total combined credit for exams and ACE-approved training cannot exceed 60 credits. For example, if 45 credits are accepted by exam, a maximum of 15 credits can be accepted for ACE-approved training.

Interdisciplinary Minors
Interdisciplinary Minors
In addition to departmental based minors, CAS offers 14 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 please see the Academic Policies chapter of the catalog.

◆ African American Studies
Faculty
Brigey, Carton, Clark, Dennis, Fuchs, Horton, Johnson, Levine, Miller, Mobley McKenzie, Paden, Richards Jordan, Smith, Stewart, Trafton, 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.

Requirements
African American studies is an interdisciplinary field of study 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.

The interdisciplinary minor in African American studies requires a minimum of 21 credits of related course work, which includes 12 required credits and 9 elective credits from various disciplines in CAS with a minimum GPA of 2.00.

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

Elective Courses
AFAM 490 Internship
DANC 118 World Dance
ENGL 414 The Harlem Renaissance
Arts and Sciences

• 3 to 6 credits of practicum: a museum course (ARTH 394/594) or archaeological field work done for credit

• 3 credits of seminar: ARTH 420 or ARTH 430 (if topic is appropriate)

• 6 to 9 credits of electives from ANTH 320, 322, 325, 375, 420, 430; ARTH 319, 320, 321, 322, 324, 333, 399 (with approval); CLAS 340, 350, 360, 370, 380, 390; HIST 301, 302, 480; PHIL 301; RELI 351, 352; other courses pertaining to the region and period, with approval of the coordinator

• Preparatory work: At least 3 credits of Greek, Latin, or a modern research language in addition to the basic Mason two-year introductory language sequence or 3 credits of course work in ancient literature chosen from ARTH 102; CLAS 250, 260; RELI 211, 251, 252

• Three required courses (9 credits):
  - ARTH 320 Art of the Islamic World
  - ARTH 383 Arts of Southeast Asia
  - ARTH 384 Arts of China
  - ARTH 385 Arts of Japan

• Four electives (12 credits), chosen from:
  - ANTH 306 Peoples and Cultures of Island Asia
  - ANTH 311 Peoples and Cultures of Mainland Southeast Asia
  - HIST 430 Art of the Islamic World
  - GOVT 333 Government and Politics of Asia
  - HIST 251 and 252 Survey of East Asian History

Other courses as approved by the coordinator of the interdisciplinary minor in African American studies.

◆ 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, as well as 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 9 credits must be taken outside ARTH, with at least 3 credits in 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 Mason two-year introductory language sequence or 3 credits of course work in ancient literature chosen from ARTH 102; CLAS 250, 260; RELI 211, 251, 252

• Three required courses (9 credits):
  - ARTH 320 Art of the Islamic World
  - ARTH 383 Arts of Southeast Asia
  - ARTH 384 Arts of China
  - ARTH 385 Arts of Japan

• Four electives (12 credits), chosen from:
  - ANTH 306 Peoples and Cultures of Island Asia
  - ANTH 311 Peoples and Cultures of Mainland Southeast Asia
  - HIST 430 Art of the Islamic World
  - GOVT 333 Government and Politics of Asia
  - HIST 251 and 252 Survey of East Asian History

Other courses as approved by the coordinator of the interdisciplinary minor.

Language courses in Chinese or Japanese are strongly recommended.

◆ Film and Media Studies

Faculty
Burton, Christensen, Fuchs (coordinator), Gibson, Lont, Ricouart, Roan, Teminaga, Winkler

We are inundated on a daily basis with mass culture, especially as it is purveyed through the mass media. The effects are enormous and often unconscious. The film and media studies (FAMS) interdisciplinary minor aims to develop in students a more informed awareness of the nature of this culture, its ideological tendencies, and its effects on daily life in our society. The program offers diverse perspectives on mass media in the belief that such juxtapositions are more productive than any single approach. Committed to interdisciplinary studies, the program addresses the increasing complexity and multiplicity of visual cultures.

The program’s basic components are offered through the departments of Communication, English, and Music, with

Asia-Pacific Studies

Faculty
Butler, Chang, Cheng, Cuong, DeCaroli, H. Nguyen (coordinator), Lin, Liu, 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

• Four electives (12 credits), chosen from:
  - HIST 130 History of the Modern Global System
  - HIST 131 History of the Modern Global System
  - HIST 251 and 252 Survey of East Asian History
  - HIST 253 History of the Modern Global System
  - HIST 254 Modern China
  - HIST 255 Modern Japan
  - REL 314 Chinese Philosophies and Religious Traditions
  - REL 315 The Buddhist Tradition
  - REL 337 Mysticism: East and West
  - REL 376 Special Topics in Religious Thought (if topic is on Asia)

Approved study abroad or internships or other courses as approved by the coordinator of the interdisciplinary minor.

Other courses as approved by the coordinator of the interdisciplinary minor.

Language courses in Chinese or Japanese are strongly recommended.
other courses available through the Department of Modern and Classical Languages. This 18-credit interdisciplinary minor introduces and explores mass culture in its visual manifestations. The program offers students the tools with which to read a variety of texts, including film, television, video, news media, and architecture.

**Requirements**

Students in this minor complete 18 credits distributed as follows.

- Two required courses (6 credits) provide an introduction to the languages of film and popular media, and to modes of analysis appropriate to each. These courses are prerequisites for all advanced work in the minor.
  - ENGL 332 Introduction to Film (offered every semester)
  - COMM 380 Media Criticism (offered every semester)
- After completing the two required courses, students select four additional courses (12 credits) from those listed below. These courses are designed to introduce a more specialized level of study. Students may decide to focus on film or emphasize the study of mass culture, or they may choose some mixture of courses that suits their own interests.

Communication majors must choose at least 6 credits outside of Communication for their FAMS elective courses.

- 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 425 Media Production Practicum (prerequisite: COMM 355)
- COMM 462 Comparative Media Studies
- COMM 602 Theories and Research of Mass Communication
- COMM 655 Theories of Visual Communication in Telecommunications
- ENGL 327 Introduction to Cultural Studies
- ENGL 334 Literary Approaches to Popular Culture
- ENGL 338 Cultural Constructions of Sexuality
- ENGL 421 Topics in Film History (Sample topics include Italian film, films of the 50s, and French film)
- ENGL 422 Topics in Film Theory (Sample topics include reading television and Hitchcock and film theory)
- ENGL 490 Special Topics in Film (Sample topics include the horror film, queer film and theory, and African American Film)
- ENGL 493 Special Topics in Popular Literature
- ENGL 498 Internship: Special Topics
- ENGL 499 Independent Study
- FREN 470 Topics in French Cinema
- JAPA 320 Japanese Cinema
- MUSI 301 Music in the Motion Pictures
- RUSS 470 Topics in (Post) Soviet Film

For more information, contact Peter Brunette, Department of English, Robinson Hall, Room A465, 703-993-1190.

* requires approval of FAMS coordinator
** may be repeated if topic is different

*** permission of instructor and approval of FAMS coordinator

◆ **Folklore and Mythology**

**Phone:** 703-993-1172

**Web:** www.gmu.edu/folklore/resources

**Faculty**

Burns, Decaroli, Fiolliott, 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 tools to explore the compelling meanings within these seemingly simple, everyday cultural texts, and 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**

A minimum of 18 credits are required, taken from three groupings of courses with a minimum GPA of 2.00. If any of these courses is taken for credit toward the BA literature requirement, it may not be taken for credit in the minor.

**Group 1 (3 credits)**

- ARTH 102 Symbols and Stories in Art
- CLAS 250 Classical Mythology
- RELI 100 The Human Religious Experience
- RELI 211 Religions of the Near (Middle) East
- RELI 212 Religions of the Orient

Students may take only one Group 1 course from a department for credit toward the minor.

**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 383 Arts of Southeast Asia
- 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

**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 should not select the English Department’s folklore, mythology, and literature concentration.

For more information, contact Margaret Yocom, Department of English, Robinson Hall A, Room 439; or Carol Mattusch, Department of History and Art History, Robinson Hall B, Room 373A.

◆ Global Systems

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.

• One required course (3 credits): GOVT 149 Global Awareness

• 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 Refugees
    - 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 Economies 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, nursing, systems engineering, urban and suburban studies, civil and infrastructure engineering
    - BIOL 307 Ecology
    - BIOL 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
    - NURS/HSCI 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 103 Musics of the World
- MUSI 451 Music History in Society
- THR 359 World Stages

Other globally oriented courses such as UNIV, GLOA, and departmental special topics courses, may also fulfill or substitute for the requirements of this program; written permission of the coordinator is required prior to registration.

For more information, contact the coordinator in the Department of Public and International Affairs, Robinson Hall, Room A201, 703-993-1400.

◆ Islamic Studies

Core Faculty

Amireh, Dakake, Hamdani (coordinator), Mandaville

Affiliated Faculty

Bakhash, Beyoghlow, Butler, Chamberlain, DeCaroli, Fatih, Friedlander, Hilmi, Katz, Lukacs, 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 and consists of a minimum of 21 credits of related course work, including 9 required credits, 9 elective credits, and 3 language credits or proficiency as determined by the Department of Modern and Classical Languages.

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 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 Successor 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 ARAB
101, 102, 201, or 202. Other languages can be substituted on approval of the coordinator.

Students may demonstrate proficiency in a relevant foreign language to fulfill the language requirement of the minor; those that do have 3 additional elective credits. Courses in another language of the Islamic world can be applied toward elective credits.

Special topics courses, when relevant, may be used to fulfill elective credits for the minor with prior 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 18 credits: 9 required and 9 elective. Electives may include language credits. Credits taken for the minor cannot be applied toward the certificate.

For more information contact the coordinator, Robinson Hall B, Room 347, 703-993-1261.

◆ Latin American Studies
See the “Latin American Studies” section of this chapter for a description of the minor.

◆ Linguistics
Faculty
Chamberlain, Goldin, Hamburger, Holisky, Jones, Leeman, Levine, Roman-Mendoza, Weinberger (coordinator), Wulf

Linguistics is the scientific study of language. Language is studied in a variety of ways—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 linguistics coordinator

◆ Multimedia
Faculty
Cambridge, Chung, Forche, Higgins, Hu, Lont, Martin, O’Connor, Smith, 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 in this minor 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 or ENGL 209 Enhanced Digital Text (1 credit)

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 the university-wide minor in the New Europe complete a minimum of 18 credits: a 3-credit required course and 15 credits of electives (at least 3 credits from each field). Special topics courses, seminars, independent study, internships, and study abroad, where relevant to the minor, may also be taken for elective credits, with approval of the coordinator.

• One required course (3 credits):
  GOVT 334 Government and Politics of Europe, or
  GOVT 444 Issues in International Studies (with approval of the coordinator)
• Five electives (15 credits, at least one chosen from each field below):

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  
FERM 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

◆ Non-Profit Studies  
See the “New Century College” section of this chapter for a description of the minor.

◆ Urban and Suburban Studies  
Faculty  
Clapsaddle, Clark, Dumont, Gifford, Hackler (coordinator), K. Haynes, Horton, Hysom, Mattusch, Rosenzweig, Schintler, 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: www.cas.gmu.edu/mais

Executive Committee  
Addleson, Burns, Jordan, Lont, Miller, Radner (director), Ro, Rodgers, Salmon, Seligmann, 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.

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 through Mason’s extended studies program; or credits taken at another institution (with prior MAIS approval) after admission to the MAIS program.

◆ MAIS Concentration in Anthropology  
This concentration prepares students for advanced work in anthropology through courses focusing on the study of culture. The salient features of our epoch—global communications, a world market, mass migrations, and intra- as well as international conflict—underscore the importance of understanding cultures in all their complexity and variety. Anthropology is the study of human similarities and differences, and their impact on a wide range of social phenomena. Anthropologists refine methods uniquely suited to understanding social phenomena at different scales within a historical context, and bring important perspectives to bear on contemporary problems and issues. Frequently, they are able to offer refreshing approaches to resolving problems and conflicts. Especially distinctive is the emphasis among
anthropologists on what unites diverse peoples as well as on what distinguishes one culture from another.

In the anthropology concentration, students learn how to use participant-observation fieldwork methods, as well as interdisciplinary, comparative, and holistic knowledge and research methods. Courses are offered in the analysis and understanding of nationalism and transnationalism; social movements, ethnicity, and identity; conflict and violence; migration, displacement, and refugees; political economy and globalization; health and culture; education and culture; and ecology and conservation. As an interdisciplinary concentration, students take courses in a variety of disciplines including sociology, nursing and health science, education, public policy, government, conflict analysis and resolution, environmental science and policy, cultural studies, and English.

**Degree Requirements**

Students complete 36 credits of core courses and specialized courses distributed as follows:

- **12 credits of core courses:** ANTH 535, 536, 635, 650
- **18 to 21 credits of electives/specialization,** chosen in consultation with the advisor. The anthropology program director of graduate studies must approve the student's course of study. These credits must include 6–12 credits from other units. A total of 6 credits of independent reading and research are permitted (ANTH 680, 682, 684). Possible specializations include: sociocultural anthropology (must include at least 9 of 18 elective credits in anthropology), ecology and conservation, violence and conflict resolution, health and anthropology, and anthropology and education.

- **1 credit of MAIS 797** (for students admitted after summer 2004)
- **2 to 6 credits of research project,** MAIS 798, or 5 to 6 of MAIS 799 Thesis Research. Internship credit (ANTH 690) may serve for 3 credits for students doing a research project, provided the internship is linked to courses in the students' area of specialization and students submit a substantial project delineating the relationship of their internship experience to their area of specialization. Students who take 3 credits of MAIS 798 are required to take 21 credits of electives.

◆ **Concentration in Community College Teaching (in Communication, Computer Science, English, Mathematics, Psychology, or TESL)**

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, or teaching English as a second language. This concentration qualifies students to teach entry-level courses in these growing fields at the two-year level. In addition, this MA concentration is 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 (12 credits): CTCH 601, 602, 603, 604
- **Knowledge area course requirements (21 credits):**
  - **Communication:** 12 credits of core courses including COMM 602 (or 634), 650, and 635 (or 605); and 9 credits of electives in consultation with a faculty advisor from graduate-level communication courses, including core courses listed above not used to meet the 12 credit requirement.
  - **Computer Science:** CS 540, 571, 583, and 631, plus three additional graduate-level CS or CS related courses chosen in consultation with a faculty advisor.
  - **English:** ENGL 701, ENGL 610 or 615 (or both), and additional courses in English chosen in consultation with a faculty advisor.
  - **Mathematics:** MATH 621, 675, and additional courses in mathematics and related disciplines (including statistics) chosen in consultation with a faculty advisor.
  - **Psychology:** PSYC 611–612 (Advanced Statistics), plus one graduate course each in cognitive psychology (PSYC 701, 766, or 768), neurosciences (PSYC 702, 558, or 559), and either developmental psychology (PSYC 704, 669, or 669) or social psychology (PSYC 703, 678, 668). In addition, in consultation with a faculty advisor students will either complete a 1-credit directed readings course, or take an elective and choose one additional course in consultation with an advisor.
  - **Teaching English as a Second Language (TESL):** LING 520, 521, 522, 523, and 582; and three electives chosen in consultation with a faculty advisor. LING 507 may be substituted for LING 521.

- **3 credits of MAIS 798.**

◆ **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 as well as compelling global connections. This course of study prepares students for careers in cultural agencies, governmental organizations, and teaching institutions; and for advanced study in the humanities.

**Degree Requirements**

Students choose a specialization that draws on unique programs throughout Mason, such as museum studies, conflict resolution, non-profit 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 from the following:
  - ENGL 591, 491/798, 604, and 798; and 3 credits of research methodology, chosen from ENGL 701, HIST 610, or SOCI 634. Remaining courses chosen in consultation with advisor.
• 9 credits of specialization (approved by advisor). Specialization topics include public folklore—museums, archives, arts and humanities councils, and nonprofit organizations; folklore—ethnicity and immigration; folklore and literature; folklore and the teaching of writing and literature; folklore and history; and folklore and conflict resolution. Students also can opt for open specialization, with courses chosen in consultation with advisor. Possibilities include folklore and editing, applied storytelling, folklore and mythology, folklore and art history, folklore and gender studies, and folklore and communication.

• 3 to 6 credits of electives (approved by advisor)
• 1 credit of MAIS 797 (for students admitted after summer 2004).
• 2 to 6 credits of MAIS 798 (project), or 5 to 6 credits of MAIS 799 (thesis)

◆ MAIS Concentration in Higher Education
The MAIS concentration in higher education prepares individuals for administrative and leadership positions in colleges and universities, and in associations and government agencies whose activities impact higher education. Within the concentration, students may choose to emphasize administration or student affairs.

Degree Requirements
• 12 credits of core courses including CTCH 621 or 601; remaining course chosen in consultation with advisor
• 3 credits of research methodology
• 3 credits of specialization
• 9 credits of electives chosen in consultation with advisor
• 3 to 4 credits of CTCH 885 Practicum
• 1 credit of MAIS 797 (for students admitted after summer 2004)
• 2 to 6 credits of MAIS 798 (project) or 5 to 6 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 student 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 student advisor and MAIS director.

Students must successfully complete 36 credits of graduate course work, including the following:
• 12 to 18 credits in a single discipline (individualized plan must include a minimum of 12 and a maximum of 18 credits in one concentration)
• 9 to 18 credits in complementary disciplines (as approved by advisor and MAIS director)
• 3 credits of research methodology (approved by the student’s faculty advisor and MAIS director)
• 1 credit of MAIS 797 (for students admitted after summer 2004)
• 2 to 6 credits of MAIS 798 (project), or 5–6 credits of MAIS 799 (thesis)

◆ Concentration in Video-Based Production
The concentration emphasizes video production that encompasses various components, such as teleconferencing, interactive video, and digital 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, teleconferencing, interactive video techniques, digital video editing, and multimedia.

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 Division focuses on computer-mediated visual applications, including the study of multimedia tools and design, digital and electronic art, animation, and virtual reality.

Students must have a basic knowledge of video production. Students with little or no video experience must take COMM 590 Seminar in Video Production within the first 9 credits of the program. Students with video experience who wish to waive this requirement must provide a videotape of their past work.

Degree Requirements
• Seven required core courses: COMM 590 (Video Production); COMM 655 or ENGL 670; COMM 590 (Script Writing) or EDIT 704; COMM 697; EDIT 611 or EDIT 750; COMM 694; MAIS 798
• 9 to 12 credits of electives chosen from COMM 554, 590, 602, 636, 656, or 696; EDIT 571, 572, 575, 757, 771, 772; AVT 676
• 1 credit MAIS 797
• 2–6 credits of MAIS 798, or 5–6 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 disciplinary 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, 640
- 12 credits in a disciplinary concentration, selected in consultation with advisor, including 3 credits in a course cross-listed with WMST
- 9 to 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
- 2 to 6 credits of MAIS 798 (project) or 5–6 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 technology, and group interaction, as well as advance necessary skills in leadership, and fiscal and personnel management.

This degree offers three specializations within the concentration (see web site for full description): leadership in zoo and aquarium collections management, leadership in zoo and aquarium administration, and leadership in zoo and aquarium conservation education.

Degree Requirements

Students must successfully complete 36 credits of graduate course work, including the following:

- 12 credits of core courses: PUAD 505; NCLC 520, 510, 511
- 9 credits of cognate courses, determined by field of specialization and chosen in consultation with faculty advisor (must have approval of ZAL faculty coordinator)
- 9 to 12 credits of electives, approved by advisory committee and selected in consultation with faculty advisor. Courses may be taken at Mason or through distant learning or the Washington Area Consortium (6 credits maximum); or they may be transfer credits (12 credits from other accredited institutions, with prior approval of advisors, MAIS program director, and dean).
- 1 credit of MAIS 797 (for students admitted after summer 2004)
- 2 to 6 credits of research project, MAIS 798, or 5 to 6 credits of thesis research, MAIS 799.

Latin American Studies

Phone: 703-993-1010
Web: chnm.gmu.edu/las/

Faculty

Berrou (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), Meyer (Economics), Rabin (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 linkages 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

As an interdisciplinary program, Latin American studies offers courses across a range of departments. For the most part, these courses do not bear the LAS code. For the major and minor, students should consult with the director to determine if a certain course counts as Latin American studies.

UNDERGRADUATE PROGRAMS

◆ Latin American Studies, BA

In addition to satisfying Mason's general education requirements and requirements for the BA degree in CAS, students must complete 31 credits of Latin American studies. Students must achieve 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 comprise 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; select two of the following:
  - 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

Latin American Studies
• 3 credits of humanities courses related to Latin America. Select one of the following:
  ENGL 333 Folklore 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 on 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 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 grade 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 Mason policy, at least 8 credits must be applied only to the minor in Latin American studies, and may not be used to fulfill requirements of the student’s major, concentration, or another minor.

Mason Topics
Phone: 703-993-3912
Web: www.masontopics.gmu.edu

Faculty
Beach, Berg, Behmand, Burns, Carroll, Cherubin, Chang, DeNys, Giandrea, Gregg, Hawkes, Kelly, Koch, Leekeer, Lytton, Mattox, McPherson, McVay, Michals (director), Nadler, Nanian, Robbins, Samuelian, Taciuch, Thompson (coordinator), Tomasovic, Zawacki

Introduction
The Mason Topics Program encourages academically motivated students to make meaningful connections between classes in different disciplines by enrolling them in two “linked” popular general education classes each semester of freshman year. Faculty teaching these linked classes work together to highlight shared concepts and skills. Class discussions are not confined to the classroom. The program showcases cultural resources of the Washington, D.C., region and the university, and students enjoy films, talks, and study sessions linked to their classes on the Mason Topics Living/Learning floors in the freshman residence halls, helping academics become a focus for social life.

Course Work
The program coordinates curricular links between a variety of courses that are offered by individual academic departments. These courses satisfy university-wide general education requirements for graduation. The courses selected for linkage vary each semester.

Admission
All entering freshmen are eligible, but priority is given to those students whose high school record indicates that they are academically motivated and prepared for the program.

Requirements
The program is not an academic major. Rather, it links classes that fulfill a number of general education requirements for graduation that apply to all majors.

Transfers
Because the program links courses that are regularly offered by Mason’s academic departments, it has no effect on the process of transferring to another institution.

Mathematical Sciences
Phone: 703-993-1460
Web: math.gmu.edu

Faculty
Professors: Alligood, Colonna, Fischer (chair), Kulesza, B. Lawrence, J. Lawrence, Levy, Morris, Polyak, Sachs, Saperstone, Sauer (CAS Distinguished Scholar), Shapiro, Singman, Soltan, Struppa, Walnut
Associate professors: Anderson, Gabel, Kiley, Lamba, Lim, Lin, Wanner, Zoltek
Assistant professors: Agnarsson, Goldin, Sander, Zietsman
Adjuncts: Ailes, Lieberman, Lightbourne, Perencevich, Shaw, Wallace, Zampedro
Term instructors: Crossin, Granfield, Nuttall, O’Beirne, O’Brien, Orlova-Shokry, Pilley
Affiliates: Loustaunau, Namiki, Peterson

The degree programs in mathematics serve the needs of 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 CAS, students must present the following. (Through the course work below, math majors satisfy the university-wide requirement in quantitative reasoning.) A maximum of 6 credits of grades below 2.00 may be applied toward the major.

- 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.

Mathematics, BS

In addition to satisfying the university-wide general education requirements for the BS degree, students majoring in mathematics must present the following. (Through the course work below, math majors satisfy the university-wide requirement in quantitative reasoning and natural sciences.) A maximum of 6 credits of grades below 2.00 may be applied toward the major.

Students may pursue a traditional mathematics program, or a concentration in actuarial mathematics or applied mathematics.

- Mathematics core requirements: 23 credits of required MATH courses from MATH 113, 114, 203, 213 or 215, 214 or 216, 290, and 322
- Science, accounting, and economics requirements:
  - For all students, 8 credits of a laboratory science sequence selected from one of the following:
    - BIOL 213 and 303 or 304
    - CHEM 211 and 212
    - GEOL 101 and 102
    - PHYS 160, 260, 261
  - For students in the traditional mathematics program and applied mathematics concentration, a second year of science selected from one of the following three options:
    - A second course sequence from the list above
    - Credits from more advanced courses in biology, chemistry, geology, and physics (but only courses acceptable for credit toward a natural science major)
    - PHYS 262, 263
  - For students in the concentration in actuarial mathematics, 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.)
  - 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:
  - For students in traditional mathematics, 24 credits of MATH (MATH 125, 315, 316, and 321 or 431) and 12 credits of course work above MATH 300
  - For students in the actuarial mathematics concentration, 24 credits of MATH (MATH 351, 352, 551, 554, 555, 556) and 6 credits from MATH 441, 442, or 446
  - For students in the applied mathematics concentration, 24 credits of MATH 125, 315, 351, 413, 414, and 446; and 6 credits of course work above MATH 300

The department recommends that a two-year proficiency in French, German, or Russian be demonstrated.

For math majors:

MATH 105, 106, 108, 110, 111, 271, and 272 do not satisfy requirements for a major in mathematics.

For non-math 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 to their basic calculus sequence courses from MATH 313, 314, 351, 352, 382, 441, 442, 446, and 447.

For majors and non-math majors:

- The following math courses have as a prerequisite a specified score on the Math Placement Test: MATH 105, 106, 108, 110, 111, 113. The Math Placement Test is given frequently; for the schedule, go to cas.gmu.edu/math_placement.
  - Students who do not achieve the necessary test score to take the math course they need may go to the Math Literacy Center (see below), or they may study and retake the test on their own. If they do not complete the relevant program in the center or do not achieve the necessary score after re-taking 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 go to the Math Literacy 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:
    - MATH 113
    - MATH 105 or 108
    - MATH 351 or STAT 344
    - MATH 110
    - MATH 441
    - MATH 111

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 mathematics fulfill this requirement by successfully completing MATH 290.

Minor in Mathematics

To receive a minor in mathematics, students must complete 21 credits with a minimum GPA of 2.00, distributed as follows:
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. Upon 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.

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 recommended, but 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 322), a calculus-based course in probability (equivalent to MATH 351), and statistics (equivalent to MATH 352). Completion of the Society of Actuaries Course I is also sufficient preparation for the certificate program.

All other students must have a course in linear algebra (equivalent to MATH 322) and a course in advanced calculus (equivalent to MATH 315). 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
- 6 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.)
- 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-tech 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. The emphasis in computational and applied mathematics also provides the background necessary for advanced graduate work, in particular for the PhD in computational sciences and informatics.

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/CSI 717
- 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

Students receiving the master’s degree in mathematics are required to write a thesis or present a paper. In preparation for either option, they 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.

Students choosing the thesis option complete 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, and students must give an oral thesis defense.

Students choosing the paper presentation option give an oral presentation of a paper (or series of papers or book chapter) agreed to in advance by the 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.

In the thesis defense or paper presentation, the student gives an oral defense or presentation of the thesis or paper to the committee and the Mason community at large. Students are expected to respond to questions on the thesis or paper and related material. The committee determines whether the defense or presentation is satisfactory.

Certificate in the 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 specific training related to the first 4 courses offered by the Society of Actuaries.

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 advisor.

Modern and Classical Languages

Faculty

Professors: Elstun, Francescato, Gilbert, Ricouart, Winkler
Associate professors: Berroa, Chamberlain (chair), Christensen, Goldin (associate chair), Levine, Rabin, Roman-Mendoza
Assistant professors: Roberts, So, Vasilyeva, Zhou
Term assistant professors: Alonso, Beaulieu, Fyfe, Hancock, Hilmi, Lee, McCabe, Mireca-Pines

Course Work

This department offers all course work designated ARAB, CHIN, CLAS, FREN, FRLN, GERM, HEBR, ITAL, JAPA, LATIN, 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:

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 CAS. Approved literature courses offered by the Department of Modern and Classical Languages can be used to fulfill the university general education and college-level requirements in literature. FREN 451, RUSS 353, and RUSS 354 fulfill the college-level requirement in non-Western culture. RUSS 353 and 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

Mason 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 CAS, candidates must complete a minimum of 30 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 30 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
• Four courses (12 credits) of FREN courses at the 400 level or above that serve as application of competencies in the French language and in French and Francophone literature and culture to the study of a given period, genre, or theme
• Three electives (9 credits) in FREN at the 300 level or above

No more than one course (3 credits) conducted in English may be used to fulfill requirements for the concentration in French.

Students are encouraged to take courses in other languages and literatures, and in 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 CAS, students in this concentration complete 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 fill 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 (SPAN 321, 322, 325, and 329 may not be applied toward the concentration in Spanish).

No unsatisfactory grades may be applied to the major program.

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 language 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: ENGL 494 or 551, FREN 381, or SPAN 390, as appropriate for the student’s focus
• 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 crosscultural topic.

For more information, contact the Department of Modern and Classical Languages or the Department of English.

Teacher Licensure
Students who wish to become teachers should consult the CEHD chapter and attend an information session early in their undergraduate career. For more information, call 703-993-2892, e-mail gseadmirt@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, distributed as follows. 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

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
• Two electives (6 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
  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
Students complete 18 credits distributed as follows:

• 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 for 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 [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 being advanced to degree status.

Degree Requirements
Students who elect a concentration in one language must complete a program of 30 credits. Those who concentrate in two languages must complete a program of 42 credits. The concentration in Spanish/bilingual-multicultural education requires 36 credits. In all three concentrations, 6 of the total credits may be earned with a thesis. Regardless of the concentration selected, all students must meet the core and distribution requirements given below and pass an oral comprehensive exam.

◆ Concentration in French
The requirement is 30 credits, with at least 18 earned in courses listed under the designator FREN and distributed accordingly: 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 either 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
The requirement is 30 credits, distributed as follows:

• 9 credits of core courses:
  SPAN 502 Hispanic Sociolinguistics (3 credits)
  SPAN 505 Applied Spanish Sylistics (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 semester hours. Core courses may be taken concurrently with other courses.
• 9 credits of courses in Spanish to be 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 to be 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 Spanish 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 (799).

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 BA and BS in biology provide a sound liberal 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 study in medicine, dentistry, veterinary medicine, wildlife management, fisheries biology, or marine science. The department also offers a BS in medical technology. Additional information can be found at the Molecular and Microbiology Department’s web site at gmu.edu/departments/MMB or by contacting the Molecular and Microbiology 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. See the department web site, or contact the undergraduate coordinator for more information.

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 the requirements for a BA degree in CAS, 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, 492 (or 494).
  • 8 credits of chemistry: CHEM 103, 104 or 211, 212
  • 6 credits of STAT 250 and IT 103
  • 6 credits from the following: ASTR 103, 111, 113; GEOL 101, 102; PHYS 243, 245

Students expecting to enter graduate or professional school are strongly urged to complete MATH 113 and 114. Organic chemistry and PHYS 243, 244, 245, and 246 are recommended.

■ Biology, BS
In addition to satisfying the university-wide general education requirements for the BS degree, students must
complete the following course work with a minimum GPA of 2.00. (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, and 492 (or 494)
- 13 credits of chemistry: CHEM 211, 212, 313, 315
- One of the following options: CHEM 314 and 318 (5 credits)
  - One chemistry course at the 300 or 400 level (3 credits)
  - GEOL 101 and 102 (8 credits)
- 8 credits of physics: PHYS 243, 244, 245, 246
- At least 6 credits from the following: MATH 110, 111, 113, 114, or STAT 250
- 3 credits of computer skills: IT 103

Students are encouraged to consult with a biology faculty advisor to determine which option best meets their career goals. Students who wish to take biochemistry must take BIOL 483/583 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 seeking employment in the field, or who 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.)

- 25 credits in biology, including BIOL 213, 303, 304, 305, 306, 307, 311, 492 (or 494)
  * Laboratories associated with courses are required.
  ** Subject to approval by program coordinator.
- 18 credits in chemistry, including CHEM 211, 212, 313, 314, 315, 318
- 8 credits of physics: PHYS 243, 244, 245, 246
- At least 6 credits from the following: MATH 110, 111, 113, 114, or STAT 250
- 3 credits of computer skills: IT 103

◆ 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 the 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.)

- 25 credits in biology including BIOL 213, 303, 304, 305, 306, 307, 311, 492 (or 494)
- 19 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 BIOL 309, 326, 331, 332, 333, 342, 344, 345*, 440, 472, 449; EVPP 350*, 415, 451; NCLC 401.
  * If not used for field course requirement.
- 13 credits of chemistry including CHEM 211, 212, 313, 315
- One of the following options:
  - CHEM 314 and 318 (5 credits)
    - One chemistry course at the 300 or 400 level (3 credits)
    - 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 the 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.)

- 25 credits in biology including BIOL 213, 303, 304, 305, 306, 307, 311, 492 (or 494)
- 12 credits in microbiology: BIOL 405, 406, 407
- 7 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

◆ Concentration in Molecular Biology
The molecular biology concentration provides basic knowledge of the structure of macromolecules, and chemical processes that occur in living cells. The concentration prepares students for employment or further advanced study in molecular biology.
In addition to satisfying the university-wide general education requirements for the BS degree, students majoring in biology with a concentration in molecular biology must complete the following. (Through the course work below, they satisfy the university-wide general education requirements in natural science, quantitative reasoning, and information technology proficiency.)

- 25 credits in biology including BIOL 213, 303, 304, 305, 306, 307, 311, 492 (or 494)
- 12 credits in molecular biology: BIOL 385, 482, 483, and 486
- 7 credits of elective courses chosen from BIOL 322, 402, 403, 452, 453, 563, 568, 575, 580
- 18 credits of chemistry, including CHEM 211, 212, 313, 314, 315, 318
- 8 credits of physics: PHYS 243, 244, 245, 246
- At least 6 credits from the following: MATH 110, 111, 113, 114, STAT 250
- 3 credits of computer skills: IT 103

Policy on the Use of 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 Bioinformatics

A minor in bioinformatics is an interdisciplinary program consisting of required courses in biology, computer science, and statistics. Students must complete 19–20 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, and Preveterinary Students

Students planning to enter medical, dental, or veterinary schools may choose to major in biology. These students should meet with one of the health sciences advisor in their second semester for assistance and information about the university’s Medical Sciences Advisory Committee. For more information, contact 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. Students who decide not to major in biology should take BIOL 213 and 303. Other requirements generally include organic chemistry (CHEM 313, 314, 315, and 318 or 320) and a year of physics (PHYS 243 through 246). A course in calculus is required by some and highly recommended by others. Admission requirements can generally be met by either a BA or a BS degree.

Teacher Licensure

Students who wish to become teachers should consult the CEHD 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.

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 medical technology schools is selective. 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 and on 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 300-400 level biology or chemistry 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 the 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: a minimum of 20 credits, including BIOL 213, 303, 305, 306, 311, 452, 453
- Chemistry: a minimum of 18 credits, including CHEM 211, 212, 313, 314, 315, 318
- Mathematics: a minimum of 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 are BIOL 380, 465, 483, 484, 485; CHEM 321; and PHYS 243, 244, 245, 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 (MLT) Articulation Program
A special program is available for 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 the clinical requirement 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 and Premedical Honor Society
The Biology Club functions as both a social and 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.

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 on the professional school admissions process to students interested in health-related fields such 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.

◆ Accelerated Master's Degree in Biology
Qualified undergraduates may be admitted to an accelerated master's program and obtain both a BS and 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, 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
qualifer removed. Ordinarily, students should receive a minimum combined score of 1100 on the verbal and quantitative portions of the general test and be at least in the 50th percentile on the subject exam.

**GRADUATE PROGRAMS**

**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, ecology, evolutionary biology, and animal biology. Master’s-level concentrations are available in molecular biology, microbiology, 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 background in cell biology, molecular biology, genetics, or biochemistry (two to four upper-division courses); plus some undergraduate background in computer science (two to four courses that include substantial programming projects). Students without this background may be asked to remedy their deficiencies. A GPA of 3.00 in biology or in the last 60 credits of undergraduate study is required. Students must also submit a letter of recommendation and scores on the GRE. Successful applicants usually score at least 1100 on the verbal and quantitative sections of the GRE (1200 for the BCB). Applicants to all concentrations except BCB must submit scores on the GRE subject exam in either 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, which 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.

**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**

**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 501 and 556
- 2–4 credits in molecular techniques (see below)
- 5–13 credits of electives in BIOL, BIOS, or related areas as approved by the student’s advisor

**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, 584
- 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 (see below)

**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
- 1–3 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 in BIOL, BIOS, or related areas as approved by the student’s advisor (see below)

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 count for this requirement, but only in semesters in which they are taught in a laboratory format.

Recommended Electives for Students in Molecular Biology, Bioinformatics, and Computational Biology
This list 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.

Biodefense, MS
The program provides students with a background in the foundations of science and technology of biodefense, threat analysis of biological weapons, and specialized areas of medical defense, including engineering defense, non-proliferation in biodefense, and counter-terrorism and law enforcement of biodefense.

Admission Requirements
Applicants are expected to have either a bachelor’s degree or an advanced degree. Due to the breadth of the topic, students with a background in areas such as international affairs, political science, law, public policy, and conflict resolution are eligible for the program in addition to those with a background in the sciences. Students lacking a background in the sciences will be considered for admission, but may be required to satisfy prerequisite courses prior to required graduate courses.

The program requires a minimum 3.00 cumulative undergraduate GPA, but exceptions are considered on an individual basis. Applicants who meet the minimum criteria will be considered for admittance to the program on the basis of experience, letters of recommendation, and other relevant credentials. Admissions are determined by available funding for the program, with individual candidates selected by an admission committee. No specific set of qualifications guarantees admission to the program.

Applicants must provide a completed application form; all undergraduate and graduate transcripts; three letters of recommendation from faculty members or individuals who have firsthand knowledge of academic or professional capabilities; statement of purpose consistent with research interests or professional goals; departmental form; resume; scores from GRE taken within the past five years prior to date of application (may be waived if applicant holds an advanced degree); and if required, scores on the TOEFL.

Degree Requirements
Students must successfully complete 30 credits distributed as follows.
- Four core courses (12 credits): BIOD 604, 605, 606, 607
- Two seminars (2 credits): BIOD 702, 703
- Concentration courses (9 credits; see options below)
- Electives (1–6 credits)
- Thesis (3–6 credits) BIOD 799 or project (1–3 credits) BIOD 798

Concentrations
A minimum of 9 credits are required within the chosen concentration. Appropriate courses include:

Medical Biodefense
BIOD 704 (3) Principles of Toxicology
BIOD 708 (3) Epidemiology of a Bioterror Attack
BIOD 710 (3) Approaches to Bioweapon Medical Treatment and Response
BIOD 711 (3) Techniques in Immunology Lecture
BIOD 712 (1) Techniques in Immunology Laboratory
BIOD 761 (3) Dispersal Patterns of Biological Agents
BIOD 762 (2) Into the Hot Zone: Working in a High Threat Environment
BIOD 763 (2) History of Genetically Engineered Bioweapons
BIOD 765 (2) Drug Discovery and Development

Nonproliferation
BIOD 705 (2) Detecting Production of Biological Agents
BIOD 706 (3) History of Biological Agent Use and Treaties
BIOD 709 (3) Nonproliferation in Biodefense
BIOD 722 (3) Examining Terrorist Groups
BIOD 723 (3) Counterterrorism and Civil Rights
BIOD 763 (2) History of Genetically Engineered Bioweapons

Engineering Defense/Countermeasures
BIOD 705 (2) Detecting Production of Biological Agents
BIOD 707 (4) Detection Techniques in a Bioterror Attack
BIOD 710 (3) Approaches to Bioweapon Medical Treatment and Response
BIOD 761 (3) Dispersal Patterns of Biological Agents
BIOD 766 (2) Bioengineering and Bioprocessing

Counterterrorism/Law Enforcement
BIOD 706 (2) History of Biological Agent Use and Treaties
BIOD 721 (2) Coordinated Response to a Bioterror Attack
BIOD 722 (3) Examining Terrorist Groups
BIOD 723 (3) Counterterrorism and Civil Rights
Biodefense, PhD
The program integrates knowledge of potential pathogenic agents used in biological warfare with medical defense to such agents. Other areas of biodefense, including nonproliferation, counter-terrorism and law enforcement, and engineering defense, are integral parts of the program.

Admission Requirements
Preparation should include a BA, BS, MA, MS, MD, or JD. Due to the breadth of the topic, students with a background in international affairs, political science, law, public policy, and conflict resolution are eligible for the program in addition to those with a background in the sciences. Students lacking a background in the sciences will be considered for admission, but may be required to satisfy prerequisite courses prior to the required graduate courses. The program normally requires a minimum 3.00 cumulative undergraduate GPA, but exceptions will be considered on an individual basis. Applicants who meet the minimum criteria will be considered for admittance to the program on the basis of experience, letters of recommendation, and other relevant credentials. For a given year, actual admissions will be determined by the available funding for the program, with individual candidates selected by an admission committee. No specific set of qualifications guarantees admission to the program.

Applicants must provide the following materials: completed application form; all undergraduate and graduate transcripts; three letters of recommendation from faculty members or individuals who have firsthand knowledge of academic or professional capabilities; statement of purpose consistent with research interests or professional goals; departmental form; resume; scores from GRE taken within the past five years prior to date of application (may be waived if applicant holds an advanced degree); and, if required, TOEFL score.

Degree Requirements
All students are required to complete 72 credits including dissertation research in the chosen concentration. 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 approval of the doctoral coordinator and the dean’s office.

• Four core courses (12 credits): BIOD 604, 605, 606, 607
• At least 2 credits of seminars BIOD 702, 703
• At least 9 credits in a concentration (see options below)
• Biodefense electives or courses in areas related to the concentration chosen in consultation with advisor and approved by doctoral coordinator
• Dissertation proposal and research (12–24 credits) BIOD 998, 999

Students carry out an original and independent research project in biodefense. They must present the results of the dissertation research to their graduate committee and in a seminar. Successful completion of a dissertation is contingent upon approval of the majority of the graduate committee and the dean. The dissertation format must be reviewed and approved by the dissertation/thesis service coordinator in the University Libraries.

Concentrations
A minimum of 9 credits are required within the chosen concentration. Appropriate courses include:

Medical Biodefense
BIOD 704 (3) Principles of Toxicology
BIOD 708 (3) Epidemiology of a Bioterror Attack
BIOD 710 (3) Approaches to Bioweapon Medical Treatment and Response
BIOD 711 (3) Techniques in Immunology Lecture
BIOD 712 (1) Techniques in Immunology Laboratory
BIOD 761 (3) Dispersal Patterns of Biological Agents
BIOD 762 (2) Into the Hot Zone: Working in a High Threat Environment
BIOD 763 (2) History of Genetically Engineered Bioweapons
BIOD 765 (2) Drug Discovery and Development

Nonproliferation
BIOD 705 (2) Detecting Production of Biological Agents
BIOD 706 (3) History of Biological Agent Use and Treaties
BIOD 709 (3) Nonproliferation in Biodefense
BIOD 722 (3) Examining Terrorist Groups
BIOD 723 (3) Counterterrorism and Civil Rights
BIOD 763 (2) History of Genetically Engineered Bioweapons

Engineering Defense/Countermeasures
BIOD 705 (2) Detecting Production of Biological Agents
BIOD 707 (4) Detection Techniques in a Bioterror Attack
BIOD 710 (3) Approaches to Bioweapon Medical Treatment and Response
BIOD 761 (3) Dispersal Patterns of Biological Agents
BIOD 766 (2) Bioengineering and Bioprocessing

Counterterrorism/Law Enforcement
BIOD 706 (2) History of Biological Agent Use and Treaties
BIOD 721 (2) Coordinated Response to a Bioterror Attack
BIOD 722 (3) Examining Terrorist Groups
BIOD 723 (3) Counterterrorism and Civil Rights

Certificates in Microbial Biodefense, and Biological Threat and Defense
These certificates are valuable options for college graduates employed in the biodefense industry, pharmaceutical industry, national defense, and national security. The certificate in microbial biodefense is geared toward those with a background in the sciences. Courses have been selected to provide a sound knowledge of agents of biological warfare, as well as areas such as epidemiology, immunology, toxicology, and approaches to biological warfare medical treatment and response. The certificate in biological threat and defense is for those with an interest in threat analysis and defense to such threats. This program stresses the history of biological agent usage, nonproliferation, and such topics as coordinated response to bioterrorist attacks, incident response, and counter terrorism and civil rights.

Admissions Requirements
Applicants must provide the following materials: completed application form; all undergraduate and graduate transcripts; 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 research interests or professional goals;
departmental form; resume; scores on GRE taken within five years prior to application (may be waived if applicant holds an advanced degree); and, if required, TOEFL score.

**Certificate Requirements**

**Certificate in Microbial Biodefense**

Students must complete at least 15 credits as follows:

<table>
<thead>
<tr>
<th>Required courses</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOD 604 Introduction to Biodefense/Threat Analysis I: Bacterial Agents</td>
<td>3</td>
</tr>
<tr>
<td>BIOD 605 Introduction to Biodefense/Threat Analysis II: Viral Agents</td>
<td>3</td>
</tr>
<tr>
<td>BIOD 702 Special Topics in Biodefense Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

**8 credits from the following list of courses**

- BIOD 606 Introduction to Biodefense/Threat Analysis II: Agricultural Biodefense | 3 |
- BIOD 607 Introduction to Biodefense/Threat Analysis IV: Toxins | 3 |
- BIOD 704 Principles of Toxicology | 3 |
- BIOD 708 Epidemiology of a Bioterror Attack | 3 |
- BIOD 710 Approaches to Bioweapon Medical Treatment and Response | 3 |
- BIOD 711 Techniques in Immunology Lecture | 1 |
- BIOD 712 Techniques in Immunology Laboratory | 1 |
- BIOD 762 Into the Hot Zone: Working in a High Threat Environment | 2 |
- BIOD 763 History of Genetically Engineered Bioweapons | 2 |

**Certificate in Biological Threat and Defense**

Students must complete at least 15 credits as follows:

<table>
<thead>
<tr>
<th>Required courses</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOD 604 Introduction to Biodefense/Threat Analysis I: Bacterial Agents</td>
<td>3</td>
</tr>
<tr>
<td>BIOD 605 Introduction to Biodefense/Threat Analysis II: Viral Agents</td>
<td>3</td>
</tr>
<tr>
<td>BIOD 702 Special Topics in Biodefense Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

**8 credits from the following list of courses**

- BIOD 706 History of Biological Agent Use and Treaties | 2 |
- BIOD 709 Nonproliferation in Biodefense | 2 |
- BIOD 721 Coordinated Response to a Bioterror Attack | 2 |
- BIOD 722 Examining Terrorist Groups | 3 |
- BIOD 723 Counterterrorism and Civil Rights | 3 |
- BIOD 763 History of Genetically Engineered Bioweapons | 2 |

**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 include microarray analysis of gene expression, sequencing and analysis of genes, gene family evolution, mechanisms of toxicology and mutagenesis, and biotechnological applications.

The academic component is a three-tiered structure. The first provides a set of four core courses designed to advance research skills across all disciplines. This is followed by four or five core courses and elective courses. The first two levels are designed to be completed in approximately two years, including the comprehensive exam. Upon completion of these requirements and the comprehensive exam, the student advances to candidacy status. The third level 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.

- A minimum 3.25 GPA in previous course work, with significant training in the biological sciences. A TOEFL score of 575 (paper-based exam) or 230 (computer-based exam) is required for international students.
- Three letters of recommendations from faculty members or individuals who have firsthand knowledge of the applicant’s academic or professional capabilities.
- A 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 the date of application submission.

Also, 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 upon 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
- Qualifying exam
- Dissertation proposal and research 12–24 credits in 998, 999

Upon 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 by petition to the program director and dean. With the advisor, students adopt an individual program that focuses on a specific area of research.

By the end of the fourth semester of course work, the student assembles 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.
Upon 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. Upon successful completion of the qualifying exam and all other coursework, 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 (998, 999). Students must present their dissertation results to their graduate committee and in a seminar, and defend the 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, concentration director, and dean.

**Concentration in Functional Genomics and Biotechnology**

This concentration prepares students for significant contributions in an academic or industrial 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

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### Philosophy and Religious Studies

**Phone:** 703-993-1290  
**Web:** gmuc.edu/departments/philosophy

**Faculty**

**Professor:** Bergoffen  
**Associate professors:** Burns, Cherubin, De Nys, Fletcher, Froman, Holman, Kaufmann (chair), Kinnaman, Nguyen, Paden, Ro, Rothbart, S.M. Skousgaard  
**Assistant professors:** Dakake, Shiner  
**Adjuncts:** Catlett, Caudill, Glazer, Giuliani, D. Gregory, Hebar, Oberto, Romanovskaya, S.A. Skousgaard, Sojka

**Course Work**

This department offers all course work designated LS, PHIL, and RELI 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 to emphasize philosophy while acquiring a broad liberal arts education. Students can use this major as preparation for professions such 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 the university-wide general education requirements and the requirements for a BA degree in CAS, 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 173 or 376
- **History of philosophy (at least 12 credits)**
  - Required: PHIL 301, 303, and 332
  - 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

When the subject matter is appropriate, and at the discretion of the undergraduate coordinator, PHIL 391, 392, 421, 425, or 426 may be used to fulfill the theories of value requirement.

- **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
  - PHIL 520 Current Issues in Philosophy of Science
  - PHIL 531 Freud and Philosophy
  - PHIL 560 Philosophical Foundations of Science
  - PHIL 573 Current Issues in Theory of Knowledge
  - PHIL 574 Philosophical Issues in Cognitive Science

When the subject matter is appropriate, and at the discretion of the undergraduate coordinator, PHIL 391, 392, 421, 425, or 426 may be used to fulfill the reality, knowledge, and science requirement.

- **Philosophy electives**

The following philosophy courses fulfill the general education syntheses requirement: PHIL 309, 377 and 378.

**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. Philosophy majors should consult the undergraduate coordinator for the 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 from 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 at the discretion of the undergraduate coordinator, PHIL 391, 392, 421, 425, or 426 may be used to fulfill the emphasis requirements.

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) Eastern 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 crosscultural perspectives with relation to global issues.

The courses are writing intensive and allow the student to study and analyze religious ideas and symbols, and encourage students to present well-argued papers.

In addition to the university-wide general education requirements and the requirements for a BA in CAS, religious studies majors must complete at least 33 credits in religious studies earning a minimum grade of C- (1.67) in each. No course may be used to fulfill more than one requirement. The credits must be 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 Seminar).

• 6 credits in courses emphasizing either comparative or methodological aspects of the study of religion, such as:
  ANTH 313 Anthropological Perspectives on 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, at the discretion of the student’s advisor, 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 requirements 2 or 3.

• 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 (e.g., Arabic, Biblical Hebrew, Chinese, Classical Greek, Latin, Sanskrit) may be used to fulfill requirements 4 or 5.

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 one of the courses under the second requirement above.

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. 3 credits must be taken from 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 C- (1.67) in each course and have a minimum GPA of 2.000 in courses applied to the minor.

Graduate Program
The department offers a comprehensive master’s degree in traditional and contemporary philosophy. The degree is designed for students who intend to go on to a doctorate in philosophy, as well as 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; a graduate certificate in professional ethics is also offered.

Philosophy, MA
Admission Requirements
In addition to fulfilling the university admission requirements for graduate study, applicants must submit three letters of recommendation. GRE exams are recommended, especially for those students planning to pursue a PhD in philosophy.
Degree Requirements
Students must successfully complete 30 credits distributed as follows. As part of their course work, students may elect to do a thesis or project. Students must find an advisor on entering the program, and meet regularly with that advisor during their course of study. With the agreement of their advisor, students establish a contract defining their program of study. With an advisor’s approval, students may apply up to 9 credits from other departments toward the degree.

- 3 credits in ancient or medieval philosophy (PHIL 602, 604, or 681 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 or 733)
- 18 credits of electives that may include 3 to 6 credits of thesis

Students who wish to receive the concentration in professional ethics must complete the following:

- 6 credits in the history of philosophy, including the history of ethical theory, 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 biomedical ethics, PHIL 642; environmental ethics, PHIL 643; business ethics, PHIL 644; or criminal justice ethics, PHIL 645.
- 9 to 12 credits of electives.
- Project or thesis (3 to 6 credits).

Certificate in Professional Ethics

Admission Requirements
Students must be admitted to graduate study or approved for graduate course enrollment through extended studies. Students who initially enroll in the certificate program through extended studies 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 applied ethics chosen from biomedical ethics, PHIL 642; environmental ethics, PHIL 643; or business ethics, PHIL 644
- 3 credits of an elective (requirement can be fulfilled by taking a course in philosophy, but students are encouraged to take courses in other disciplines)

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. With the agreement of their advisor, students establish a contract defining their program of study. With an advisor’s approval, students may apply up to 9 credits from other departments toward the degree.

- 3 credits in ancient or medieval philosophy (PHIL 602, 604, or 681 where appropriate)
- 3 credits in modern philosophy (PHIL 605, 608, or 681, or 691 where appropriate)
- 6 credits in applied ethics chosen from biomedical ethics, PHIL 642; environmental ethics, PHIL 643; or business ethics, PHIL 644
- 3 credits in professional ethics, PHIL 641
- 3 credits in the history of ethical theory, PHIL 640 (PHIL 691 may be taken to fulfill this requirement only with the written permission of the graduate coordinator).

Physics and Astronomy

Phone: 703-993-1280
Web: physics.gmu.edu

Faculty

Professors: Blaisten-Barojas, Dworzecka (chair), Ehrlich, Ellsworth, Kafatos, Lieb, Satija, Summers, Trefil (Robinson Professor)
Associate professors: Becker, Ceperley, Evans, Gluckman, Roberts, Sambruna, So, Wallin
Assistant professors: Barreto, Rubin, Satyapal, Sauer, Weingartner
Term assistant professors: Oerter, Wyczalkowski
Term instructor: Ewell, Geller, Goldman, Jazaeri, Pezzano

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 science education fields where analytical skills and scientific background are advantageous. Students who are considering a double major in the fields of mathematics, science, computer science, and engineering should talk to an undergraduate coordinator. Some course substitutions are allowed for such majors, but 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.)

- Seven required core astronomy courses (21 credits): ASTR 103 or 113, 201, 328, 403, 404, 428, and 490
- Seven required physics courses (18 credits): PHYS 160, 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 pre-approved BIOL, CHEM, MATH, or PHYS courses.

In meeting the above requirement, 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 areas require more than 9 credits as listed below.

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; 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, 506 (The Origin of Life) and complete a senior project (ASTR 408) or internship (ASTR 409).

**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. Students majoring in astronomy may fulfill this requirement by successfully completing ASTR 490.

**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. Students in the fields of mathematics, science, computer science, and engineering who are considering a double major should discuss it with the undergraduate coordinator. Some course substitutions are allowed for such majors, but they must be approved in writing in advance.

In addition to satisfying university-wide general education requirements for the BA degree, students must complete a minimum of 26 credits in physics and astronomy, and 6 credits in mathematics, with a minimum GPA of 2.00. (Through the course work below, astronomy majors satisfy university-wide requirements in natural science and quantitative reasoning.)

- 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, 260, 262 (10 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.

**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. Students majoring in astronomy may fulfill this requirement by successfully completing ASTR 490.

◆ **Minor in Astronomy**
The minor requires completion of a physics prerequisite and 15 credits in astronomy, with a minimum GPA of 2.00. The prerequisite consists of one of the two sequences: PHYS 243, 244, 245, 246; or PHYS 160, 260, 261, 262, 263. Following the introductory physics sequence, students are required to take ASTR 111, 112, 113, 114; PHYS 416; and two astronomy courses chosen from ASTR 201, 228, 328, 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 for 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 it with the undergraduate coordinator. Some course substitutions are allowed for such majors, but they should be discussed in advance.

In addition to satisfying the university-wide general education requirements for the BS degree, candidates 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.)

- Eight required core physics courses (21 credits): PHYS 160, 260, 261, 262, 263, 305, 308, and 407 (students double majoring in engineering/physics may substitute ECE 305 for PHYS 305, and ECE 333, 334 for 407)
- 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 in 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. In addition, they complete 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; 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, 530, 532, 535; and MATH 446. In addition, students 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 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; ECE 430; and ECE 431. In addition, students complete a senior project (PHYS 408 or 409) or honors thesis (PHYS 405 and 406) in applied solid state physics.

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 physics may fulfill this requirement by successfully completing PHYS 407.

Honors Program in Physics
Physics majors who have completed the prerequisites for PHYS 405 and 406 Honors Thesis in Physics, and who have maintained an overall GPA of at least 3.50 in physics courses and a GPA of 3.500 in all courses taken at Mason, may apply to the departmental honors program. 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.

Minor in Physics
The minor requires 18 credits with a minimum GPA of 2.00, including PHYS 160, 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.

Physics for Majors
Students who intend to major in physics should take the physics introductory sequence (PHYS 160, 260, 261 or 265, 262, 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 for mathematics students who seek a BA degree. PHYS 101, 102, 103, and 104 are intended for nonscience majors. PHYS 160, 260, 261 or 265, 262, 263 constitute a calculus-based sequence in general physics to be taken by physics and engineering majors, and chemistry, computer science, and mathematics students who are pursuing a BS degree. Students may receive credit for only one of the following three sequences: PHYS 242, 243, 245, 246; PHYS 103, 104; or PHYS 160, 260, 261, 262, 263.

Premedical, Predental, and Preveterinary Students
Students planning to enter medical, dental, or veterinary schools may meet the requirements of these professional schools by majoring in physics. Those students should consult with the premedical advisor for physics.

Teacher Licensure
Students who wish to become teachers should consult the CEHD 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.

Physics, Bachelor’s/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. Upon completion, students are exceptionally well prepared for entry into either a professional school, or a PhD program in physics or a related discipline. Well-prepared students are encouraged to apply to this program after they complete 90 credits. Admitted students take selected graduate courses during their senior year (when they have successfully completed the prerequisites), and are able to use up to 6 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion of that degree and with satisfactory graduate level 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 both 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, jointly 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 either 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 for a limited number of research assistantships.

Admission Requirements

Those holding a baccalaureate degree in physics or a related field from an accredited institution and who earned a GPA of 2.750 (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 last 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:

- 9 credits of required core courses: PHYS 510, 513, and 732 or 736
- 9 credits in an emphasis
  - For the applied physics emphasis, any three of the following courses: PHYS 512, 533, 540, 575, 612, 613, 620, 676, 701, 705, 711, 722, 728, 732, and 736; ASTR 530, 761, 764, 765, and 766
  - For the engineering physics emphasis, PHYS 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 the student to make an oral defense. ECE/PHYS 798 may be taken only once. No more than 6 credits of PHYS 799 may be applied to the degree.

In addition to the requirements stated above, students may also select an emphasis in astrophysics, atmospheric physics, biological applications of physics, computational physics, condensed matter, instrumentation (engineering physics), or nonlinear dynamics. An emphasis requires that a student complete 15 credits of approved courses. The students in the master’s degree program can earn a graduate certificate in computational techniques and applications from the School of Computational Sciences by choosing an approved sequence of courses.

Computational Sciences and Informatics, PhD

The doctoral program in computational sciences and informatics includes concentrations in computational physics, and in space sciences and computational astrophysics. See the School of Computational Sciences chapter for degree and admission requirements.

Physical Sciences, PhD

This interdisciplinary doctoral program is offered jointly by the Department of Physics and Astronomy, the Department of Chemistry, and the School of Computational Sciences. The degree focuses on preparing scientists to perform research as members of interdisciplinary science teams, primarily involving astronomy, 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 comprise the degree (physics, chemistry, and astronomy). However, the program curriculum has been designed to provide enough flexibility to accommodate students seeking a fully interdisciplinary program as well as those with interests that are more closely aligned with one of the traditional physical sciences disciplines.

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 exam. Applicants with insufficient undergraduate records may be accepted provisionally.

Students are encouraged to undertake research under close faculty supervision in a number of potential areas, including, but not limited to, 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
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 previous 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 credit dissertation research

The 9 credits comprising 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 701 (see below) is the 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. After students select a dissertation advisor and finalize the composition of the dissertation committee, they take the candidacy exam, which has written and oral components. Upon passage of the candidacy exam and approval of the dissertation proposal by the committee, the student is advanced to doctoral candidacy.

Psychology

Phone: 703-993-1342
Web: gmu.edu/departments/psychology

Faculty

Professors: Boehm-Davis (director, Applied Experimental Programs), Denham, Klimoski, Lehman (director, Developmental/Biopsychology/School Programs), Maddux, Mandes, Naglieri, Parasuraman, Pasnak, Riskind, Rojahn (director, Center for Cognitive Development), Schiff, R. Smith (chair), Tangueney, Tetrick (director, Industrial/Organizational Program), Zaccaro

Associate professors: Ascoli, Butler, Buffardi, Cortina, Flinn, Gessner, Sanford (associate chair for undergraduate studies), Short, Winsler

Research associate professors: Bachus

Assistant professors: Cattaneo, Greenwood, Kashdan, Kello, Peterson, Spasojevic

Term associate professor: Chrosniak, Wanschura, Wasserman

Research assistant professors: Beck, Chong, Fu, Mashek, McDonald, Stuewig, Wochinger

Term assistant professor: Hurley, Meier

Affiliates: DeMulder, Eby, Fadden, Hunt, Trafton, Wexley

Adjunct: Anderson, Battaglia, Brooks, Curtin, Dechman, Feuerbach, Grande, Hawley, Hirsch, Klirs, Levitas, Mayfield, McCloy, Morrison, Mutchler, Paolitto, Perez, Schumann, Shiraev, Stanhope, Steve, Toth, 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 the university-wide general education requirements and requirements for the BA degree in CAS, psychology majors must complete the following 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, 231, 300, 301, 317, 325, 372, and 465. Students must have a minimum grade of C- (1.67) in each of these 9 courses.

- It is strongly recommended that students fulfill the natural science requirement by completing BIOL 103 and 104. (These courses are prerequisites to PSYC 372.)

Students who receive transfer credit for a research methods course must take PSYC 304, 309, or 323 unless the transfer course has been approved as writing intensive.

Some of these courses may simultaneously fulfill university or college general education 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, 231, 300, 301, 317, 325, 372, and 465; and one of the following: PSYC 304, 309, 320, 323, or 373. Students must have a minimum grade of C- (1.67) in each of these 10 courses.

- 14 credits of natural science; this must include BIOL 103 and 104 (which fulfill the university natural science requirement), plus 6 credits from ASTR, BIOL, CHEM, GEOG 102 and 309, GEOL, PHYS, and UNIV 301.

- 6 credits of mathematics, selected from MATH 108, 110, 111, 113, and 114 (fulfills university quantitative reasoning requirement)

- 3 credits of IT 103 (fulfills the university IT proficiency requirement)

- 12 credits of social and behavioral science (not in psychology or 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
• 3 credits of literature (ENGL 201; any other course in English literature at the 200 level, for which ENGL 201 is a prerequisite; or any literature course in foreign languages at the 300 level or above; fulfills the university-wide literature requirement)

Information for All Majors in Psychology

A grade of D in any of the nine (10 for BS students) required psychology courses may not be used toward graduation. All psychology courses may be used to satisfy either 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 experiences 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.

Mason undergraduate students may be eligible to admission to an accelerated MA in psychology with a concentration in biopsychology. This program makes it possible for students to complete some graduate classes during their last 30 credits of their undergraduate degrees. Interested undergraduates should contact the department.

Writing-Intensive Requirement

The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in psychology may fulfill this requirement by successfully completing PSYC 301, 304, 309, or 323.

Honors Program in Psychology

Students majoring in psychology may apply. The program consists of a sequence taken over three consecutive semesters, PSYC 490, 491, and 492 (see “Course Descriptions” chapter of this catalog), to be taken during the spring semester of the student’s junior year, and fall and spring semesters of the senior year. For more information, please contact the Undergraduate Psychology Office.

To be eligible for admission, psychology majors must have completed at least 50 credits, have a minimum cumulative GPA of 3.25, and a minimum GPA of 3.40 in psychology courses. To graduate with honors in psychology, a student is required to maintain a minimum GPA of 3.25 and a minimum GPA of 3.40 in psychology courses. Students must earn at least 3.50 in their three honors courses culminating in the successful completion and presentation of an independent honors thesis.

Minor in Psychology

The Psychology Department offers a minor to students who major in any other discipline at Mason. Students in the minor complete 18 credits of course work in psychology distributed as follows.

- 3 credits of PSYC 100 Basic Concepts in Psychology
- One course from three of the following five areas (9 credits; at least one course must be PSYC 317 or 372):
  - Developmental: PSYC 211 or 313
  - Social/Personality: PSYC 231 or PSYC 324
  - Cognition: PSYC 317
  - Abnormal: PSYC 325
  - Physiological: PSYC 372
- 6 additional credits of psychology courses. No more than 3 credits may be taken from PSYC 260, 350, and 460.

Related coursework in psychology can enhance many different majors. Please contact the Undergraduate Psychology Office or visit 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 CEHD 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

- 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- or full-time practicum before completing the degree.

The school psychology concentration prepares students for endorsement as fully certified school psychologists in Virginia and in 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 seeks to develop clinical psychologists with a strong capacity to create and integrate new knowledge and procedures into practice.

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 last 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 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. The deadline for receipt of all application materials is January 1 for the clinical psychology concentration; February 1 for the school psychology, applied developmental and biopsychology concentrations; and March 1 for the industrial/organizational and human factors/applied cognition concentrations. 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, 633, 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 permission of advisor)
- Thesis 798, 799 (optional: 6 credits of thesis requires permission of chair)
- Other courses within or outside the department may be taken with advisor’s approval

Concentration in School Psychology: Masters 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 (NASP). Students completing the program will be eligible for licensure in Virginia and in 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 the 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 credits
With the 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 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 if 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 including the following:

• 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 to be selected from relevant courses including the following:
  BIOL 583 General Biochemistry
  BIOL 693 Directed Studies, Bioinstrumentation
  PSYC 561 Behavioral Biology of Substance Abuse
  PSYC 646 Issues and Methods in Developmental Psychology
  PSYC 702 Biological Bases of Behavior
  PSYC 704 Life-Span Development
• 6 credits of thesis: PSYC 798, 799. A thesis is normally required, but 6 credits of practicum (PSYC 792) may serve as a substitute if approved by the advisor and program coordinator.

Mason undergraduate students may be eligible to admission to an accelerated MA in psychology with a concentration in biopsychology. This program makes it possible for students to complete some graduate classes during their last 30 credits of their undergraduate degrees. Interested undergraduates should contact the department.

◆ Concentration in Clinical Psychology

Students who have been admitted to the doctoral program with a concentration in clinical psychology are awarded an MA in psychology upon completion of the following.

• PSYC 611/612 Advanced Statistics I and II (8)
• One course from three of the following sets of courses:
  Cognitive core (PSYC 701, 766, or 768) (3 credits)
  Biological core (PSYC 558, 559, or 702) (3 credits)
  Social core (PSYC 667, 668, or 703) (3 credits)
• Development core (PSYC 666, 669 or 704) (3 credits)
• Historical core (PSYC 705) (3 credits)
• PSYC 880 Clinical Foundations (3)
• PSYC 830 Theories of Psychotherapy (3)
• A total of 30 graduate credits in psychology
• Good standing in the clinical program (as determined by the director of clinical training)

The MA concentration in clinical psychology is not a terminal degree to which individuals can apply independent of the PhD. It is awarded only to clinical PhD students who have met the above requirements.

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 assured that such requests will be granted. If granted, however, 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 coordinator.

Provisional Admission

Students admitted provisionally must 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 SCS, CAS, and the Krasnow Institute for Advanced Study. For details, see the School of Computational Sciences 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 settings such 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 focuses on educating clinical psychologists to deal with the unique demands of mental health systems and private practice.

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, 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 (SRIF), 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 deadline for receipt of all application materials is January 1. The department does not normally consider applications that fail to meet the minimum criteria of 3.00 undergraduate GPA, 3.25 in psychology course work, and combined GRE scores of 1100. 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.

Requirements

In addition to fulfilling the admission requirements, applicants are expected to have the following:

- For the PhD with a concentration in industrial/organizational psychology or in human factors/applied cognition, at least 15 credits in psychology, including a statistics course and a laboratory course in psychology, are required. A tests and measurements course is recommended.
- For the PhD with a concentration in clinical psychology, at least 15 credits in psychology, including a statistics course, a laboratory science course, and abnormal psychology, are required. 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, are required. 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 practice, 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 of research (999), and must 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 the university library.

Student Evaluation
A student in the doctoral program is evaluated on the basis of grades, comprehensive examinations, 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 in August. Students who successfully complete the comprehensive exams are admitted to doctoral degree candidacy.

Concentration in Applied Developmental Psychology
Students must complete the following requirements:
- 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)

SubTotal = 64

A second year research project is required as part of a student’s program. It must be completed before a student 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.

Electives:
- 0 to 6 credits of Practicum (792)
- 0 to 8 credits of Electives

SubTotal = 8

Total = 72

- Can be taken only by students concurrently enrolled in school psychology MA concentration.

Concentration in Biopsychology
Students must complete 72 graduate credits taken from the following:
- 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 hour per first 3 semesters) and a third-year research project, 3 credits of PSYC 897; or 6 hours of MA Thesis (PSYC 798, 799)
- 15 credits of specialized content: Select 15 credits from 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 hour of professional seminar: PSYC 890 and NSC 709
- 12 credits of dissertation: PSYC 998 and 999

Concentration in Clinical Psychology
The clinical psychology program at Mason is guided by the scientist-practitioner model. The necessary preparatory training requires the following:
- A primary commitment by both faculty and students to research and clinical work.
- The ability to conduct, evaluate, and apply research. Clinical psychologists must be able to create new knowledge and apply new discoveries to clinical problems. They must be capable of, and committed to, evaluating the services provided to consumers.
- A broad knowledge of psychological science. Clinical psychologists must possess a fundamental knowledge of their field.
- Exposure to a variety of approaches in clinical psychology. Clinical psychologists must be aware of a range of perspectives on psychopathology, assessment, and intervention to ensure flexible and creative approaches to problems they encounter.
- Acquisition of skill and experience in the major techniques of assessment and intervention. Clinical psychologists should acquire skills and substantial experience in human service settings.
Students must complete 88 graduate credits taken from the following:

- 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; six credits from PSYC 631, 638, 640, 733, 736, 592/892; and 6 credits from PSYC 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)
- 20 credits of practicum (PSYC 790) or directed readings (PSYC 897) (at least 1 credit per semester)
- 12 credits of dissertation: PSYC 998 and 999

◆ Concentration in Industrial/ Organizational Psychology

Students must complete 88 graduate credits taken from the following:

- 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; six credits from PSYC 631, 638, 640, 733, 736, 592/892; and 6 credits from PSYC 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)
- 20 credits of practicum (PSYC 790) or directed readings (PSYC 897) (at least 1 credit per semester)
- 12 credits of dissertation: PSYC 998 and 999

Public and International Affairs

Phone: 703-993-1400
Web: www.pia.gmu.edu

Faculty
Robinson Professors: Heelo, Paden
Emeritus Faculty: Early, Hart-Nibbrig, Knight, White
Professors: Cioffi-Revilla, Clark, Conant, Conlan, Dudley, Gortner, Katz, Keeter, Mastrofski, Regan, Sacco, Snyder, Travis, Walters, Wan
Associate professors: Balint, Benjamin, Brigety, Burt, Gallagher, Gould, Hackler, Johnson, Mandaville, McDonald, Miller, Rivera, Shogan, Toepfer, Wilson
Term assistant professors: Burroughs, Bushée, Feit, Robbins

Research professor: Turner
Affiliate faculty: Brandwine, Butler, Czarda, Gifford, Gould, Haynes, Hennessey, Kash, Piffner, Rossell
Course Work
The Public and International Affairs Department offers all course work designated ADJ, GOVT, and PUAD in the “Course Descriptions” chapter of this catalog.

UNDERGRADUATE PROGRAMS

Government and International Politics, BA
In addition to satisfying the university-wide general education requirements and the requirements for the BA degree, CAS 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 IT and IT ethics requirements)
• 21 credits in advanced government courses. At least 3 credits must be taken from each of the fields listed below:
  American politics: GOVT 301–319, 400–419
  Political theory and law: GOVT 320–329, 420–429
  International and comparative politics: GOVT 330–349, 430–449
  Public administration and policy: GOVT 350–369, 450–469

With permission of an advisor, a total of 9 credits of GOVT 480 and 496 may be substituted for upper-division GOVT field courses. Only 3 credits of 6-credit 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)
• 3 credits of analytic or language competency skills from the following: GOVT 359, 459; any CS, INFS, IT, or STAT course; or an upper-level foreign language course taught in the language.
• 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.
A total of 120 credits are required for the degree, 45 of which must have been at the 300 and 400 levels. Only courses passed with a grade of C or better may be used to fulfill major requirements. This includes GOVT courses, and the course for the advanced competency skill requirement.

Public Administration, BS
In addition to satisfying the 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.

• 18 credits of core requirements: GOVT 101, 103, 132 or 133 or 149, 204, 300, 351 (fulfills the university social science, global understanding, and IT and IT ethics requirements)
• 21 credits of advanced GOVT courses including GOVT 355, 356; and 3 credits from GOVT 357, 358, 452, 464; NCLC 331; 3 credits from GOVT 320’s or 420’s; 3 credits from GOVT 360’s or 460’s; 3 credits of upper level GOVT taken outside of GOVT 350’s and 450’s (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; JT/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 and 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
A total of 120 credits are required for the degree, 45 of which must have been at the 300 and 400 levels. Only courses passed with a grade of C or better may be used to fulfill major requirements. This includes GOVT courses, major supporting courses, and Option A or B courses. The following courses can be applied to only one major requirement: JT/STAT250; GOVT 343, 358 and 464.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in government and international politics and in 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 CEHD 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.

Administration of Justice, BS
The BS degree 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,
Students may satisfy all degree requirements at Mason. Students may also use up to 18 credits of approved ADJ courses taken at Northern Virginia Community College (NVCC) or another Virginia community college to fulfill requirements in the four categories below (no more than 9 credits may be used in the first category; no more than 6 credits in the other categories). Once a student enrolls at Mason, no additional courses may be taken at another institution without prior approval. Students transferring from the administration of justice program at NVCC are subject to special transfer policies and should consult with an advisor.

In addition to the university-wide general education requirements, students must complete the following. Only ADJ courses passed with a minimum grade of 2.00 may be used to fulfill major requirements.

• 21 credits in justice system and the legal process: ADJ 100, and 18 credits chosen from: ADJ 301, 302, 401, 402, 404, 405, 406, 407, 408, 409, 460; GOVT 452; SOCI 475/575

• 12 credits in social and human problems chosen from ADJ 471, 475; SOCI 101, 301, 308, 309, 310, 315, 332, 352, 373, 401, 441; GOVT 103, 414; PSYC 100, 211, 231, 313, 314, 322, 325, 326, 327, 328, 362, 372, 561; SOCW 410, 423, 435

• 12 credits in legal, philosophical, and ethical standards chosen from ADJ 471, 475; SOCI 101, 301, 308, 309, 310, 315, 332, 352, 373, 401, 441; GOVT 103, 414; PSYC 100, 211, 231, 313, 314, 322, 325, 326, 327, 328, 362, 372, 561; SOCW 410, 423, 435

• 15 credits from a skill area chosen from one of the following:
  - research and policy analysis: GOVT 364, 366, 399, 400; PSYC 260; SOCI 405, 410; STAT 362, 455, 463, 474
  - management and planning: ADJ 425; GOVT 305, 309, 351, 355, 356, 357, 358, 359, 376, 409, 416, 459, 464
  - computers and information management: GOVT 359, 459; GEOG 311; any CS course; any IT course
  - social work: SOCW 200, 301, 323, 324, 351, 352, 425, 430
  - foreign language: 15 credits in a single foreign language, including only courses that develop or require foreign language skills and are taught in the language
  - field experience in justice administration: 3 credits of ADJ 479; 9 credits of ADJ 480; and one upper-level, 3-credit ADJ class taken from courses listed under items 1-4 above. Course must be relevant to the student’s internship experience, and requires advisor approval. Course may not simultaneously fulfill another ADJ requirement.

Credits earned in ADJ 490 and 499 may be applied to requirements with approval of an advisor.

Writing-Intensive Requirement
The university requires all students to complete at least one course designated “writing intensive” in their majors at the 300 level or above. Students majoring in 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.

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

◆ Interdisciplinary Minors
The department coordinates the interdisciplinary minors in Asia-Pacific studies, global systems, and urban and suburban studies. See the Interdisciplinary Minors section in this chapter for descriptions.

The following applies to the five minors below:

All courses applied to the minor require a grade of C or better. At least 8 credits must be unique to the minor, and may not be used to fulfill the requirements of the student’s major, concentration, or another minor.

◆ 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.

The minor requires 18 credits of course work in administration of justice, each course with a minimum grade of 2.00:

• ADJ 100 (3 credits)
• One of the following (3 credits): ADJ 306 or 424
• 12 credits of upper-level ADJ courses (excluding ADJ 479 and ADJ 480)

Students should plan their course of study with an administration of justice faculty advisor who will be assigned by the program. The minor must be approved by the administration of justice program before graduation. At least 9 credits must be completed at Mason.

◆ Minor in American Government
This minor develops knowledge of the principles, institutions, and behaviors of the American political system. It requires 18 credits of government courses, including GOVT 103 Introduction to American Government, and five additional courses from the following:
12 graduate credits may be used in partial satisfaction of a BA and a MA with 144 credits. Admitted students may take an accelerated master’s degree program and obtain both a BA and MA with 144 credits. This program 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 301 Public Law and Judicial Process, and four additional courses chosen 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

To be eligible, Mason undergraduates must have completed at least 90 credits toward their bachelor’s degree, and have a cumulative GPA of 3.50 or higher. Students must apply to the MA in political science program, and be admitted before they will be allowed to start the program. To apply, students must submit an application form, two letters of recommendation, preferably from professors, and a resume. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

Minor in International/Comparative Studies

This minor increases students’ awareness of the regions and current issues of the world on theoretical and practical levels. It requires 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

To be eligible, Mason undergraduates must have completed at least 90 credits toward their bachelor’s degree, and have a cumulative GPA of 3.50 or higher. Students must apply to the MA in political science program, and be admitted before they will be allowed to start the program. To apply, students must submit an application form, two letters of recommendation, preferably from professors, and a resume. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

Minor in Legal Studies

This minor focuses on the constitutional foundations, interpretation, processes, and functions of domestic and international law. It requires 18 credits of government courses, including GOVT 103 Introduction to American Government and GOVT 301 Public Law and Judicial Process, and four additional courses chosen 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

To be eligible, Mason undergraduates must have completed at least 90 credits toward their bachelor’s degree, and have a cumulative GPA of 3.50 or higher. Students must apply to the MA in political science program, and be admitted before they will be allowed to start the program. To apply, students must submit an application form, two letters of recommendation, preferably from professors, and a resume. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

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

To be eligible, Mason undergraduates must have completed at least 90 credits toward their bachelor’s degree, and have a cumulative GPA of 3.50 or higher. Students must apply to the MA in political science program, and be admitted before they will be allowed to start the program. To apply, students must submit an application form, two letters of recommendation, preferably from professors, and a resume. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

Accelerated MA in Political Science

Highly qualified undergraduates may apply to a bachelor’s/accelerated master’s degree program and obtain both a BA and a MA with 144 credits. Admitted students may take graduate courses after completing 90 credits, and up to 12 graduate credits may be used in partial satisfaction of the requirements for their undergraduate degree. Upon completion of their undergraduate degree and with satisfactory graduate-level performance (3.00) in the graduate courses, students earn advanced standing in the master’s degree in political science and complete the remaining credits required for the master’s degree. (If they took 12 graduate credits as part of their undergraduate degree, this will be an additional 24 credits.) All other master’s degree requirements must be met.

To be eligible, Mason undergraduates must have completed at least 90 credits toward their bachelor’s degree, and have a cumulative GPA of 3.50 or higher. Students must apply to the MA in political science program, and be admitted before they will be allowed to start the program. To apply, students must submit an application form, two letters of recommendation, preferably from professors, and a resume. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

Accelerated MPA

Highly qualified undergraduates may apply to a bachelor’s/accelerated master’s degree program and obtain both a BA and a MPA with 147 credits. Admitted students may take graduate courses after completing 90 credits, and up to 9 graduate credits may be used in partial satisfaction of the requirements for their undergraduate degree. Upon completion of their undergraduate degree and with satisfactory graduate-level performance (3.00) in the graduate courses, students earn advanced standing in the MPA degree and complete the remaining credits required for the master’s degree. (If they took 9 graduate credits as part of their undergraduate degree, this will be an additional 27 credits.) All other master’s degree requirements must be met.

To be eligible, Mason undergraduates must have completed at least 90 credits toward their bachelor’s degree, and have a cumulative GPA of 3.40 or higher. Students must apply to the MPA program, and be admitted before they will be allowed to start the program. To apply, students must submit an application form, two letters of recommendation, preferably from professors, and a resume. The one-page application can be obtained at the graduate admissions desk in the Department of Public and International Affairs.

GRADUATE PROGRAMS

Justice, Law, and Crime Policy, MA

The master’s degree in justice, law, and crime policy prepares graduate students for doctoral study, or for employment in academia or relevant policy or practitioner communities.

The program draws on a multidisciplinary faculty in the Administration of Justice (ADJ) program for required core courses and electives. It also makes available a wide range of other electives from many different Mason 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 Mason’s proximity to many justice organizations at the federal, state, and local level in the capital region. The curriculum is structured to give students the skills to do policy-relevant research, and to 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 at Mason, applicants should submit three letters of recommendation from faculty members or individuals with first-hand knowledge of academic or professional capabilities; a statement of purpose of study no longer than 500 words; official verbal, quantitative, and analytical GRE scores on tests taken within five years of application submission; and a writing sample of a recent sole-authored work of at least 2,500 words. An interview may be required.

Satisfactory Progress

Each new student is assigned a faculty advisor who helps develop a program of study. The advisor and JLCP faculty assess the progress of all students annually. Students who fail to make satisfactory progress may be terminated from the program.

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
- 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 coordination of the program.

Students may request a maximum of 14 transfer credits if prior graduate course work in a relevant area, subject to approval of the graduate coordinator and dean and 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, achieve justice, reduce crime, and enhance domestic security.

The program draws on a multidisciplinary faculty in the Administration of Justice (ADJ) program for required core courses and electives. It also makes available a wide range of other electives from many different Mason 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 Mason’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 to 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 at Mason, 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 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. Upon 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.

Degree Requirements

Students must successfully complete 48-60 credits of course work, pass a comprehensive exam, 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), 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.
• 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
• 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.

Comprehensive (Qualifying) Exams
The comprehensive exam consists of two parts. First, students must pass a written comprehensive (“qualifying”) exam in two core substantive fields of the student’s choosing, selected from the three fields below. Questions from the two fields may be administered at one time or serially, depending upon the preference of the committee. Students are not eligible to take the comprehensive exams until they have successfully completed course work specified above and, for students earning the master’s in JLPC, completed the master’s thesis (799).

Each field of the written comprehensive exam may be repeated once at the discretion of the readers of that field. Second, upon successful completion of both parts of the written comprehensive exam, students are required to offer an oral defense of the answers, graded by the readers of both parts of the written exam. Students who fail the oral portion can retake the oral exam once.

Dissertation Committee
The student’s committee is comprised of at least three faculty and a chair, at least two of which must be full-time JLCP faculty and one, a member of Mason’s 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; SOC1 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; SOC1 503; PHIL 711; CONF 733; ECON 895 (when topic is Law & 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, the law school instructor, and the 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 760; SOC1 607; GOVT 745; PUAD 640, 644, 741; CONF 734; PSYC 616, 617
• Analytical Methods
  JLCP 781; SOC1 631, 632, 634; STAT 574, 674, 658, 662, 665, 673; PSYC 633, 640; PUAD 643; CSS 600, 610
Students may use other courses offered by JLCP or other programs as elective credit for a substantive field with prior written approval of the student’s advisor, the coordinator of the JLCP program, and the sponsoring program.

Political Science, MA
The master of arts in political science is a 36-credit degree program that 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. Courses are offered at the Fairfax Campus at 4:30 p.m. and 7:20 p.m. to accommodate full- and part-time students.

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. The application includes the application form (designate the MA in political science); two copies of official undergraduate transcripts; three letters of recommendation, preferably from recent professors; GRE, GMAT, or LSAT exam results for students whose GPA is less than 3.40, and for all students who intend to apply for assistantships; resume listing employment and volunteer work; and a statement of interests and career goals.

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 (for example, SOCI 630, 634; STAT 530, 535)

- 3 credits of GOVT 798 Research Project, or 3-6 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.

Public Administration, MPA

This 36-credit program is designed to build the knowledge base and skills of people who are playing, or who intend to play, a leadership role in organizations that develop and implement public policy. The curriculum consists of eight required courses and four electives. 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. 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, health policy, administration, administration of justice, and information policy and administration. 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 courses are delivered at both the Fairfax and Arlington Campuses during the week at 1:30 p.m., 4:30 p.m., and 7:20 p.m. Classes are also offered during the weekend in an accelerated format, meeting from 6 to 9 p.m. on Fridays, and 9 a.m. to 5 p.m. on Saturdays every other weekend for eight weeks. The Arlington Campus is located near the Virginia Square Metro stop, which makes it easily accessible for those who work in Washington, D.C. The Fairfax Campus can be reached by taking a bus from the Vienna Metro. Parking is available at both the Fairfax and Arlington Campuses.

Completion of the MPA can lead to a variety of postgraduate opportunities, including the Presidential Management Internship. With more than 1,000 alumni, the MPA program can also serve as a valuable source for networking and job placement. Additionally, the MPA can serve as a key credential in the pursuit of a PhD in public policy, offered by the School of Public Policy.

Application and Admission

Students may start the MPA program in the fall, spring, or summer semesters. The Admissions Committee considers an application as soon as the file is complete. Late applications are considered on a space-available basis. A complete application file consists of the graduate application form; two copies of official transcripts from each college and graduate institution attended; a resume listing work experience and volunteer activity; three letters of recommendation; statement of professional goals; and test scores from the GRE, GMAT, or LSAT. If the applicant’s undergraduate GPA is 3.30 or higher, the applicant may petition the Admissions Committee for a waiver of the exam. However, to be considered for financial aid, all applicants must submit a GRE score. Applicants who already have a graduate degree in another field may also petition the committee for a waiver of the exam requirement.

Transfer of Credits

Students may request transfer credit for graduate courses taken at other accredited universities or colleges, for courses recommended for graduate credit by ACE, or for courses taken through extended studies at Mason. Transfer credit is subject to university policies, and must be approved by the MPA program and dean. Students who enroll initially through extended studies are advised to submit their application to the MPA program in their first semester of study. Only 9 credits taken through extended studies may be transferred to the degree program.

Program Requirements

All students are required to take eight MPA core courses. These courses give students the opportunity to develop a shared knowledge base and skill set. The 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.

- PUAD 502 Administration in Public and Nonprofit Organizations
- PUAD 611 Problem Solving and Data Analysis I
- PUAD 612 Problem Solving and Data Analysis II
- PUAD 620 Organization Theory and Management Behavior
- PUAD 640 Public Policy Process
- PUAD 660 Public and Nonprofit Accounting and Finance
Students may take their elective courses within one of the concentrations listed below. Alternatively, with the approval of their advisor, students may create their own concentration, or they may select their elective courses from several concentrations or fields. Students may receive only one concentration.

◆ Concentration in Administration of Justice

CONF 501 Introduction to Conflict Analysis and Resolution
PUAD 509 Justice Organizations and Processes
PUAD 510 Policing in a Democratic Society
PUAD 691 Justice Program Planning and Implementation
PUAD 781 Information Management: Technology and Policy
PUAD 791 Justice Program Evaluation
PUAD 799 Issues in Justice Administration
SOCI 607 Criminology
SOCI 608 Juvenile Delinquency
SOCI 609 Sociology of Punishment and Corrections

◆ Concentration in Environmental Science and Public Policy

Previous science major:
BIOL 607 Fundamentals of Ecology
BIOL 641 Environmental Science and Public Policy
EVPP 675 Environmental Planning and Administration
PUAD 741 Policy Analysis
PUAD 749 Issues in Public Policy (Public Policy and the Environment)*

For students who desire more science (in place of BIOL 607), the department recommends one of the following ecology courses:
- BIOL 546 Estuarine and Coastal Ecology (saltwater and estuarine emphasis)
- BIOL 547 Terrestrial Plant Ecology
- BIOL 550 Waterscape Ecology and Management (freshwater emphasis)

Students with little or no science background:
- BIOL 607 Fundamentals of Ecology
- BIOL 670 Environmental Law for Biologists
  or PRLS 501 Introduction to Natural Resources Law (taken after BIOL 607)
- PUAD 741 Policy Analysis
- PUAD 749 Issues in Public Policy (Public Policy and the Environment)

An introductory biology sequence is also recommended: BIOL 102, 103; or 211, 212

◆ Concentration in Health Policy and Administration

HSCI 542 Health Policy
HSCI 678 Introduction to the U.S. Health System
HSCI 704 Contemporary Issues in Health Systems Leadership and Management
HSCI 710 Health Management Practicum and Capstone Seminar
PUAD 741 Policy Analysis
PUAD 794 Internship

◆ Concentration in Human Resources Management

LRNG 602 Group Dynamics and Team Learning
LRNG 601 Organizational Learning
LRNG 672 Organizational Learning Laboratory
LRNG 692 Special Topics in Learning
LRNG 792 Special Topics in Learning
MGMT 721 Seminar in Personnel Administration
PSYC 631 Industrial and Personnel Testing and Evaluation
PSYC 635 Topics in Organizational Psychology
PSYC 638 Training: Psychological Contributions to Theory, Design, and Evaluation
PSYC 639 Survey of Organizational Processes
PSYC 640 Techniques in Industrial/Organizational Psychology
PSYC 667 Behavior in Small Groups and Teams
PUAD 670 Human Resources Management in the Public Sector
PUAD 671 Public Employee Labor Relations

◆ Concentration in Information Policy and Administration

PUAD 732 Managing Technology Transfer
PUAD 781 Information Management: Technology and Policy
INFS 515 Computer Organization
INFS 590 Program Design and Data Structures
CULT 816 Culture and Information Technology
HSCI 709 Health/Medical Informatics for Health System Managers
TCOM 500 Modern Telecommunications

Students may take INFS and TCOM courses, which are offered by the School of Information Technology and Engineering, if they have met the prerequisites.

◆ Concentration in International Management

PUAD 504 Managing in the International Arena
PUAD 634 Management of International Security
PUAD 636 The NGO: Managing the International Nonprofit Organization
PUAD 732 Managing Technology Transfer
PUAD 738 Issues in International Security
PUAD 739 Issues in International Management
PUAD 794 Internship

CONF courses are offered by Mason’s Institute for Conflict Analysis and Resolution.
ITRN courses are offered by Mason’s International Commerce and Policy Program

◆ Concentration in Nonprofit Management

PUAD 505 Introduction to Management of Nonprofits*
PUAD 636 The NGO: Managing the International Nonprofit Organization
PUAD 654 The Community, Marketing, and Public Relations
PUAD 655 Philanthropy and Fundraising
PUAD 657 Association Management
PUAD 659 Nonprofit Law, Governance, and Ethics*
PUAD 664 Advanced Topics in Nonprofit and Public Financial Management
PUAD 720 Performance Measurement
PUAD 730 Professional Development Workshop
PUAD 794 Internship (3 credits only)

◆ Concentration in Policy Studies
PUAD 622 Program Planning and Implementation
PUAD 661 Public Budgeting Systems
PUAD 727 Seminar in Risk Assessment and Decision Making
PUAD 741 Policy Analysis
PUAD 742 Program Evaluation
PUAD 749 Issues in Public Policy
PUAD 794 Internship
PUBP 701 Analysis for Public Decision Making
PUBP 705 Rational Choice and Uncertainty: Modeling Judgment

◆ Concentration in Public Management
PUAD 615 Administrative Law
PUAD 622 Program Planning and Implementation
PUAD 661 Public Budgeting Systems
PUAD 670 Human Resources Management in the Public Sector
PUAD 720 Performance Measurement
PUAD 729 Issues in Public Management
PUAD 730 Professional Development Workshop
PUAD 742 Program Evaluation
PUAD 750 Federalism and Changing Patterns of Governance
PUAD 794 Internship

◆ Concentration in Public and Nonprofit Finance
PUAD 661 Public Budgeting Systems*
PUAD 664 Advanced Topics in Nonprofit and Public Financial Management
PUAD 729 Issues in Public Management
PUAD 769 Issues in Public Financial Management
PUAD 794 Internship

◆ Concentration in State and Local Government
PUAD 615 Administrative Law
PUAD 651 Virginia Politics, Policy, and Administration
PUAD 654 The Community, Marketing, and Public Relations
PUAD 661 Public Budgeting Systems
PUAD 729 Issues in Public Management
PUAD 730 Professional Development Workshop
PUAD 750 Federalism and Changing Patterns of Governance
PUAD 759 Issues in Local Government Administration
PUAD 794 Internship
*Required elective

Certificate Programs
Four certificates are offered: administration of justice, association management, information policy and administration, and nonprofit management. Applications for admission are made through the Office of Graduate Admissions in CAS. Students may enter a program at the beginning of any semester. Students may use up to 12 credits earned in a certificate program toward the MPA degree, pending admission to the MPA program and subject to university policies.

Admission Requirements
Admission requirements for the certificate programs are the same as they are for the MPA degree program.

Certificate Requirements
The certificate is awarded after satisfactory completion of five graduate courses as specified below.

◆ Certificate in Administration of Justice
PUAD 502 Administration in Public and Nonprofit Organizations
PUAD 509 Justice Organizations and Processes
PUAD 691 Justice Program Planning and Implementation
Two electives

◆ Certificate in Association Management
PUAD 659 Nonprofit Law, Governance, and Ethics
PUAD 660 Public and Nonprofit Accounting and Finance
PUAD 657 Association Management
Two electives, chosen from the following:
PUAD 620 Organization Theory and Management Behavior
PUAD 640 Public Policy Process
PUAD 654 Nonprofit Marketing and Media Relations
PUAD 655 Fund Raising and Resource Development
PUAD 664 Advanced Topics in Nonprofit and Public Financial Management
PUAD 720 Performance Measurement
PUAD 794 Internship

◆ Certificate in Information Policy and Administration
PUAD 620 Organization Theory and Management Behavior
PUAD 680 Managing Information Resources
PUAD 781 Information Management: Technology and Policy
Two electives

◆ Certificate in Nonprofit Management
This certificate may be obtained through 3-credit courses, or through online courses.
PUAD 505 Introduction to Management of Nonprofits
PUAD 660 Public and Nonprofit Accounting and Finance
PUAD 659 Nonprofit Law, Governance, and Ethics
Two electives

Russian Studies
Phone: 703-993-1233
Web: www.gmu.edu/departments/fld/russian

Faculty
Barnes (History and Art History), 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), Vasilyeva (Modern and Classical Languages), Wade (History and Art History)
UNDERGRADUATE PROGRAM

■ Russian Studies, BA

Two directions are possible 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, who are interested in careers as translators, or who are studying for self-enrichment.

In addition to satisfying the university-wide general education requirements and the requirements for a BA degree in CAS, students majoring in Russian studies must complete the following coursework with a minimum GPA of 2.000:

- 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 and college literature requirements for the BA)
- 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 (may simultaneously satisfy the non-Western culture requirement)
- 3 credits of RUSS 354 or HIST 329 (may simultaneously satisfy the college-level and university-level synthesis requirement, and the university-wide global understanding requirement)
- 3 credits of GEOG 330 or GOVT 338 (may simultaneously satisfy a CAS 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 326, 329, 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.

Social Work

Phone: 703-993-2030 or 4247
Web: www.socialwork.gmu.edu

Faculty

Professors: Raskin, Ritchie, Rose
Associate professors: Davis, Rome (chair), Wolf-Branigin
Assistant professors: Ericson, Nemon, Kiernan-Stern, Tompkins

This department offers all course work designated SOCW in the “Course Descriptions” chapter of this catalog.

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:

- General education course work: BIOL 103, 104; COMM 100; ENGL 101, 201; Fine Arts (3 credits); Global Understanding (3 credits); GOVT 103; HIST 100, 120; INFT 103; MATH 106 or above; PSYC 100; ECON 100; PHIL or RELI (3 credits); SOCI 101.

Entering freshmen may choose to complete 32 credits of the above requirements by registering for the New Century College Integrative Studies first year sequence (NCLC 100/120 and NCLC 130/140). Freshmen who choose this option must also complete BIOL 103, GOVT 103, HIST 120, and PSYC 100.

- PSYC 300 or SOCI 313.

- Required social work courses: SOCW 200, 301, 323, 324, 351, 352, 357, 358, 359, 452, 453, 454, 456, 471 with a minimum grade of 2.00 in each course, and two 400- or 500-level social work electives. The Senior Practicum (SOCW 453 and 456) is graded on a satisfactory/no-credit basis.
To be admitted to the social work program, a student must have completed at least 45 credits with a GPA of 2.50; completed or be registered in BIOL 103 and 104, ENGL 101, SOCI 110, and PSYC 100; earned at least a C in SOCW 301 and 351; satisfactorily completed at least 60 hours in one semester in a social service agency approved by the director of field instruction in conjunction with SOCW 301; and submitted an application for the social work major to the director of social work admissions. Sophomores 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 junior field practica) by May 30 will not be considered for admission until the fall semester.

The social work faculty evaluate 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 BIOL 104 are required for graduation. SOCW 323, 351, and 357 are sequenced courses offered only during the fall semester. The second part, SOCW 324, 352, and 358/359, are only offered during the spring semester, and can only be taken upon successful completion of the first part (with a grade of C or better). Graduation will be delayed if courses are not taken in proper sequence.

Students must have completed 6 credits of psychology before registering for PSYC 300.

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 may fulfill this requirement by successfully completing SOCW 471.

Certificate in Child Welfare
The 24-credit child welfare certificate is available to undergraduate students majoring in social work, psychology, nursing, education, administration of justice, integrative studies, and other related majors. The certificate is beneficial for students interested in pediatrics, maternal and child health, youth recreation, school counseling, public social service, and diverse populations. Students complete course work and a supervised practicum. For more information, call 703-993-1951.

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, and a child protective services check. Any cost related to this requirement is the responsibility of the student.

Insurance Coverage (For students enrolled in SOCW 301, 359, 453, and 456)
Students who participate in internships 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 Liability Plan for the Commonwealth of Virginia is available in the office of the director of field instruction.

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 including SOCW 623, 624, 651, 652, 657, 658, 670, 671
- One elective from either SOCW 675 or SOCW 676
- One elective chosen from among selected courses in business administration, communication, conflict analysis and resolution, education, law, nursing and health science, psychology, public administration, public policy, sociology, or statistics
- Concentration courses including SOCW 684, 685, 687, 688, 690, 691
- Successful completion of 900 hours of supervised field practicum in agencies approved by the director of field education: 450 hours in conjunction with SOCW 672 and 673, and 450 hours in conjunction with SOCW 690
- Successful completion of a culminating thesis project
- 60 total credits

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 liberal arts, including at least 3 credits in each of the following: English composition, human biology, history or government, social sciences, and statistics.

Students may complete the MSW program under a two-year or 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 must maintain a 3.00 GPA. A course in which the student earns a C may be repeated once (with the exception of SOCW 672, 673, 690, and 691, which may not be repeated). A prerequisite must be satisfied with a B- or better before registering for the next course in a sequence. No more than 7 total credits of C may be repeated overall.

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 personal fitness for the profession of social work. The student has the right to appeal.

Extended studies 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, then move directly into the concentration year.

Minimum admission requirements include a BSW degree earned within the past 5 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:

- One elective from either SOCW 675 or 676
- One elective chosen from among selected courses in business administration, communication, conflict analysis and resolution, education, law, nursing and health science, psychology, public administration, public policy, sociology, or statistics
- SOCW 670
- Concentration courses including SOCW 684, 685, 687, 688, 690, and 691
- Successful completion of 450 hours of supervised field practicum in agencies approved by the director of field education, taken in conjunction with SOCW 670
- Successful completion of a culminating thesis project
- 33 total credits

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 NASW, 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 this requirement is the responsibility of the student. Students can register for classes prior to the completion of the immunizations. Immunizations are program requirements and must be completed by the student even if they are not required by the agency. Documentation to verify immunization must be submitted to the MSW Program administrative assistant.
Term assistant professors and instructors: Falen (Anthropology); Arabandi, Masters (Sociology)
Affiliate professors: Avruch (Anthropology); Bainbridge, Bockman, Doplins, Goldstone, Johnson, Levine, McAuley (Sociology)
Emeritus: Golomb (Anthropology); Tavani (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 the university-wide general education requirements and the requirements for the BA degree in CAS, students majoring in anthropology must complete the following 36 credits with a minimum GPA of 2.00:

• A 9-credit core in anthropology:
  ANTH 114 Introduction to Cultural Anthropology
  ANTH 390 Theories, Methods, and Issues I
  ANTH 490 Theories, Methods, and Issues II

• A 9-credit 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 apply 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 the university-wide requirements in global understanding, information technology, and synthesis as well as the CAS requirement in non-Western culture.

Students wishing to pursue careers in anthropology should consider including ANTH 114, 332, 120 or 135; and 430 or 450. See an advisor (in the department for more information).

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, 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 including ANTH 114, 332, 120 or 135; and 430 or 450. See an advisor in the department for more information.

For policies governing all minors, see “minors” under “The Undergraduate Academic Program” in the Academic Policies chapter of this catalog.

The Department of Sociology and Anthropology coordinates the concentration in anthropology within the master of arts 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 students to pursue a varied set of career paths, ranging from teaching, human service and human resource occupations to positions in the criminal justice system, marketing, and social research. The sociology major is excellent preparation for students considering law school or graduate training in the social and behavioral sciences.

In addition to satisfying the university-wide general education requirements and the requirements for the BA degree in CAS, students majoring in sociology must take 35 credits of sociology courses with a minimum GPA of 2.00. These include at least three credits of core courses (SOCI 101 or 102, 303, 311, 313, and 412), each of which must be completed with a minimum grade of 2.00, and an additional 18 credits of course work in sociology at the 300 or 400 level. Of the required 35 credits in sociology, no more than 6 credits of courses with unsatisfactory grades (C- or D) may be applied toward the degree, none of which can be core courses.

Areas of Emphasis

In completing the 18 credits of study beyond the core sociology courses, students are strongly encouraged to select an area of emphasis to suit their interests and career objectives. An area of emphasis consists of 12 credits as described below. Students who are invited to participate in the sociology honors program may apply 3 credits of honors course work (480, 481, 482) to their selected area of emphasis.

• Deviance, Crime, and Social Control
Focuses on the sociology of crime and delinquency; legal and political systems of social control; informal patterns of norms and values that regulate human action; and the social forces that produce deviant behavior and responses to it. This area of emphasis is appropriate for students interested in the criminal justice system and the law. Choose
12 credits from SOCI 300, 301, 302, 310, 332, 340, 352, 402, 503.

- **Social Inequality and Social Conflict**
  Focuses on race, class, and gender inequalities; the social bases of social and political conflict, including protest movements and collective action; and debates over human rights and equality in a global context. This area is of central interest to students interested in social change, political reform, and nonprofit organizations. Choose 12 credits from SOCI 300, 307, 308, 310, 315, 326, 332, 340, 352, 390, 401, 450; ANTH 365 or 488.

- **Applied Social Research**
  Focuses on the social and institutional forces that give rise to social problems in various institutional contexts, including the family, urban communities, and formal organizations. This emphasis is appropriate for students interested in pursuing careers involving human services, social policy, and business organizations. Choose 12 credits from SOCI 304, 305, 309, 320, 332, 352, 383, 410, 413, 421, 441; ANTH 333 or 365.

- **Sociology of Culture**
  Focuses on the social and institutional forces that shape religion, the arts, language, gender, and cultural norms and tastes. This area is relevant for students interested in a wide array of pursuits ranging from museums and cultural memory to music and market research. Choose 12 credits from SOCI 309, 314, 315, 332, 377, 385, 401, 414, 505; ANTH 332 or 488.

- **Health and the Environment**
  Focuses on the complex interplay between nature and human life; the relation between ecology and human well-being; and the social bases of health and illness, including both mental and physical health. This emphasis is relevant to students interested in health care organizations and kindred human services. Choose 12 credits from SOCI 320, 332, 352, 373, 390, 401, 441; ANTH 332 or 488.

**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 who 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 Sociology and Anthropology Department.

**Minor in Sociology**
Students can select one of five emphases in sociology offered by the department. A minor in sociology requires 21 credits in one emphasis with a minimum GPA of 2.00. All emphases require SOCI 101 and 311 with a minimum grade of 2.00 in each one. See an advisor in the department for more information.

**Accelerated MA in Sociology**
Highly qualified undergraduates may be admitted to an accelerated master’s program and obtain both a BA and MA in sociology. Students admitted to this program may take elective graduate courses during their senior year, and up to 9 graduate credits may be used to partially satisfy requirements for the undergraduate degree. (Upon completion of the undergraduate degree and a GPA of at least 3.00 in graduate courses, students have 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.)

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 CEHD 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.

**Joint Programs**
The BA, BS, and minor in conflict analysis and resolution are jointly awarded by the Institute for Conflict Analysis and Resolution (ICAR) and CAS. Students in this program are considered students in both ICAR and CAS. For details, see the ICAR chapter of this catalog.

**GRADUATE PROGRAMS**

- **Anthropology, MAIS**
  See the description of the graduate program in anthropology under Interdisciplinary Studies, MAIS. Anthropology offers a master’s program with emphasis in advanced socio-cultural training, anthropology and health, anthropology and social justice, and anthropology and environment.

- **Sociology, MA**
  Students 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 the general admissions requirements for graduate study, applicants must present the following:

1. A bachelor’s degree from a regionally accredited college or university, with a minimum overall GPA of 3.00. Students who have not completed a bachelor’s degree may be considered for provisional admission.
2. Three letters of recommendation from academic or professional sources.
3. A statement of purpose outlining career goals and how the graduate program at GMU will help achieve them.
4. Appropriate GRE scores for all students. The GRE is required for students not having a cumulative GPA of 3.50 or higher.

For more information, see the sociology graduate coordinator.
• A 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.

Acceptance of applicants to the program depends upon assessment by the departmental graduate committee.

Extended Studies
Students who do not wish to pursue a degree or who have not supplied all required documents to be considered for admission may enroll through extended studies. These students may later apply for admission to the degree program. With approval, 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
All students are required to complete 33 credits distributed as follows:
• 6 credits of social theory (SOCI 611 and 612)
• 6 credits of research methods and statistics
• 3–6 credits of master’s thesis (SOCI 799)
• Elective credits

Emphasis in General Sociology
Additional sociology electives.

Emphasis in Sex and Gender
A degree with this emphasis requires 9 credits in sex and gender (SOCI 505, 525, and 696).

Emphasis in Conflict Analysis and Management
A degree with this emphasis requires 9 credits in the sociology of conflict and conflict management.

Emphasis in Race and Ethnicity
A degree with this emphasis requires 9 credits in race and ethnicity.

Emphasis in Crime, Delinquency, and Corrections
A degree with this emphasis requires 9 credits in crime, delinquency, and corrections (SOCI 607, 608, and 609).

Emphasis in Sociology of Culture
A degree with this emphasis prepares students for the doctoral program in cultural studies. It requires SOCI 614 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

Faculty
Amireh, Baker, Bartholomew, Beach, Bergoffen, Bowen, Braithwaite, Brown, Burr, Carbonneau, Cenzer, Cherubin, Christensen, Copelman, Davidson, Deshmukh, Eby, Fischer, Fiolliot, Francescato, Fuchs, Fyfe, Gilbert, Gould, Gring-Pemble, Hamdani, Hanrahan (director), Henry, Hodges, Horton, Irvine, Irving, Johnsen-Neshati, Jordan, Kaplan, Kirkland, Koch, LeBaron, Lont, Mann, Masters, McNeely, McKenzie, Muir, Oates, Palkovich, Pascarell, Rabin, Rader, Ray, Raybuck, Regan, Ricouart, Rosenblum, Rosenweig, Samuelian, Sandole-Staroste, Seligmann, Snyder, Sparks, Stearns, Schwartzstein Tichy, Todd, Travis, Walter, Weitzman, Yocom, Zawacki

Course Work
Women’s studies offers all course work designated WMST in the “Course Descriptions” chapter of this catalog.

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
• One course (3 credits) selected from WMST courses:
  WMST 301 Sociology of Sex Roles
  WMST 302 Cultural Constructions of Sexualities
  WMST 303 Psychology of Women
  WMST 364 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 graduate certificate is for students interested in understanding the social, political, and economic situations of women in their local, national, and global contexts. 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 the approval of the graduate coordinator in the respective program.
Admission
The certificate is open to all students who meet the university criteria for admission to graduate study. Students must submit a Mason 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 through extended studies toward the certificate, subject to the approval of the director and the dean.

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
  Possible electives:
  ENGL 675 Feminist Theory and Criticism
  HIST 630 U.S. Women’s History
  PHIL 658 Feminist Theory
  SOCI 575 Women and the Law
  SOCW 511 Status of Vulnerable and At Risk Women

- Capstone portfolio

Students synthesize their work in the certificate program by reflecting on how the 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 seven 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.
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), family studies, conservation studies, Internet and new media, organizational administration, nonprofit management, 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 address 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 perspectives, problem-solving, group interaction, effective citizenship, aesthetic response, 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 that 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), and 44 credits in general education. A student’s concentration consists of at least 30 credits with a minimum GPA of 2.00, which may draw from learning communities, experiential learning, independent study, and traditional university courses. Students must present a final, cumulative portfolio and a college senior exposition.

Curriculum 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 6-credit English composition requirement is met through completion of Division I and II with an overall 2.00 average. Students majoring in integrative studies fulfill the university writing-intensive requirement by completing their concentration. Most 300-level courses and above 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 interims or a winter intersession. Each meets Monday through Thursday and may include lectures and exams, but emphasizes seminar discussions, collaborative assignments, problem-centered projects, and self-paced learning.

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 Western civilization; and NCLC 140 studies the relationship between the individual and society. The sessions are built into the curriculum to allow cocurricular activities such as community service learning, leadership training, or specialized workshop courses, or to allow students to complete their work at their own pace. 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 nonresidential 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 two semesters prior to graduation.

Division IV, experiential learning requirement: all students are required to participate in at least 12 credits of experiential learning. A portion of the credits can be earned in various learning communities. Students may also meet this requirement through internships, study abroad, and experiential learning courses. 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. A maximum of 24 credits of experiential learning (or its equivalent) may be applied toward the BA or BS degree.

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.

◆ Interdisciplinary Minor in Multimedia
NCC and the College of Visual and Performing Arts coordinate the interdisciplinary minor in multimedia. See the “Interdisciplinary Minors” section of this chapter for a description.

◆ Minor in Nonprofit Studies
Faculty
Benjamin, Borkman, Sacco, Toepler

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. Upon 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 credit, distributed as follows.

Required: three 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)

Elective: one course (3 credits), chosen from
• 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.

◆ Certificate in Leadership Studies
The certificate provides a curriculum and learning environment that includes theory, application, and reflection. This 24-credit certificate can be completed while pursuing an undergraduate degree, or after graduation. All students complete a core of 9 credits and a 1- to 3-credit internship or experiential learning project. They then choose a maximum of 14 credits from approved elective courses.

The certificate provides students with a broad understanding of leadership in contemporary times. To understand current issues, students examine historical perspectives and theories of leadership. Students gain an understanding of leadership concepts and behaviors, civic responsibility, creativity, communication, and change. In addition, students have the opportunity to practice and enhance their skills.

For more information, please contact the Center for Service and Leadership at 703-993-2900, or New Century College at 703-993-1436.
School of Computational Sciences

GRADUATE PROGRAMS

The School of Computational Sciences (SCS) offers the following academic programs:

- PhD in Bioinformatics
- PhD in Climate Dynamics
- PhD in Computational Sciences and Informatics
- PhD in Earth Systems and Geoinformation Sciences
- PhD in Neuroscience (with the College of Arts and Sciences and the Krasnow Institute)
- PhD in Physical Sciences (with the College of Arts and Sciences)
- MS in Bioinformatics
- MS in Computational Science
- MS in Earth Systems Science (with the College of Arts and Sciences)
- Certificate in Computational Techniques and Applications
- Certificate in Nanotechnology and Nanoscience
- Certificate in Remote Sensing and Earth Image Processing

Administration

Menas Kafatos, Dean
George E. Taylor Jr., Associate Dean
Peter A. Becker, Associate Dean for Graduate Studies
James E. Gentle, Assistant Dean for Faculty
Paul S. Schopf, Assistant Dean for Research
John J. Grefenstette, Assistant Dean for Prince William Operations

Introduction

The School of Computational Sciences (SCS) results from the merger of the Institute for Computational Sciences and Informatics and the Institute for Biosciences, Bioinformatics, and Biotechnology. SCS serves as the primary academic unit providing scientific and applications content to Mason’s information technology focus. This content includes applications in the biological, physical, mathematical, and data sciences. Along with other units, SCS also contributes to the university’s focus on educational and research programs related to the environment.

Through its interdisciplinary and multidisciplinary activities, SCS seeks to integrate computation in the sciences, mathematics, and engineering to advance human knowledge and develop new approaches to the solution of complex problems. SCS maintains extensive facilities on both the Fairfax and Prince William Campuses.
Faculty

Academic Units
The academic and research activities of the SCS are organized into several units, termed programs. The programs are semiautonomous, with their own faculty and chairs. The programs are listed below, along with the respective program chairs. The development of new programs is anticipated as the school continues to evolve in response to faculty members’ academic and research activities.

• Astrophysical, Planetary, and Space Sciences: J. Wallin, chair
• Bioinformatics and Computational Biology: J. Grefenstette, chair
• Climate Dynamics: J. Shukla, chair
• Computational Neuroscience: J. Olds, chair
• Computational Neurosciences: J. Olds, chair
• Common core courses in one of the areas of concentration
• Data Sciences: J. Gentile, chair
• Earth Systems and Geoinformation Sciences: D. Wong, chair
• Fluids and Materials: R. Löhner, chair

Course Work
SCS offers all course work designated Bioinformatics (BINF), Climate Dynamics (CLIM), Computational Sciences and Informatics (CSI), Earth Observing and Systems (EOS), Nanotechnology (NANO), Neuroscience (NEUR), and Physical Sciences (PSCI) in the “Course Descriptions” chapter of this catalog. Fellowships and assistantships are generally available beginning in the fall semester. Students must submit completed applications by February 1 for fall admission; all other applications for fall admission are due by March 1. Applications for spring admission should be received by November 1 of the preceding year. Applications from local students may be accepted beyond the dates stated above. These are general guidelines; for complete information, go to www.scs.gmu.edu.

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 per 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 spanning, but not limited to, 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; computer design of materials; 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. Additionally, applicants should have taken at least one course in differential equations, and should 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 the list of disciplines, 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 per week in the late afternoon or early evening.

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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, the student must form a doctoral committee, which will write the student’s candidacy exam. The exam includes written, oral, and computational components. Upon passing the candidacy exam and submitting an acceptable dissertation proposal, the student is 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 www.scs.gmu.edu. In addition to the common core of CSI 700, 701, 703, and 710, required scientific core courses for the specific areas of concentration are as follows:

- **Atmospheric Transport and Dispersion**: two of CSI 655, CLIM 711, EOS 854
- **Computational Finance**: STAT 652 and 656; CSI 771 and 776; two courses in finance
- **Computational Fluid Dynamics**: CSI 721, 722, and 780; CSI 783 or 784; CSI 785 or PHYS 513
- **Computational Intelligence and Knowledge Mining**: CSI 711, 773, 777, 873
- **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
- **Computer Design of Materials**: CSI 685, 780, 783, 787, and 885
- **Space Sciences and Computational Astrophysics**: CSI 661 and 784; CSI 781 or 782; CSI 785 or PHYS 513; and 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, Earth systems and geoinformation sciences, computational chemistry, climate dynamics, and bioinformatics, several of which are now autonomous PhD programs within SCS.

### Bioinformatics, 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 utilizes 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 main objective of the program 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 as well as 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 to both 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 1100 (verbal plus quantitative) and 4.0 (analytical writing). Applicants should have taken courses in molecular biology, cell biology, biochemistry, genetics, calculus, 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 application including 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 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 for all foreign applicants.

### Degree Requirements

The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work, and 24 credits of dissertation research. For those holding master’s degrees, the 72 required credits may be reduced by up to 30 credits, depending on graduate courses completed. The curriculum is divided into four areas: 12 credits of fundamental biosciences courses; 16 credits of core bioinformatics courses; 20 credits of electives or independent research; and 24 credits of dissertation research. The course work is organized as follows:

- Fundamental bioscience courses: BINF 701, 702, plus 3 credits each of BINF 703 and 704
• Core bioinformatics courses: BINF 690, 705, 730, 731, and 732; and one of the computational emphasis courses: CSI 701, 703, or 710
• General electives

If the undergraduate record does not include basic biochemistry, the student will be required to take a basic course prior to BINF 701 Biochemical Systematics (Biochemistry). If the undergraduate record is otherwise insufficient, the student may be required to take prerequisite courses, some of which may not be applicable to the 48-hour 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. Upon passing the candidacy exam and submitting an acceptable dissertation proposal, the student is advanced to doctoral candidacy.

Climate Dynamics, PhD
The mission of this program is to train the next generation of world leaders in the science of climate dynamics. While there is no unambiguous definition of “climate,” climate dynamics is generally considered to encompass processes that determine the behavior of the atmosphere, land, and oceans averaged over time scales of weeks to centuries and millennia. Understanding climate variability and predictability poses difficult mathematical, computational, and observational questions that have generated increasing intellectual excitement in recent years. Because atmospheric behavior is strongly coupled to the oceans and land surface, physical oceanography and land surface physics can also be considered part of the science of climate dynamics. Understanding climate variability has important ramifications for society, from planning for next year’s electrical demand and forecasting agricultural production, to answering complex questions involving long-term global change. While it is thought to be theoretically impossible to predict day-to-day weather more than a few weeks in advance, recent progress in predicting El Niño supports the idea that seasonal averages of temperature, rainfall, and other factors may be at least partly predictable months or even years in advance.

The climate dynamics faculty is varied and consists of a blend of expertise in dynamics, statistics, and computational methods while covering the traditional areas of atmospheric dynamics, physical and dynamical oceanography, and land surface physics. The faculty and students involved in the program work closely with scientists at the Center for Ocean-Land-Atmosphere Studies (COLA), utilizing common models, datasets, and computational facilities. Faculty research focuses on the areas of climate prediction and predictability; climate variability; coupled ocean-atmosphere-land dynamics; and dynamical systems and retrospective analysis. Recent research topics include:
• Predictability of weather and climate
• Modeling of the complex climate system
• El Niño dynamics
• Deforestation, desertification, and monsoons
• Atmosphere-ocean interaction
• Land-climate interaction
• Decadal climate variability
• Ocean circulation theory
• Abrupt climate change

External research collaborations exist with federal agencies, private corporations, and other universities, exemplifying the commitment of SCS and the university 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 1100 (verbal plus quantitative). To apply, prospective students should forward a completed Mason GRE score, two copies of official transcripts from each college and graduate institution attended, a current resume, and an expanded goals statement to the SCS 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 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 for all foreign applicants.

Degree Requirements
The program requires 72 credits beyond the baccalaureate degree, with a minimum of 48 credits in course work, and 24 credits of dissertation research. For those holding master’s degrees, the required 48 credits may be reduced by up to 30 credits, depending on graduate courses completed. The degree will be awarded upon completion of the required course work and approval of a PhD thesis that makes an original and significant contribution to the field.

The curriculum is divided into four logical areas: 12 credits of fundamental climate science courses; 9 credits of core computational methods; 3 credits of seminar; a minimum of 24 credits of electives; and a minimum of 24 credits of dissertation research. The course work is organized as follows:
• Fundamental climate science courses: CLIM 710, 711, 712, 714
• Core computational courses: CSI 700, CSI 701, and CLIM 715
• Climate seminar: 3 credits of CSI 991
• 24 credits of electives, including up to 5 credits of independent research

Close to the time that course work is completed, each student must form a dissertation committee. This committee prepares and administers a qualifying exam. Following successful completion of the qualifying exam, the student presents a written dissertation proposal to the committee. The student may enroll in CLIM 998 Doctoral Dissertation Proposal to complete this effort. After approval of the dissertation proposal, the student is formally advanced to candidacy for the PhD degree, and produces the dissertation while taking CLIM 999. The degree will be awarded upon completion of the required course work, and approval of a PhD thesis that makes an original and significant contribution to the field.
Earth Systems and Geoinformation Sciences, PhD

The innovative, new PhD program in Earth systems and geoinformation sciences (ESGS) is based on the integration of the two scientific disciplines in geoscience, geosciences and geography, with the two slightly more technology oriented scientific disciplines in geoinformation sciences, remote sensing and GIS. Graduates from the ESGS doctoral program will be qualified to serve as lead scientists in a wide range of activities involving geosciences, geography, geographic information systems, 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 will ensure a constant need in the foreseeable future for qualified scientists in these fields. Graduates will 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 will facilitate career advancement in either the public sector or private industry. Graduates will be equipped to participate in interdisciplinary research, which is the norm in today’s research arena. In addition, students will 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 related field, with a minimum GPA of 3.00. Applicants should have knowledge of calculus, and 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 resume, and an expanded goals statement to the ESGS Graduate Admissions Processing Center. Applicants should also include three letters of recommendation, and an official report of scores obtained on the GRE-General exam. 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 for all foreign applicants.

Degree Requirements

The curriculum consists of 72 credits: 48 credits of course work, and 24 hours of dissertation research. The 48-credit requirement may be reduced by up to 30 hours for a qualifying student holding a previous master’s degree. Up to 24 credits of previous, relevant graduate course work may be transferred into the program as long as those credits have not been applied toward a previous degree. The curriculum is organized into the four concentrations listed below:

- Geosciences (GSC)
- Geography (GEOG)
- Remote Sensing and Earth Observation (RS)
- Geographic Information Systems Sciences (GIS)

Students may select one of the four concentrations listed above, or they may opt to develop a curriculum that combines elements from two or more concentrations, subject to approval by the program director.

All students are required to select courses from a set of three core areas: computational, geosciences-geography, and geoinformation. Additional requirements include courses in the concentration, a single credit of seminar or colloquium, and electives relevant to the student’s focus. In recognition of the diverse interests in this scientific area, students are given considerable flexibility to construct their curriculum, under the guidance of a faculty advisor. To provide the desired level of flexibility and encourage interdisciplinary education and research, the following seven program elements are required:

- 6 credits of computational core courses
- 6 credits of geosciences-geography core courses
- 6 credits of geoinformation sciences core courses
- 3 credits of seminar and colloquium (1 credit, taken three times)
- 18 credits of electives
- 24 credits of dissertation research

For a complete list of the various courses in each category, go to www.scs.gmu.edu.

All students will be assigned a temporary academic advisor when they first enroll in the program. No later than the end of the second year, each student should identify a dissertation advisor and form a doctoral committee. After completing all required courses, each student must take a candidacy exam administered by the dissertation committee. The exam will have written and oral components. Its purpose is to determine whether the student has acquired adequate general knowledge in the selected subject area, as well as much more detailed knowledge of the specific research topic planned for the dissertation. After students have completed all required courses and passed the candidacy exam, they should prepare an acceptable dissertation proposal. After the dissertation proposal is approved, the student is formally advanced to doctoral candidacy. The degree will be awarded upon completion of the required course work, and approval of a PhD thesis that makes an original and significant contribution to the field.

Neuroscience, PhD

The interdisciplinary doctoral program in neuroscience is offered jointly by SCS, the College of Arts and Sciences, and the Krasnow Institute for Advanced Study. The complexity of the human brain presents a major challenge to the development of an integrative understanding of human cognition and higher brain function. In response to this challenge, the rapidly developing field of neuroscience has produced an exponential increase in the amount of data available to investigators as they develop new theories of brain function and new hypotheses to test. The main objective of the program is to prepare students to participate at the cutting edge of this exciting field in academia, industry, and government. The program provides students with a rich interdisciplinary intellectual environment that fosters the
development of the skills they will need to successfully pursue research careers.

Current faculty research focuses on the broad areas of behavior, anatomy, physiology, biochemistry, computational modeling, and informatics. External research collaborations exist with federal agencies, private corporations, and other universities. The scope of research ranges from the subcellular and molecular level (in the context of such phenomena as drug addiction and the biological basis of schizophrenia) to the systems and behavioral level (including cognitive studies on great apes in collaboration with the National Zoological Park). Current research projects include:

- 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
- 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 a completed Mason graduate application, two copies of official transcripts from each college and graduate institution attended, a current resume, and an expanded goals statement to the SCS 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 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 for all foreign 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 thesis. Two concentrations are included in the program: behavioral, anatomical, and molecular neuroscience (BAM); 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 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, the student is 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.

Physical Sciences, PhD

The interdisciplinary doctoral program in physical sciences is offered jointly by SCS and the College of Arts and Sciences. This degree focuses on the preparation of scientists trained to perform research as members of interdisciplinary science teams, primarily involving astronomy, chemistry, and physics. The main emphasis of this program is on theoretical, experimental, or laboratory research. It is not intended to produce graduates who are scientific generalists because modern research in the physical sciences is, of course, highly specialized. However, the areas of specialization often cut across traditional disciplines.

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 comprise the degree (physics, chemistry, and astronomy). However, the program curriculum has been carefully designed to provide enough flexibility to accommodate students seeking a fully interdisciplinary program, as well as those with interests that are somewhat more closely aligned with one of the traditional physical sciences disciplines.

Students are encouraged to undertake research under close faculty supervision in a number of potential areas, including, but not limited to, 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
After passing the exam and receiving committee approval, they take the candidate exam, which will have written and oral components.

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.

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 courses in a variety of scientific areas. All courses are offered in the late afternoon or early evening to accommodate students with full-time employment outside the university.

The degree is centered on a strong computational component, which comprises 22 credits of course work. The remaining 9 credits represent the scientific component, which centers on specific areas such as mathematics, physics, chemistry, biology, and statistics. This provides students with a flexible set of options that can be used to create their own customized curriculum under the guidance of a faculty advisor. Students are encouraged to undertake an optional master’s thesis or research project that allows them to gain useful experience in the development of simulations and other aspects of computational science.

Admission Requirements

Applicants should have academic backgrounds in physical or biological sciences, engineering, mathematics, or computer science. They should have an undergraduate degree from an accredited institution, with a GPA of at least 3.00 in their last 60 credits of study. Additionally, applicants should have taken at least one course in differential equations, and should 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 resume, and an expanded goals statement to the SCS Graduate Admissions Processing Center. Applicants should also include three letters of recommendation, an official report of scores 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 foreign applicants.

Degree Requirements

The total curriculum consists of 72 credits: 48 credits of course work, and 24 credits of dissertation research. For students entering the doctoral program with previous graduate work, the 48 credits may be reduced by a maximum of 30 credits. Of the 48 credits, 9 will consist of core courses to be taken by all students in the program, and at least 15 will be selected as part of a student’s “contract” with a three-member faculty committee (see below). In summary, the program consists of the following:

- 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 comprising 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. One of the three courses (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 predoctoral dissertation 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 applicable “contract” core courses, which will be a minimum of 15 credits. After students have selected a dissertation advisor and finalized the dissertation committee, they take the candidacy exam, which will have written and oral components. After passing the exam and receiving committee approval of the dissertation proposal, the student is advanced to doctoral candidacy. The degree will be awarded upon completion of the required course work, and approval of a PhD thesis that makes an original and significant contribution to the physical sciences.
Bioinformatics, MS

This degree addresses the growing national and regional demand for trained computational biologists. It combines a solid foundation in biotechnology with 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 either as a 3-credit research project, or as 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, 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 resume, and an expanded goals statement to the SCS 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 foreign applicants. 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 resume, and an expanded goals statement to the SCS 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 foreign applicants.

Degree Requirements

Candidates must successfully complete 30 credits as follows:

• 9 credits of Earth science core: CSI 655, EOS 656, and EOS 657
• 3 credits of Earth observation courses: EOS 753 or GEOG 579
• 3 credits of quantitative techniques courses: EOS 754 or GEOG 585
• 3 credits of human and biological perspectives courses: one of CSI 750; EOS 759; EVPP 577, 636; GEOG 575, 670
• 3 credits of colloquium or seminar: CSI 899 and EOS 792
• 3–6 credits of research: CSI 798 or 799
• General electives

Earth Systems Science, MS

This interdisciplinary master’s program is offered jointly by SCS and the College of Arts and Sciences (Department of Environmental Science and Policy; 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 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.

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. Additionally, applicants should have taken at least one course in differential equations, and should 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 resume to the SCS Graduate Admissions Processing Center. TOEFL scores are required for all foreign applicants.

**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 also 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 is composed of 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 SCS 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 resume to the SCS Graduate Admissions Processing Center. TOEFL scores are required for all foreign applicants.

**Certificate in Remote Sensing and Earth Image Processing**

This graduate certificate program in remote sensing and Earth image processing (RSEIP) focuses on the skills needed to take advantage of the enormous increase in the availability and utilization of remotely sensed data related to the Earth. The RSEIP certificate is administered by the Earth Systems and Geoinformation Sciences (ESGS) Program within the SCS. The RSEIP certificate requires students to complete 15 credits of SCS graduate courses. Ideal candidates for this certificate are those who have a background in Earth and environmental sciences, and are either working in or planning to enter into the fields of remote sensing, Earth observing, or image processing.

The RSEIP 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 will be used to fund continuing improvements in the SCS 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 resume to the SCS Graduate Admissions Processing Center. TOEFL scores are required for all foreign applicants. Nondegree status is available for professionals who are interested in taking a limited number of courses.

**Facilities**

Computation is recognized as a central feature of the instructional and research programs of SCS. Therefore, the school continues to establish world-class computational facilities. In addition, high-speed Internet connections permit interactive distance learning and access to remote databases.

SCS facilities on both the Fairfax and Prince William Campuses include state-of-the-art computational laboratories, and electronic classrooms for research and interactive instruction. The SCS Graduate Instructional Computational Facility in Fairfax houses 24 Linux workstations clustered with a 100 GB RAIDS system. These machines are configured with advanced software for symbolic manipulation, modeling, simulation, data analysis, database management, and data visualization. Other advanced computing platforms within SCS include a high-performance parallel PC cluster with 134 processors, an SGI Origin 2000 workstation with 16 processors, and numerous Octane visualization workstations. SCS students are issued computer accounts and access to the SCS instructional facilities. Other computing platforms are available for research by graduate students.

SCS facilities on the Prince William Campus include computer labs, molecular biology labs, and specialized classrooms. Available computer facilities include XServe and SGI file servers; and SGI, OSX, and Linux workstations. SCS supports drop-in computer labs and computer classrooms configured with advanced bioinformatics, visualization, and data-mining software. Three wet labs for teaching and training are supported by adjacent computer labs, classrooms, prep labs, and equipment labs, including automated DNA analyzers. Facilities on the Prince William Campus are partially shared with the American Type Culture Collection, the world’s largest collection of living biological cultures.
Faculty
Professors: Avruch, Druckman, Gopin, Mitchell, Rouhana, Rubenstein, Sandole
Associate professors: Cobb, Cheldelin, Jeong
Assistant professors: Goodale, Lyons, Paczynska, Warfield
Research professor: Sluzki

Administration
Sara Cobb, Director
Susan Hirsch, Undergraduate Program Director

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
All conflict analysis and resolution students take a series of core courses that address theories of conflict, including sources and processes; methods of conflict analysis; and identity conflicts. These courses also provide training in conflict resolution skills. Following the core courses, students take a series of gateway courses that cover conflict resolution in the areas of interpersonal conflict, group and community conflict, and international conflict. After selecting an area of conflict as a concentration, students choose courses from a variety of units across the university that relate to their concentration, including anthropology, communication, economics, government, sociology, philosophy, psychology, and New Century College. The major also requires 3 credits of field work that can take the form of an internship, service learning, or study abroad through the Center for Global Education. The BA, BS, and minor in conflict analysis and resolution are jointly awarded by ICAR and the College of Arts and Sciences (CAS). Students in this program are considered students in both ICAR and CAS.

Advising
All conflict analysis and resolution majors and minors are strongly encouraged to meet regularly with an academic advisor who will help them to develop and follow a coherent plan of study and complete the degree in a timely manner. The ICAR program is designed for students to develop concentrations that are relevant to their educational and career goals. Students interested in pursuing a BS are strongly encouraged to consult an advisor early in their program of study to obtain complete information about degree requirements.
Conflict Analysis and Resolution, BA

In addition to satisfying the university-wide general education requirements and the requirements for the BA degree within CAS, students majoring in conflict analysis and resolution must complete the requirements listed below.

Students will complete a total of 39 credits for the major:

- 15 credits in required core courses: CONF 101, 300, 301, 302, and 490
- 9 credits of required bridge courses: CONF 320, 330, and 340
- 3 credits of field experience approved by an advisor: internship, service learning, or study abroad. Students register for internship and service learning credits through New Century College and should speak with an advisor at NCC before registering. More information is available at www.ncc.gmu.edu. Students interested in Study Abroad should register through the Center for Global Education. Prior approval by the major advisor is required for study abroad.
- 12 credits within a concentration of conflict at the interpersonal, community and organizational, or international level. Students should choose classes that pertain to their concentration and are listed as approved. Approved courses include offerings in anthropology, communication, government, philosophy, sociology, and psychology, among others within CAS. For the full listing of approved courses, go to icar.gmu.edu/undergrad. Students are encouraged to check special topics courses of interest each semester, and to think creatively about the applicability of courses that support learning in their chosen concentration.

Conflict Analysis and Resolution, BS

In addition to satisfying the university-wide general education requirements and the requirements for the BS degree within CAS, students majoring in conflict analysis and resolution must complete the following requirements:

- 15 credits in required core courses: CONF 101, 300, 301, 302, and 490
- 9 credits of required bridge courses: CONF 320, 330, and 340
- 3 credits of field experience approved by an advisor. 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, and should speak with an advisor at NCC before registering. More information is available at www.ncc.gmu.edu. Students interested in Study Abroad should register through the Center for Global Education. Prior approval by the major advisor is required for study abroad.
- 12 credits within a concentration of conflict at the interpersonal, community and organizational, or international level. Students should choose classes that pertain to their concentration and are listed as approved. Approved courses include offerings in anthropology, communication, government, philosophy, sociology, and psychology, among others within CAS. For the full listing of approved courses, go to icar.gmu.edu/undergrad. Students are encouraged to check special topics courses of interest each semester, and to think creatively about the applicability of courses that support learning in their chosen concentration.

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 as writing intensive.

Conflict Analysis and Resolution, Minor

Students are required to take the following, for a total of 18 credits:

- 6 credits in required core courses: CONF 101 and 300
- One of three bridge courses: 320, 330 or 340. Students should choose the course that corresponds to their chosen concentration.
- 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. Approved courses include offerings in anthropology, communication, government, philosophy, sociology, and psychology, among others within CAS. For the full listing of approved courses, go to icar.gmu.edu/undergrad. Students are encouraged to check special topics courses of interest each semester, and to think creatively about the applicability of courses that might support learning in their chosen concentration.

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.

GRADUATE PROGRAMS

Conflict Analysis and Resolution, MS

This two-year professional program prepares students for practice and further academic work by integrating conflict analysis and resolution theory, research, and practical technique. Students study the theory, methods, and ethical perspectives of the field and apply this knowledge in laboratory simulations and workshops, internships, and field practica. Graduates work in a variety of settings where conflict resolution is useful—businesses, unions, government agencies, religious groups, court systems, educational institutions, community centers, international relief and development organizations, and conflict resolution consulting firms—and where interest groups are in conflict with current and emergent public policy.

Admission Requirements

In addition to meeting all admission requirements for graduate study, applicants must submit the following:

- 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
- 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 for foreign students. For more information, see the “Admission of International Students” section in the Admission chapter of this catalog.

Background courses in the 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; usually, Mason does not permit any reduction in 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**

A total of 41 credits are required: 15 in required core courses, 20 elective credits, and 6 integrative credits (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 (fall) Overview of the Field
- CONF 610 (fall) Introduction to Research
- CONF 713 (fall) Introduction to Application at the Interpersonal Level
- CONF 601 (spring) Theory of Sources of Conflict
- CONF 642 (spring) Resolution

**Elective Courses**

Students take 20 credits of elective course work.

- CONF 695, 795, and 697, and appropriate graduate courses from other Mason departments or consortium universities, may also apply as electives.

**Integrative Courses**

Students must complete 6 credits (two courses) of integrative work, choosing one of the following options:

- CONF 690 Practicum in Conflict Analysis and Resolution (6 credits)
- CONF 694 Internship (3 credits) and CONF 697 Directed Reading (3 credits)
- CONF 799 Master’s Thesis (3 credits in fall; 3 credits in spring)

**Directed Readings**

Only two directed readings (CONF 697) may be applied toward requirements for the master’s degree.

**Field Opportunities**

The internship option is available throughout the academic year to MS and PhD students as 3-credit elective opportunities to experientially apply theory to practice. With the assistance of ICAR’s internship coordinator, students locate suitable organizations or other opportunities “in the field,” where they can assist site supervisors in relevant aspects of conflict analysis and resolution. Frequently, this takes place where public agencies have formulated or intend to formulate policies that one or more segments of the population are in conflict with. Although internships can be completed throughout the year, enrollment occurs only during the summer term (CONF 694). For more information, consult the ICAR Student Handbook.

The Applied Practice and Theory (APT) program is a 6-credit course running 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.

**Certificate in Conflict Resolution for Health Professionals**

ICAR jointly offers a certificate program for health professionals. For more information, see the College of Nursing and Health Science chapter.

**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 both the public and private sectors.

The program stresses a close link between knowledge of theory and of process in the resolution of conflict. For this, training in the methods of research and analysis is necessary and 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 three 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.

**Degree Requirements**

For students with a master’s degree, 57 credits are required. The semester in which courses are usually offered is indicated in parentheses.

**Required Core Doctoral Courses**

Students take 24 credits of required course work; each course is 3 credits.

- CONF 713 Interpersonal and Intergroup Conflict
- 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 (spring)

**Selective Courses**

Students must take two of the following, for a total of 6 credits:

- CONF 601, 701, 702, 709, 901 Advanced Theory
- CONF 703, 714, 715 Advanced Practice

**Elective Courses**

Fifteen elective credits must be completed prior to comprehensive exams from any appropriate graduate courses. The
intent is to allow students to have maximum flexibility in the selection of courses to build skills and knowledge needed in their dissertation work.

**Directed Readings**
Only two directed readings (CONF 897) can be applied toward doctoral elective requirements.

**Dissertation Units**
CONF 998
Doctoral Dissertation Proposal**
CONF 999
Doctoral Dissertation Research*** (total of 12 credits)

* CONF 811 has a prerequisite, “demonstrated competence in social statistics.” This means that the entering student may be required to take an advanced course in statistics, STAT 510 (fall) or STAT 550 (spring), before registering for CONF 811. However, the course is not counted toward the total credits needed for the degree.

** All CONF 998 courses are graded In Progress (IP) until completion of the proposal. At that time, an appropriate grade is issued.

***All CONF 999 courses are graded In Progress (IP) 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 doctoral degree reduced by up to 18 credits. The actual number of the credit reduction 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.

Entering the Program without Master’s Degree
Students may be admitted to the doctoral program directly without having completed a relevant master’s degree (in conflict analysis and resolution or a related field). However, a master’s degree is strongly recommended. Students without a master’s degree are required to take 15 additional credits at the beginning of the doctoral course of study, including CONF 601; and 720, 730, or 740.

**Foreign Language Requirement**
All doctoral students must show competence in a foreign language (that is, a language other than the native tongue), preferably before “comps.” This requirement must be completed before beginning the dissertation. Under no circumstances are dissertations accepted without evidence of meeting this requirement. Overseas 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 American Sign Language or computer languages cannot be used to fulfill this requirement.

**Advancement to PhD Candidacy**
Upon completing course work (except dissertation) listed on the Program of Studies and passing written comprehensive exams, students will be advanced to candidacy. A candidate is permitted five years from the advancement date to complete the dissertation.
College of Education and Human Development

Graduate School of Education

Graduate Degree Programs
- Counseling and Development, MEd
- Curriculum and Instruction, MEd
  - Adult Education
  - Advanced Studies in Teaching and Learning
  - Early Childhood Education (Unified Transformative Early Education Model—UTEEM; Initial Teacher Licensure)
- Educational Psychology
- 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)
- Foreign Language or Latin PK–12 (Initial Teacher Licensure)
- Instructional Technology
- Multilingual and Multicultural Education
- Secondary Education 6–12 (Initial Teacher Licensure)
- Education Leadership, MEd
- New Professional Studies: Teaching, MA
- Special Education, MEd
- Education, PhD

Graduate Certificate Programs
- Advanced Studies in Teaching and Learning (ASTL)
- Alternative Education
- Applied Behavior Analysis
- Assistive Technology
- 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
- Gifted Child Education
- History
- Instructional Technology
- Integration of Technology in Schools
- Learning Disabilities, Emotional Disturbance, and Mental Retardation Licensure
- Literacy
- Mathematics
- Mental Retardation Licensure
- Multimedia Development

Exercise, Fitness, and Health Promotion, MS
  (Recreation, Health, and Tourism)
Recreation Resources Management, MAIS
  Concentration (Recreation, Health, and Tourism)
Graduate School of Education

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

Faculty
Professors: Behrmann, Bemak, Brozo, Earley, Ford, Galluzzo, Goor, Gotell, Isenberg, Kelly, Mastropieri, Mellander (dean emeritus), Norton, Scruggs, Shaklee, White, M. Williams
Associate professors: Bannan-Ritland, Bauer, Burns, Chung, Colley, Dabagh, DeMulder, Dimitrov, Duck, Dunklee, Dzama, Haley, Kitsantas, Maxwell, McDonald, Moyer-Packenham, Osterling, Pierce, Razeghi, Samaras, Sanchez, Sprague, Sterling, Sturtevant, Thomas, Thorp, Upperman, Werner

• Post-Master's Counseling Licensure
• School Counseling Leadership
• Science
• Secondary Education Licensure
• Severe Disabilities Licensure

School of Recreation, Health, and Tourism

Undergraduate Degree Programs
• Athletic Training, BS
• Health, Fitness, and Recreation Resources, BS with concentrations in:
  • Exercise Science
  • Health Promotion
  • Parks and Outdoor Recreation
  • Sport Management
  • Therapeutic Recreation
  • Tourism and Events Management
• Physical Education, BSEd (Teacher Licensure in Health and Physical Education PK–12)

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

Division of Undergraduate Studies

Undergraduate Degree Programs for PK–12
• Art Education
• 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
• Special Education:
  • Early Childhood Special Education
  • Emotional Disturbance and Learning Disabilities
  • Mental Retardation
  • Severe Disabilities

Administration
Jeffrey Gorrell, Dean
Martin E. Ford, Senior Associate Dean
Mark B. Goor, Associate Dean, Academic and Student Affairs
Joan P. Isenberg, Associate Dean, Outreach and Program Development
G. Linda Rikard, Director, Division of Undergraduate Studies
David K. Wiggins, Director, School of Recreation, Health, and Tourism

The College of Education and Human Development (CEHD) is comprised of the Graduate School of Education (GSE), the School of Recreation, Health, and Tourism (RHT), and the Division of Undergraduate Studies in Education (USIE). 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 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. Faculty develop and support 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 recommendation for students desiring to complete requirements for licensure programs approved by the state and the National Council for the Accreditation of Teacher Education (NCATE) to prepare teachers, administrators, counselors, and related instructional personnel. Initial teacher licensure at the undergraduate level in art education, dance education, music education, and physical education is offered through the major program’s school (College of Visual and Performing Arts and RHT). Initial teacher licensure at the graduate level is provided within the following master’s programs: 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 including early childhood special education, emotional disturbance and learning disabilities, emotional disturbance/learning disabilities/mental retardation, mental retardation, and severe disabilities.

For more information as well as 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 Mason’s teacher education program completers are also available on the web site.
Assistant professors: Berger, Brazer, Castle, Clark, Cozart, Dunlap, Fox, Frazier, Gagnon, Gordon, Groth, Hicks, Jackman, Kaffenberger, Kalbfleisch, Kayler, Kidd, Mirochnik, Murphy, Pieterse, Shockley, Straw, Talleyrand, Weller, K. Williams

Instructors: Kinases-Jerome, Rioux-Bailey, Warrick


Research faculty: Wang

Course Work
GSE programs offer all course work designated EDAE, EDAL, EDCD, EDCI, EDEP, EDIT, EDLE, EDRD, EDRS, EDSE, EDUC, EDUT, IETT, and MNPE.

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

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<th>Course Work</th>
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<td>Core Courses</td>
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<td>EDCD 601 Introduction to Research in Counseling</td>
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<td>EDCD 602 Foundations of Counseling</td>
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<td>EDCD 603 Counseling Theories and Practice</td>
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<td>EDCD 604 Analysis of the Individual</td>
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<td>EDCD 608 Group Processes and Analyses</td>
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<td>EDCD 610 Career and Educational Counseling</td>
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<td>EDCD 650 Multicultural Counseling</td>
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<td>EDCD 755 Practicum in Counseling</td>
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<td>EDCD 791 Internship in Counseling</td>
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<td>EDCD 797 Special Topics/Electives</td>
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| Community Agency Concentration | 15 |
| EDCD 609 Advanced Counseling Skills and Strategies | |
| EDCD 652 Introduction to Substance Abuse Counseling | |
| EDCD 654 Counseling, Ethics, and Consultation in Community Agencies | |
| 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 | |

| EDAL 542 Arranging Conditions for Adult Learning | 12 |
| EDAL 543 Practicum in Adult Learning | |
| EDAL 544 Internship in Counseling | |
| EDUC598 Independent Study | |
| EDRS 590 Education Research | |

| Required Courses | |
| 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 4, 3-credit courses) | |

Advanced Studies in Teaching and Learning (ASTL)
The 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. The program emphasizes applied knowledge in professional practice and develops teacher expertise in an emphasis 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 emphasis on alternative education, early childhood education, gifted child education, history, instructional technology, literacy and reading specialist, mathematics, science, or an individualized emphasis. The emphases 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 emphasis area
• An 18- to 21-credit graduate certificate program for advanced study in a particular area
• A 12-credit graduate certificate in the NBPTS preparation core, for advanced study in teacher leadership or applying for NBPTS certification

### Course Work

<table>
<thead>
<tr>
<th>Master's Degree Core Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 612 Inquiry into Practice</td>
<td>12</td>
</tr>
<tr>
<td>EDUC 613 How Students Learn</td>
<td></td>
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<tr>
<td>EDUC 614 Designing and Assessing Teaching and Learning</td>
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<tr>
<td>EDUC 606 Education and Culture</td>
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<tr>
<td>EDUC 615 Educational Change</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Emphasis Courses</th>
<th>18–21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete one emphasis below for the Med:</td>
<td></td>
</tr>
</tbody>
</table>

#### 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
- Elective, with advisor approval

#### 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
- Electives (choose 3): EDCI 516, 613, 614, 616, 601; EDRD 630; EDSE 556, 557, 656, 667

#### 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 605 Themes in European History
- HIST 510 Approaches to Modern World History

#### Instructional Technology 18
- EDCI 705 Instructional Design and Development
- EDCI 714 Methods of Integration
- EDCI 716 Principles of Integration and Leadership
- EDIT 611 Distance Learning
- EDIT 725 Technology and Diversity
- EDIT 750 Emerging Technology

#### 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 Intervention Groups
- EDRD 633 Literacy Assessments and Intervention for Individuals
- EDRD 634 School-Based Inquiry in Literacy
- EDRD 635 School-Based Inquiry in Literacy
- EDRD 636 Supervised Practicum in Literacy with a Group of Learners
- EDRD 637 Supervised Practicum in Literacy with an Individual Learner

#### Mathematics 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 II
- MATH 604 Geometry for Teachers
- MATH 605 Discrete/Finite Mathematics for Teachers
- MATH 6–7 Algebraic Structures for Teachers

#### Science 18
- EDCI 663 Research in Science Teaching
- EDCI 583 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) L–12**
EDSE 501 Introduction to Special Education
EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 503 Language Development and Reading
EDSE 540 Characteristics of Students with ED/LD
EDSE 627 Psychoeducational Assessment
EDSE 628 Elementary Reading, Curriculum, and Strategies for Mild Disabilities (3 credits) or EDSE 626 The Inclusive Classroom
EDSE 629 Secondary Curriculum/Strategies for Mild Disabilities
EDSE 662 Consultation and Collaboration
EDSE 790 Internship Special Education
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio

**Emotional Disturbance/Learning Disabilities/Mental Retardation (ED/LD/MR) K–12**
EDSE 501 Introduction to Special Education
EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 503 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 790 Internship Special Education
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio

**Severe Disabilities (SD) K–12**
EDSE 531 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 532 Positive Behavior Supports or EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 534 Communication and Severe Disabilities or EDSE 622 Augmentative Communication
EDSE 533 Curriculum and Assessment in Severe Disabilities or EDSE 627 Psychoeducational Assessment
EDSE 661 Curriculum and Methods—SD
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

**Early Childhood Education (Unified Transformative Early Education Model—UTEEM) Initial Teacher Licensure**
The 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 children and their families in schools and diverse community settings. Participation in the program requires a full-time, primarily daytime commitment for one summer, and two academic years of integrated study and on-going practice in four different internships. The program is designed to provide professionals with the specialized knowledge, skills, and dispositions needed to meet the developmental and educational needs of young children. 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 Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUT 511 Universality 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>
<td></td>
</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 Term</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>
<td></td>
</tr>
</tbody>
</table>
EDUT 523 Language Acquisition and Communication for Diverse Infants and Toddlers
EDUT 524 Culturally, Linguistically, and Developmentally Appropriate Practices with Infants, Toddlers, and Their Families
EDUT 791 Internship with Diverse Infants and Toddlers and Their Families

Year One, Summer Term ..................................................... 6
EDRS 590 Education Research
EDSE 517 Computer Applications for Special Populations

Year Two, Fall Term ............................................................ 15
EDUT 612 Development and Assessment of Diverse Learners, K to 3
EDUT 613 Language and Literacy Development for Diverse Learners, K to 3
EDUT 614 Integrating and Adapting Curriculum across the Content Areas for Diverse Learners, K to 3
EDUT 615 Developing Concepts in Early Childhood Mathematics and Science for Diverse Learners, K to 3
EDUT 792 Internship with Diverse Learners, K to 3

Year Two, Spring Term ...................................................... 12
EDUT 781 Frameworks for Unified, Transformativ Early Care and Education
EDUT 782 Policy Perspectives Affecting Diverse Young Learners and Their Families
EDUT 793 Specialization Internship with Diverse Learners and Their Families
◆ Educational Psychology
The 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

Educational Psychology Core ......................................... 9
EDEP 550 Theories of Learning and Cognition
EDEP 551 Principles of Learner Motivation (Prerequisite: EDEP 550)
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:
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:
EDRS 631 Program Evaluation
EDEP 650 High Stakes Assessment, and Accountability Systems
EDEP 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:
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- as well as 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

<table>
<thead>
<tr>
<th>Spring Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 542 Introduction to Elementary Curriculum</td>
</tr>
<tr>
<td>EDUC 543 Children, Family, Culture, and School</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summer Term, condensed schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 552 Mathematics Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 553 Science Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 554 Social Studies Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 555 Literacy Teaching and Learning in Diverse Elementary Classrooms I</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 552 Mathematics Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 553 Science Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 554 Social Studies Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 556 Literacy Teaching and Learning in Diverse Elementary Classrooms II</td>
</tr>
<tr>
<td>EDCI 790 Internship in Education</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Course Work ................................ 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 631 Research in Elementary Education (must be taken first)</td>
</tr>
<tr>
<td>EDCI 632 Advanced Social Studies Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 633 Advanced Mathematics Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 634 Advanced Science Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 635 Applied Research in Elementary Education (must be taken last)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 556 Literacy Teaching and Learning in Diverse Elementary Classrooms II</td>
</tr>
<tr>
<td>EDCI 557 Integrating Technology in the Elementary Curriculum</td>
</tr>
<tr>
<td>EDCI 558 Integrating Fine Arts, Movement, and Health in the Elementary Classroom</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 555 Literacy Teaching and Learning in Diverse Elementary Classrooms I</td>
</tr>
<tr>
<td>EDCI 790 Internship in Education</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Course Work ................................ 15</th>
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<tbody>
<tr>
<td>EDCI 631 Research in Elementary Education (must be taken first)</td>
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<tr>
<td>EDCI 632 Advanced Social Studies Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 633 Advanced Mathematics Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 634 Advanced Science Methods for the Elementary Classroom</td>
</tr>
<tr>
<td>EDCI 635 Applied Research in Elementary Education (must be taken last)</td>
</tr>
</tbody>
</table>

◆ English as a Second Language (PK–12)
The master’s program with 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. Also, 6 credits of a foreign language are 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 who 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 assigns co-teaching and independent teaching responsibilities.
- On-the-job internship: This option is 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 some other appropriate experience. In lieu of an internship, provisionally licensed teachers are required to pass an oral and written proficiency assessment in English.

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 assigns co-teaching and independent teaching responsibilities.
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- Internship: One-term, daytime internship in the classroom of a cooperating teacher. Intern assigns co-teaching and independent teaching responsibilities.
- On-the-job internship: This option is 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 some other appropriate experience. In lieu of an internship, provisionally licensed teachers are required to pass an oral and written proficiency assessment in English.
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**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Licensure Course Work</th>
<th>Prerequisite: Foreign language (6 credits, undergraduate or graduate level; do not count in master’s degree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>EDUC 537 Foundations of Multicultural Education</td>
<td>EDUC 539 Human Development and Learning PK–12</td>
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<tr>
<td></td>
<td>LING 520 Descriptive Linguistics</td>
<td>EDCI 516 Bilingualism and Language Acquisition Research</td>
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<tr>
<td></td>
<td>EDCI 519 Methods of Teaching in Bilingual/ESL Settings</td>
<td>EDCI 520 Assessment of Language Learners</td>
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<td></td>
<td>EDCI 790 Internship in Education</td>
<td>EDRD 615 Teaching Reading/Writing in Multicultural/Multilingual Settings</td>
</tr>
</tbody>
</table>

**Additional Course Work**  
Prerequisites: All licensure coursework listed above

<table>
<thead>
<tr>
<th>Credits</th>
<th>Additional Course Work</th>
<th>EDRS 590 Educational Research</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EDCI 516 Language Acquisition in Multilingual Settings</td>
<td>EDCI 519 Methods of Teaching</td>
</tr>
<tr>
<td></td>
<td>Multilingual Students (prerequisite: EDCI 516)</td>
<td>EDCI 777 Theory in to Practice (Must be taken last)</td>
</tr>
</tbody>
</table>

**FAST TRAIN (ESL PK–12)**
The master’s program is specifically designed for licensed teachers, educators who are working abroad or who plan on teaching overseas, or individuals living outside of the Washington, D.C., area who want a license and master’s degree in ESL/ESOL. The convenient schedule enables participants to complete the program through on-campus study during two summers, and online study during the academic year.

**Course Work**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Licensure Course Work for Preservice Teachers</th>
<th>(those who have never held a teaching license)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>EDUC 511 Introduction to Teaching in International Schools</td>
<td>EDCI 516 Language Acquisition in Multilingual Settings</td>
</tr>
<tr>
<td></td>
<td>EDCI 519 Methods of Teaching Multilingual Students (prerequisite EDCI 516)</td>
<td>EDRD 615 Reading/Writing for Multilingual Students (prerequisites EDCI 516 &amp; 519)</td>
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<tr>
<td></td>
<td>LING 520 Descriptive Linguistics</td>
<td>EDCI 777 Research to Practice (exit course)</td>
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<table>
<thead>
<tr>
<th>Credits</th>
<th>Additional Course Work</th>
<th>EDRS 590 Education Research</th>
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<tbody>
<tr>
<td></td>
<td>EDCI 520 Assessment of Language Learners (prerequisites EDCI 516 and 519, EDRD 615)</td>
<td>EDCI 521 Curriculum Development for Language Learners (prerequisites EDCI 516, 519; EDRD 615; EDCI 520).</td>
</tr>
<tr>
<td></td>
<td>EDCI 777 Research to Practice (must be taken last)</td>
<td>ESO Endorsement Requirements for Licensed (In-service) Teachers</td>
</tr>
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<table>
<thead>
<tr>
<th>Credits</th>
<th>EDUC 513 Teaching Elementary Math in International Schools</th>
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<tbody>
<tr>
<td></td>
<td>EDUC 514 Teaching Elementary Science in International Schools</td>
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<tr>
<td></td>
<td>EDUC 516 Language Across the Elementary International School Curriculum</td>
</tr>
<tr>
<td></td>
<td>EDCI 790 Student Teaching/Internship (Student teaching option 6-credit, 15-week course)</td>
</tr>
</tbody>
</table>

All licensure course work and general education courses must be finished, or may also be completed by teaching for one full year overseas or student teaching for one semester overseas.
The following courses are required for a licensed teacher who wants to add an endorsement in ESOL. Please note: These courses are required for the Commonwealth of Virginia endorsement in ESOL. Students should check with the state where they presently hold a license to see if these courses will meet their requirements.

EDCI 516  EDRD 615  EDCI 520
EDCI 519  LING 520  EDCI 521
EDUC 537

No other internship is required for licensed teachers.

◆ Foreign Language (PK–12)
The master’s program with initial licensure component prepares professionals with the knowledge, skills, and professional dispositions needed to teach specific foreign languages, including Spanish, German, French, Russian, Japanese, 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 non-licensure 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 who 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 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 co-teaching 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 some 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 will be made at the beginning of each term.

Course Work  (Recommended Sequence)

Licensure Course Work ........................................ 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 Foreign/Second Languages in PK–12 Schools
EDCI 520 Assessment of Language Learners
EDRD 620 Teaching Reading/Writing in Foreign/Second Language in PK–12 Schools
EDCI 684 Advanced Methods of Teaching Foreign/Second Languages in PK–12
EDCI 790 Internship in Education

Additional Courses ........................................ 15
EDRS 590 Education Research
EDCI 520 Assessment in Bilingual/ESL Settings
EDCI 521 Curriculum Development in Bilingual/ESL Settings
elective: EDCI 611 Cultural Issues in Second Language Acquisition
EDUC 598 Independent Study in target language or culture (may include Study Abroad Program or Total Immersion Program)

◆ 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: Instructional Design and Development

Master’s Part-time Program ........................................ 39
Required Courses .............................................. 18
EDIT 704 Instructional Technology  Foundations and Learning Theories
EDIT 705 Instructional Design
EDIT 732 Advanced Instructional Design
EDRS 590 Education Research
EDIT 790 Practicum in Instructional Technology Internship
or EDUC 599 Thesis

Recommended Electives .................................... 9
EDIT 730 Analysis and Design of Multimedia/Hypermedia Environments
EDIT 750 Emerging Educational Technology
EDIT 752 Design and Production of Multimedia and Hypermedia Learning Environments
<table>
<thead>
<tr>
<th>Electives from the Multimedia Development Certificate courses</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDIT 530 Scripting and Programming</td>
<td></td>
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<tr>
<td>EDIT 571 Tools for Visual and Graphic Design</td>
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<tr>
<td>EDIT 572 Tools for Digital Video and Audio</td>
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<tr>
<td>EDIT 573 Project Management Tools</td>
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<td>EDIT 574 Networking Tools</td>
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<tr>
<td>EDIT 575 Authoring Tools</td>
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<tr>
<td>EDIT 593 Instructional Hardware Systems</td>
<td></td>
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<tr>
<td>EDIT 771 Introduction to Multimedia/ Hypermedia</td>
<td></td>
</tr>
<tr>
<td>EDIT 772 Web-based Instructional Tools</td>
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<tr>
<th>Electives or Independent Studies</th>
<th>6</th>
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<tr>
<td>(from the following):</td>
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<tr>
<td>EDIT 611 Distance Learning via Networks and Telecommunications</td>
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<tr>
<td>EDIT 773 Human/Computer Interface Design for Teaching and Learning</td>
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<tr>
<td>EDIT 797 Special Topics</td>
<td></td>
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<tr>
<td>EDSE 662 Consultation and Collaboration</td>
<td></td>
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<tr>
<td>PSYC 645 Research Methods in Human Factors and Applied Cognition</td>
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<tr>
<td>PSYC 768 Advanced Topics in Cognitive Science</td>
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<thead>
<tr>
<th>Concentration: Integration of Technology in Schools</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Cohort Program</td>
<td></td>
</tr>
<tr>
<td>EDIT 710 Technology and the Culture of Schools</td>
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<tr>
<td>EDIT 712 Technology and Learning</td>
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<tr>
<td>EDCI 714 Methods of Integration</td>
<td></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:</td>
<td></td>
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<tr>
<td>Telecommunications and Databases</td>
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<tr>
<td>EDIT 713 Technology Tools 2:</td>
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<tr>
<td>Graphics, Video Simulations</td>
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<td>EDIT 715 Technology Tools 3:</td>
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<tr>
<td>Publishing and Computational Tools</td>
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<tr>
<td>EDIT 717 Technology Tools 4:</td>
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<tr>
<td>Hypermedia and Emerging Technologies</td>
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<tr>
<td>EDIT 797 Web-Based Learning</td>
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<tr>
<td>EDIT 790 Practicum in Instructional Technology</td>
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<tr>
<td>EDRS 590 Education Research</td>
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<table>
<thead>
<tr>
<th>Concentration: Assistive and Special Education Technology</th>
<th>40–43</th>
</tr>
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<tbody>
<tr>
<td>Master’s Degree</td>
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<tr>
<td>Recommended Course</td>
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<tr>
<td>EDIT 704 Instructional Technology Foundations and Learning Theories</td>
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<td>EDIT 705 Instructional Design</td>
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<tr>
<td>EDIT 732 Advanced Instructional Design</td>
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<tr>
<td>EDRS 590 Education Research</td>
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<tr>
<td>EDIT 791 Project Development Practicum</td>
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<tr>
<td>EDIT 792 Advanced Project Development Practicum</td>
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<td>EDIT 593 Instructional Hardware Systems</td>
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<tr>
<td>EDIT 771 Introduction to Multimedia/ Hypermedia</td>
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<tr>
<td>EDIT 772 Web-based Instructional Tools</td>
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<td>EDIT 773 Human/Computer Interface Design for Teaching and Learning</td>
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<tr>
<td>EDIT 797 Special Topics</td>
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<tr>
<td>EDSE 662 Consultation and Collaboration</td>
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<tr>
<td>PSYC 645 Research Methods in Human Factors and Applied Cognition</td>
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<td>PSYC 768 Advanced Topics in Cognitive Science</td>
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<table>
<thead>
<tr>
<th>Required Courses</th>
<th>28–31</th>
</tr>
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<tbody>
<tr>
<td>EDIT 750 Emerging Educational Technologies</td>
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<tr>
<td>EDRS 590 Educational Research</td>
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<tr>
<td>EDSE/EDIT 510 Introduction to Assistive Technology</td>
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<tr>
<td>EDSE 610 Designing Adaptive Environments</td>
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<tr>
<td>EDSE 622 Augmentative Communication</td>
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<tr>
<td>EDSE 649 Clinical Psychoeducational Assessment</td>
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<tr>
<td>EDSE 790 Advanced Project Development Practicum</td>
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<tr>
<td>EDSE 662 Educational Consultation and Collaboration</td>
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<tr>
<td>EDSE 669 Interdisciplinary Approach for Children with Sensory and Motor Disabilities</td>
<td>Select one of the following:</td>
</tr>
<tr>
<td>EDUC 598 Final Project</td>
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<tr>
<td>EDUC 599 Thesis</td>
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<table>
<thead>
<tr>
<th>Electives</th>
<th>12</th>
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<tbody>
<tr>
<td>EDIT 705 Instructional Design</td>
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<tr>
<td>EDIT 593 Seminar in Hardware</td>
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<tr>
<td>EDIT 611 Distance Learning via Networks and Telecommunications</td>
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<tr>
<td>EDIT 732 Advanced Instructional Design</td>
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<tr>
<td>EDIT 752 Design of Multimedia/Hypermedia Educational Materials</td>
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<tr>
<td>EDIT 773 Human Computer Interface</td>
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<tr>
<td>EDIT 797 Special Topics</td>
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<tr>
<td>EDSE/EDIT 522 Assistive Tech for Individuals with Sensory Impairments</td>
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<tr>
<td>EDSE/EDIT 523 Accessibility/ Input Modification</td>
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<tr>
<td>EDSE/EDIT 524 Assistive Tech for Individuals with Learning Disabilities</td>
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<tr>
<td>EDSE/EDIT 525 Software for Individuals with Special Needs</td>
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<tr>
<td>EDSE/EDIT 526 Assistive Technology and the Internet</td>
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<tr>
<td>EDSE 527 Adapted Sports, Recreation and Leisure</td>
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</tbody>
</table>
EDSE 528 Low-Tech Assistive Technology Solutions
EDIT 530 Scripting Language in Authoring Educational Material
EDSE 620 Advanced Applied Behavioral Analysis
EDUC 500 In-service Educational Development
EDUC 600 Workshop in Education

**Concentration: Technology Innovations in Education**

**Master’s Degree** ................................................................. 36
EDIT 590 Educational Research in Technology
EDIT 611 Innovation in Distance Learning
EDIT 725 Technology and Diversity
EDIT 741 TIP 1 Technology Innovations Project
EDIT 742 Engineering Learning Environments
EDIT 743 Technology and Community Partnerships
EDIT 745 Technology Leadership Issues
EDIT 746 Educational Technology and Assessment
EDIT 747 Technology and Teacher Education
EDIT 748 TIP 2 Technology Innovations Project
EDIT 750 Emerging Technologies
Elective: 3 credits with advisor approval

**Multilingual/Multicultural Education**
The 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** ................................................. 30

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Foreign language (undergraduate or graduate level; do not count toward master’s degree)</td>
</tr>
<tr>
<td></td>
<td>EDUC 537 Foundations of Multicultural Education</td>
</tr>
<tr>
<td></td>
<td>EDCI 516 Bilingualism &amp; Language Acquisition Research</td>
</tr>
<tr>
<td></td>
<td>EDCI 519 Methods of Teaching in Bilingual/ESL Settings</td>
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<tr>
<td></td>
<td>EDCI 520 Assessment in Bilingual/ESL Settings</td>
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<tr>
<td></td>
<td>EDCI 521 Curriculum Development in Bilingual/ESL Settings</td>
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<tr>
<td></td>
<td>LING 520 Descriptive Linguistics</td>
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<td></td>
<td>EDIT 530 Scripting Language in Authoring Educational Material</td>
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<td></td>
<td>EDIT 590 Educational Research in Technology</td>
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<tr>
<td></td>
<td>EDIT 611 Innovation in Distance Learning</td>
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<td></td>
<td>EDIT 725 Technology and Diversity</td>
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<td></td>
<td>EDIT 741 TIP 1 Technology Innovations Project</td>
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<td>EDIT 742 Engineering Learning Environments</td>
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<td></td>
<td>EDIT 743 Technology and Community Partnerships</td>
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<td>EDIT 745 Technology Leadership Issues</td>
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<td>EDIT 746 Educational Technology and Assessment</td>
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<td>EDIT 747 Technology and Teacher Education</td>
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<tr>
<td></td>
<td>EDIT 748 TIP 2 Technology Innovations Project</td>
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<tr>
<td></td>
<td>EDIT 750 Emerging Technologies</td>
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<td>Elective: 3 credits with advisor approval</td>
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</tbody>
</table>

**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 & Language Acquisition Research
EDCI 519 Methods of Teaching in Bilingual/ESL Settings
EDCI 520 Assessment in Bilingual/ESL Settings
EDCI 521 Curriculum Development in Bilingual/ESL Settings
LING 520 Descriptive Linguistics
EDRD 615 Teaching Reading/Writing in Multicultural/Multilingual Settings

**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 who 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. 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 co-teaching or 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 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>
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<tbody>
<tr>
<td>Licensure Course Work</td>
<td>21</td>
</tr>
<tr>
<td>EDUC 522 Foundations of Secondary Education</td>
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</tr>
<tr>
<td>EDCI 500-level Curriculum and Methods</td>
<td>(prerequisite: EDCI 522 Foundations of Secondary Education)</td>
</tr>
<tr>
<td>EDCI 567 Social Science</td>
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<td>EDCI 569 English</td>
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<td>EDCI 572 Mathematics</td>
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<td>EDCI 573 Science</td>
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<tr>
<td>EDUC 672 Human Development and Learning</td>
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<tr>
<td>EDCI 600-level Advanced Curriculum and Methods</td>
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<td>EDCI 667 Social Science</td>
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<td>EDCI 669 English</td>
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<tr>
<td>EDCI 672 Mathematics</td>
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<td>EDCI 673 Science</td>
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<tr>
<td>EDRD 619 Literacy in the Content Areas</td>
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<tr>
<td>EDCI 790 Internship in Secondary Education</td>
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<tr>
<td>Additional Courses</td>
<td>12</td>
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<tr>
<td>EDUC 674 Assessing Learning and Teaching</td>
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<tr>
<td>Content elective with advisor approval</td>
<td>(English endorsement requires EDRD 597 Young Adult Literature in Multicultural Setting)</td>
</tr>
<tr>
<td>Education elective with advisor approval</td>
<td>(history and social studies endorsement requires EDUC 671 Schools and Culture)</td>
</tr>
<tr>
<td>EDUC 675 Research in Secondary Education</td>
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### Education Leadership, MEd

The master’s program with 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>Required Sequence</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EDLE 610 Leading Schools and Communities</td>
<td>30</td>
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<tr>
<td>EDLE 619 Internship</td>
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<tr>
<td>EDLE 612 Education Law</td>
<td></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>
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<td>EDRS 590 Education Research</td>
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<tr>
<td>EDLE 634 Contemporary Issues in Education Leadership</td>
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<tr>
<td>EDLE 636 Adult Motivation and Conflict Management in Education Settings: A Case Study Approach</td>
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</tr>
</tbody>
</table>
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
Students must complete the core courses, and may choose either the Mathematics Education Leadership concentration or the Science Education Leadership concentration.

Core .......................... 15
EDLE 618 Supervision and Evaluation of Instruction
EDLE 791 Internship in Education Leadership
EDCI 693 Research in Science Teaching
EDCI 666 Research in Mathematics Teaching
Technological elective with advisor approval.
Choose 3 credits from among the following:
EDIT 530 Scripting and Programming
EDIT 571 Tools for Visual/Graphic Design
EDIT 572 Tools for Digital Video and Audio
EDIT 573 Project Management Tools
EDIT 574 Networking Tools
EDIT 575 Authoring Tools
EDIT 593 Instructional Hardware Systems
EDIT 611 Distance Learning via Network and Telecommunications
EDIT 722 Web Based Instructional Tools
EDUC 598 Directed Reading, Research, and Individual Projects

Mathematics Education Leadership Concentration .......................... 18
EDCI 645 Curriculum Development in Mathematics Education
EDCI 646 Mathematics Education Leadership for School Change
EDLE 616 Curriculum Development and Evaluation
EDCI 705 Instructional Design
EDIT 704 Instructional Technology Foundations and Theories of Learning
Mathematics elective
(approval of advisor required)

Science Education Leadership Concentration .......................... 15
EDCI 683 Curriculum Development and Evaluation in Science Education
EDCI 693 Leadership and Organizational Issues in Science Education
EDLE 610 Leading Schools and Communities
EDLE 612 Education Law
EDLE 614 Managing Financial and Human Resources

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, Manassas, Va. 20110. For more information, call 703-993-8320, or e-mail iet@gmu.edu.

Course Work .......................... 30
MNPE 700 The New Professionalism: Theory and Practice
MNPE 702 The New Professional as Reflective Practitioner
MNPE 703 Technology and Learning in the New Professions
MNPE 704 Research Methodologies in the New Professionalism
EDUC 597 Apprenticeship in Classroom Research
IETT 750 Studies in Language and Culture I
IETT 751 Studies in Language and Culture II
IETT 752 Research in Practice: The Team Project
IETT 753 Teaching and Learning

Special Education, MEd
This program leads to a master of education degree for professionals who already hold a special education teacher license, or who 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 both licensure and a master’s degree must apply to a graduate certificate program as well as to this program. For required coursework, see the “Graduate Certificate Programs” section.

Course Work .......................... 30
EDSE 501 Introduction to Special Education
EDSE 503 Language Development and Reading or EDSE 557 Language Development and Emergent Literacy for Diverse Learning
EDSE 517 Computer Applications for Special Populations
EDSE 590 Research in Special Education
EDSE 662 Consultation and Collaboration
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio
Electives from EDSE courses .......................... 13

GRADUATE CERTIFICATE PROGRAMS
Certificate in Advanced Studies in Teaching and Learning (ASTL)
This certificate includes a common core of courses aligned with the National Board for Professional Teaching Standards. It offers advanced preparation for instructional leadership, and is designed to prepare teachers to apply for national board certification.
Course Work .......................................................... 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

◆ Certificate in Alternative Education
This certificate is designed for professionals who are interested in or are currently working in alternative education settings. It offers the knowledge and skills necessary to work effectively with at-risk students, their families, and involved agencies.

Course Work .......................................................... 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
Elective, with advisor approval

◆ 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.

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

◆ 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 Tech for Individuals with Sensory Impairments
EDSE/EDIT 523 Accessibility and Input Modification
EDSE/EDIT 524 Assistive Tech 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 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.

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 among the following):
EDCI 516, 613, 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 Development 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 Young 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 Emotional Disturbance/Learning Disabilities Licensure
This certificate offers the required course work for teacher licensure in emotional disturbance and learning disabilities.

Course Work ................................. 15–30
EDSE 501 Introduction to Special Education
EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 503 Language Development and Reading
EDSE 540 Characteristics of Students with ED/LD
EDSE 627 Psychosocial 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 662 Consultation and Collaboration
EDSE 791 Midpoint Portfolio
EDSE 792 Final Portfolio
EDSE 790 Internship Special Education, two experiences

◆ Certificate in English as a Second Language (ESL) Licensure
This certificate offers the course work for teacher licensure to students currently enrolled in non-licensure graduate programs at Mason or who already hold a master’s degree.

Course Work ................................. 21–27
EDUC 537 Foundations of Multicultural Education
EDUC 539 Human Development and Learning PK–12
LING 520 Descriptive Linguistics
EDCI 516 Bilingualism and Language Acquisition Research
EDCI 519 Methods of Teaching in Bilingual/ESL Settings
EDIT 504 Introduction to Educational Technology
EDRD 615 Teaching Reading/Writing in Multicultural/Multilingual Settings
EDCI 790 Internship in Education

◆ Certificate in English as a Second Language/Special Education
This certificate offers the course work for students and professionals seeking cross-over 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 & 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 International School Counseling
This certificate is designed for current international school counselors as well as teachers who are in the role of counselor in their school.

Course Work ................................. 18
EDCD 616 Counseling Skills in International Schools
EDCD 617 Group Counseling in International Schools
EDCD 618 Principles and Practices of Counseling in the International School
EDCD 619 Multicultural Counseling in International Schools
EDCD 621 Consultation and Leadership Skills for International School Counselors
EDCD 792 Internship in International School Counseling and Development

◆ Certificate in Foreign Language Licensure
This certificate offers the course work for teacher licensure to students currently enrolled in non-licensure 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 Foreign/Second Languages in PK–12 Schools
EDIT 504 Introduction to Educational Technology
EDRD 620 Teaching Reading/Writing in Foreign/Second Language in PK–12 Schools
EDCI 684 Advanced Methods of Teaching Foreign/Second Languages in PK–12 Schools
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 the 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 building 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 .......................................................... 18
EDCI 705 Instructional Design and Development
EDCI 714 Methods of Integration
EDIT 611 Distance Learning
EDIT 725 Technology and Diversity
EDIT 750 Emerging Technology

◆ 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 the 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 503 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 a Virginia reading specialist license. Training is provided in literacy foundations from birth to adulthood, and literacy assessments for groups and individuals. An advanced seminar focuses on literacy program supervision, staff development, and research-based inquiry.

Course Work .......................................................... 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 Intervention Groups
EDRD 633 Literacy Assessments and Intervention for Individuals
EDRD 634 School-Based Inquiry in Literacy
EDRD 635 School-Based Inquiry in Literacy
EDRD 636 Supervised Practicum in Literacy with a Group of Learners
EDRD 637 Supervised Practicum in Literacy with an Individual Learner

◆ 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

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 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 Multimedia Development**
This certificate is offered to those who would like to learn the technology associated with multimedia development. The program provides students with an introduction to the design and development of educational and training products and with training on current and timely technology products.

**Course Work** .......................................................... 15  
Select from the following:  
EDIT 530 Scripting and Programming: JavaScript  
EDIT 571 Tools for Visual and Graphic Design: Photoshop  
EDIT 572 Tools for Digital Video and Audio  
EDIT 573 Project Management Tools: Basic Advanced  
EDIT 574 Networking Tools  
EDIT 575 Authoring Tools: Basic Authorware Advanced Authorware  
EDIT 575 Authoring Tools: Toolbook  
EDIT 575 Authoring Tools: Director  
EDIT 593 Instructional Hardware Systems  
EDIT 771 Introduction to Multimedia/ Hypermedia  
EDIT 772 Web-based Instructional Tools: Basic Advanced  
EDIT 772 Web-based Instructional Tools: Flash/Fireworks

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

**Certificate in School Counseling Leadership**
This certificate provides comprehensive training to middle and high school counselors for leadership and administrative roles in secondary counseling programs.

**Course Work** .......................................................... 15  
EDCD 629 Principles and Practices of School Counseling Leadership and Administration  
EDCD 630 School Counseling Leadership  
EDCD 651 Ethical and Legal Issues in Counseling  
EDCD 795 Advanced 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.

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

**Certificate in Secondary Education Licensure**
This certificate offers the course work for teacher licensure to students currently enrolled in non-licensure graduate programs at Mason, or those who already have a master’s degree.
Course Work .................................................... 15–21
EDUC 522 Foundations of Secondary Education
EDCI 500-level Curriculum and Methods
    (prerequisite: EDCI 522 Foundations of Secondary Education)
EDCI 567 Social Science
EDCI 569 English
EDCI 572 Mathematics
EDCI 573 Science
EDUC 672 Human Development and Learning
EDCI 600-level Advanced Curriculum and Methods
EDCI 667 Social Science
EDCI 669 English
EDCI 672 Mathematics
EDCI 673 Science
EDRD 619 Literacy in the Content Areas
EDCI 790 Internship in Secondary Education

◆ Certificate in Severe Disabilities Licensure

This certificate offers the required course work for teacher licensure in severe disabilities.

Course Work .................................................... 15–33
EDSE 531 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 532 Positive Behavior Supports
   or EDSE 502 Classroom Management and Applied Behavior Analysis
EDSE 534 Communication and Severe Disabilities
   or EDSE 622 Augmentative Communication
EDSE 533 Curriculum and Assessment in Severe Disabilities
   or EDSE 627 Psychoeducational Assessment
EDSE 661 Curriculum and Methods—SD
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

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 in 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 Education Transformation Office at 703-993-8320. For information about the adult education concentration in the MEd in curriculum and instruction, contact 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 contact 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 post-baccalaureate 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 non-refundable 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 in the application.
- Additionally, 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, 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 minor area 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 spring 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 Research
EDUC 812 Quantitative Methods in Education Research
Research Elective from the following:
EDRS 820 Evaluation Methods for Educational Programs and Curricula
EDRS 821 Advanced Applications of Quantitative Methods
EDRS 822 Advanced Applications of Qualitative Methods
EDRS 823 Advanced Research Methods in Single Subject/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, instructional technology, literacy and reading, mathematics or science education leadership, multilingual or multicultural education (English as a second language), research methodology, and special education.

Minor Area ......................................................... 12
Students have several options including minors within the Graduate School of Education, within other Mason departments, interdisciplinary minors, or using the master’s degree as part of the minor 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, contact 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.

School of Recreation, Health and Tourism

Phone: 703-993-2060
Web: rht.gmu.edu

The School of Recreation, Health, and Tourism (RHT) prepares students for careers in health and physical education, athletic training, parks and outdoor recreation, therapeutic recreation, exercise science, health promotion, tourism and events management, and 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, sport management organizations, and tourism and events management sites. 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: Brayley, Ruhling, D. Wiggins (director)
Associate Professors: Anderson, Bever, Kozlowski, Miller, Rikard, E. Rodgers, P. Rodgers, Schack, Walker, B. Wiggins
Assistant Professors: Banville, Bowen, Caswell, Daniels, Lozar, Waddell
Instructors: Norden
Administrative Faculty: Lee, Lomax, Shaffer

Course Work
RHT offers all course work designated A TEP, 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 302
- SPMT 318
- SPMT 320
- SPMT 405
- SPMT 412

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

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 both the acquisition of technical skills and application of theory-to-experiential learning in an outdoor adventure curriculum. Students completing certificate requirements 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 Outdoor Education.

Other Certificates
Students also may complete a certificate program outside RHT in environmental management (27 credits, see the biology section of the College of Arts and Sciences chapter) and gerontology (24 credits, see the College of Nursing and Health Science 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

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 BSEd 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 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 123 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 306, 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 A103A). 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>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written communication</td>
<td>6</td>
</tr>
<tr>
<td>Oral communication</td>
<td>3</td>
</tr>
<tr>
<td>Information technology</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative reasoning</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>U.S. history</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral science</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Natural science</td>
<td>8</td>
</tr>
<tr>
<td>PHED majors are required to take BIOL 124 and 125 to meet state licensure</td>
<td></td>
</tr>
</tbody>
</table>

Synthesis

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

Professional Sequence

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRD 300</td>
<td>3</td>
</tr>
<tr>
<td>HEAL 110, 205, 220, 310, 325, 330, 405</td>
<td>22</td>
</tr>
<tr>
<td>PHED 108, 110, 150 or 159, 200, 201, 202, 273, 274, 275, 300, 306, 308, 365, 403, 404, 450</td>
<td>39</td>
</tr>
<tr>
<td>PRLS 316, 410, 460</td>
<td>9</td>
</tr>
</tbody>
</table>

Total credits .............................................. 123

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 program.

Degree requirements

The degree requires a minimum of 121 credits. Students begin the first level upon admission to Mason by enrolling in prerequisite courses, including BIOL 124 and 125; HEAL 110, 205, and 330; and ATEP 228 and 229.

After successful completion of Level I prerequisite courses, students 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 maintenance of at least a 2.50 GPA for professional courses, successful completion of prerequisite courses, concurrent enrollment in didactic and clinical courses, and current CPR certification.

The following describes the professional courses that students should take in each level of the program.

Level I courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 124, 125</td>
<td></td>
</tr>
<tr>
<td>HEAL 110, 205, 330</td>
<td></td>
</tr>
<tr>
<td>ATEP 228, 229</td>
<td></td>
</tr>
</tbody>
</table>

Level II courses:

PHED 200, 300
ATEP 310, 315, 320, 325

Level III courses:

ATEP 350, 354, 357, 413
PHED 365, 410, 450
PRLS 410

Level IV 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 equals 225. Clinical assignments may be in athletic training settings such as in secondary schools, colleges and universities; professional sports programs; sports medicine and other medical clinics; industry; and military training programs. Students will be evaluated on attainment of proficiencies in athletic training. Evaluation will occur in academic courses as well as in the clinical setting. To transfer course work from other universities, students must produce results of 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

<table>
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<tr>
<th>Category</th>
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<td>Information technology</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative reasoning</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>U.S. history</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral science</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Natural science</td>
<td>8</td>
</tr>
<tr>
<td>(ATT majors are required to take ATEP 441 )</td>
<td></td>
</tr>
</tbody>
</table>

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 ................................. 6
Total credits ................................. 120

Health, Fitness, and Recreation Resources, BS

Concentrations include the following:

Exercise Science (ES)
Emphasizes promotion of healthy lifestyles outside school settings. This degree prepares students for supervisory and managerial careers in the sport industry, the 11th largest industry in the United States. Students complete supervised internships in professional settings; a minor is available.

Health Promotion (HPR)
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)
Explores the contribution of recreation and parks to public well-being and quality of life. Curriculum includes courses in natural resources management, outdoor recreation programming, and environmental education. The program is accredited by the National Recreation and Park Association (NRPA/AALR). Graduates are employed in national, state and local recreation and park agencies, nonprofit organizations, and public and commercial operations. Students complete supervised internships in professional settings; a minor is available.

Sport Management (SPM)
Prepares students for management positions in the sport industry, the 11th largest industry in the United States. Included among its many professional positions are marketing coordinators, event management specialists, athletic directors, program coordinators, public relations managers, and human resource specialists. Students complete course work in sport marketing and finance, sport and ethics, and a supervised internship in a professional setting; a minor is available.

Therapeutic Recreation (TR)
Teaches students how to provide recreation services for people with disabilities. 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/AALR. Graduates find employment in local, state, and federal recreation settings, senior and adult health care, nonprofit organizations, and educational and clinical institutions across the life span.

Tourism and Events Management (TEM)
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, the host, and the 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
Credits

Synthesis
Tourism and events management concentration: TOUR 490 ................................. 12
Exercise science and health promotion concentrations: HEAL 490 ................................. 12
Parks and outdoor recreation, therapeutic recreation concentrations: PRLS 490  ............ 12
Sport management concentration: SPMT 490  .... 12

Professional Sequence by Concentration

Exercise Science (ES)
HEAL 205, 220, 323, 330, 350, 490 ................................. 28
PHED 200, 300, 304, 365, 410, 450, 480 .......................... 23
PRLS 310, 405, 410, 411, 450, 460 .............................. 18
Electives ................................. 11
Total ................................. 121

Health Promotion (HPR)
PHED 200, 300, 365, 410 ................................. 9
PRLS 310, 410, 411, 450, 460 .............................. 15
Electives ................................. 12
Total ................................. 120
Parks and outdoor recreation (POR)
HEAL 205, 323 ...................................................... 7
PHED 200 ............................................................. 3
PRLS 210, 241, 300, 302, 310, 316, 317, 327, 402, 405, 410, 411, 450, 460, 490, 501, 526 ... 60
Electives .............................................................. 9
Total ................................................................... 120

Sport management (SPM)
HEAL 205, 323, 350 .............................................. 10
PHED 200, 304, 410 ............................................. 9
PRLS 310, 405, 410, 411, 450, 460 ..................... 15
SPMT 201, 241, 302, 318, 320, 405, 412, 480, 490 ...................................................... 36
Electives .............................................................. 9
Total ................................................................... 120

Therapeutic recreation (TR)
HEAL 205, 323 ...................................................... 7
PHED 200 ............................................................. 3
PRLS 210, 241, 310, 316, 317, 327, 405, 410, 411, 416, 418, 450, 460, 490, 503 ................ 54
PSYC 211, 325 ..................................................... 6
Electives .............................................................. 9
Total ................................................................... 120

Tourism and events management (TEM)
HEAL 323 ................................................................ 3
PRLS 310, 410, 450, 460 ..................................... 12
Electives .............................................................. 12
Total ................................................................... 123

Writing Intensive Requirement
The university’s writing intensive requirement for HFRR majors is satisfied by successful completion of PRLS 450.

GRADUATE PROGRAMS
■ Exercise, Fitness, and Health Promotion, MS
This program prepares professionals in the fields of health and physical education, fitness, and health promotion and disease prevention to either pursue advanced academic training (doctoral program) or more adequately serve their communities.

Course Work .......................................................... 30

Core ........................................................................ 18
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
EFHP 623 Research Design and Statistical Reasoning

Electives ................................................................. 6 or 12
(6-credit thesis option or 12-credit nonthesis):
EFHP 799 Thesis option

Students must have an advisor to supervise thesis work and lead the thesis committee. The advisor must be a member of the exercise, fitness, and health promotion graduate faculty. Students may not register for thesis credit until a proposal has been approved by the graduate coordinator after consulting with the thesis advisor. The graduate coordinator appoints two members to the thesis committee, one of whom may be outside the program, on the basis of recommendations from the student and thesis advisor.

Nonthesis Option:
12 credits of electives and a written comprehensive exam

Admission Requirements
In addition to fulfilling graduate admission requirements, applicants must submit three letters of recommendation, and provide transcripts of all college course work as well as GRE or MAT scores. Students also should have completed undergraduate courses in human anatomy, physiology, nutrition, exercise physiology, and kinesiology. They also should submit a written goals statement from 500 to 1,000 words explaining how the program relates to their educational and career plans. Applicants who do not meet the above requirements may be offered provisional or nondegree status in accordance with general regulations of the Graduate Council. Admission decisions are made whenever applicants’ files are complete. Candidates may enroll in any term during the following year, although fall enrollment is recommended given the course sequence.

Division of Undergraduate Studies in Education (USIE)
Phone: 703-993-8991
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 Arts and 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 SPECIAL EDUCATION MINORS
These 15-credit minors in special education provide undergraduate students with background knowledge in special education in one of four specializations: emotional disturbance and learning disabilities, mental retardation, severe disabilities, or early childhood special education. Completing one of these minors partially fulfills requirements for licensure in special education in Virginia. For other undergraduate minors, see the RHT section in this chapter.
UNDERGRADUATE DEGREE PROGRAMS

■ Art Education (PK–12), BFA
   Offers teacher licensure through the Art and Visual Technology Department. 703-993-8898.

■ Dance Education (PK–12), BA, BFA
   Offers teacher licensure through the Dance Department. 703-993-1114.

■ Health and Physical Education (PK–12), BSED
   Offers teacher licensure under RHT. For information, refer to the department’s section in this chapter, or call 703-993-2060.

■ Music Education (PK–12), BM
   Offers teacher licensure programs in instrumental or vocal and choral music education. Contact the Music Department at 703-993-3778.
The School of Information Technology and Engineering (IT&E) 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.

IT&E offers several degree programs that concentrate on important contemporary technological issues and needs. Seven bachelor’s degree programs are offered: applied computer science, civil and infrastructure engineering, computer engineering, computer science, electrical engineering, information technology, and systems engineering. Minors in information technology, computer science, and data analysis are also available.

Thirteen 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, systems engineering management, and telecommunications. Three doctoral programs are offered: a cross-disciplinary program in information technology, and more focused programs in computer science and electrical and computer engineering. 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, post bachelor 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; electronic 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, VSLI design and manufacturing; 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, information technology, and systems and industrial engineering. Each program strongly emphasizes English composition and communication.

Students also have opportunities to develop interest areas in other fields within IT&E 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.

Administration
Lloyd Griffiths, Dean
Stephen G. Nash, Associate Dean for Graduate Studies and Research
E. Bernard White, Associate Dean for Undergraduate Studies
Stephanie Galloway, Director, Graduate Admissions
Jonathan Goldman, Director, Computing Resources
Kathleen Johnson, Director, Finance
Jennifer Lamb, Director of Development

■ Bachelor of Science

Degree Requirements
IT&E offers seven 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>
</thead>
<tbody>
<tr>
<td>Applied Computer Science</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Civil and Infrastructure Engineering</td>
<td>Civil, Environmental, and Infrastructure Engineering</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Information Technology</td>
</tr>
<tr>
<td>Systems Engineering</td>
<td>Systems Engineering and Operations Research</td>
</tr>
</tbody>
</table>

Degree Requirements
The following general requirements must be completed by all undergraduate students in IT&E:

- At least 120 credits of academic work
- 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 U.S. history, 3 credits of Western civilization, 3 credits of social and behavioral science, and 3 credits of global understanding issues university general education electives
- All requirements listed in the following sections for specific IT&E majors, which include university requirements for mathematics, IT competency and ethics, and synthesis.

Freshmen who are undecided about their specific majors may select IT&E undeclared as their major. Sample schedules that fulfill degree requirements for individual programs within IT&E 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 section in the “Academic Policies” chapter in this catalog for detailed information concerning requirements for graduation, residence, and academic quality for graduation. That chapter also details additional university requirements for minor programs. The requirements for the BIS degree can be found in the “College of Arts and Sciences” chapter. The requirements for the civil and infrastructure engineering, computer engineering, computer science, electrical engineering, and systems engineering undergraduate degree programs are provided in the academic departments’ sections of this chapter. The requirements for the BS degree in information technology are provided in the interdisciplinary section of this chapter.

Academic Progression and Course Repeat
Students majoring in IT&E 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 IT&E Student Services Office to repeat some courses required for the major in which they have previously received a grade of D or F. Individual IT&E 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 IT&E 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 for specifics. 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 IT 350, IT 362, IT 462, and IT 466 to satisfy degree requirements; however, the department must forward to the IT&E Student Services Office for approval any other recommendation for exception to the policy on restricted courses. For more information, contact the department, or the IT&E 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 IT&E 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
IT&E offers 13 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>
<tr>
<td>Information Systems</td>
<td>Information and Software Engineering</td>
</tr>
<tr>
<td>Operations Research</td>
<td>Systems Engineering and Operations Research</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>Information and Software Engineering</td>
</tr>
<tr>
<td>Statistical Science</td>
<td>Applied and Engineering Statistics</td>
</tr>
<tr>
<td>Systems Engineering</td>
<td>Systems Engineering and Operations Research</td>
</tr>
<tr>
<td>Systems Engineering and Management</td>
<td>Systems Engineering and Operations Research</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Interdisciplinary Programs</td>
</tr>
</tbody>
</table>

Doctor of Philosophy
IT&E offers a PhD in computer science, a PhD in electrical and computer engineering, and a PhD in information technology. The PhD in computer science is described in the Computer Science section of this chapter, and the PhD in electrical and computer engineering is described in the Electrical and Computer Engineering section. The PhD in information technology is a program that builds on a fundamental core and emphasizes cross-disciplinary efforts among the 13 master’s programs in IT&E, as well as with related units at Mason. Specific entrance and degree requirements for this doctoral program are found in the Interdisciplinary Graduate Programs section of this chapter.

Engineer Degree in Information Technology
This degree allows students to combine the advanced course work of the PhD degree in information technology with an applied project. It is suitable for students seeking specialized training, but who do not wish to complete an extended research project. For complete details, see the section on Interdisciplinary Programs in this chapter.

Nondegree Graduate Program
Admission to graduate study in nondegree status is available for those individuals who do not wish to pursue a degree but are interested in taking graduate courses. To be admitted, students must meet the following requirements: For routine admission, students should have a 3.00 GPA or higher and a BS degree, preferably in a discipline in the potential degree area of interest, and must have met course prerequisites as listed in the various departments. Admission criteria for students with a GPA below 3.00 or a nonengineering background are varied; applications are reviewed within departments on an individual basis.

Students who later choose to seek admission to one of the IT&E graduate degree programs must reapply for admission to a degree program and supply the additional required materials with the new application. If admitted, students may request that up to 12 credits taken in nondegree status be approved for transfer for a degree. Admission to nondegree status does not automatically guarantee admission to the degree program at a later date. Applicants may obtain more information by contacting the IT&E Student Services Office, Room 160, Science and Technology II, 703-993-1505, or by contacting the individual departments.

University Computing Capability
Academic computing capability is provided by laboratories offering a large number of individual student computers, as well as by campuswide networked facilities. All laboratories are networked and include access to local and remote servers as well as the Internet. IT&E provides multiple labs equipped with Microsoft, Sun, and Network Computing Device workstations, among others. The IT&E central system computers are clustered into UNIX and Windows servers that support student labs as well as faculty and departmental machines. Software includes compilers for a variety of programming languages and software tools supporting engineering design, graphics, neural networks, and high-performance and parallel computing. Specialized facilities are available for artificial intelligence, civil engineering, software engineering, image processing and computer vision, virtual reality, and parallel and distributed computing research.
Applied and Engineering Statistics

Phone: 703-993-3645
Web: www.gmu.edu/departments/aes

Faculty
Professors: Carr, Gantz, Gentle, Wegman
Associate professors: Bell, Bolstein (chair), Habib, J. Miller, C. Sutton
Assistant professors: Davis, Rytikova
Adjunct professors: Kamocsai, Keller, Moumen, Sims, Sirgany, Solka

Course Work
The Applied and Engineering Statistics Department (AES) 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 natural sciences, social sciences, business, nursing, education, and engineering. AES offers a variety of introductory courses as well as more advanced course work in specialized statistical methodology and applications. The focus of the department’s offerings is applied, with special emphasis on computing, 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 Arts and Sciences (CAS) and the College of Nursing and Health Science (CNHS), as well as in the School of Information Technology and Engineering (IT&E). 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.

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 are 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., metro area for people with interdisciplinary training, which includes a background in statistics and data analysis. Inquiries should be directed to AES. 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, 362, 354 or 554, and 474 or 574; and four courses chosen from ECON 445; STAT 498 or 499; OR 435, 442, or 481; 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 IT&E and CAS, especially computer science, economics, 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.

To satisfy the core requirement, the student must complete one of these sequences with grades of C or better: STAT 250–350 or STAT 344–354. STAT 554 may be substituted for STAT 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 Department of Applied and Engineering Statistics. Courses currently approved for the minor are ECON 445; STAT 362, 463, and 474; CEIE 410; CS 450; GEOG 300 and 311; GOVT 400; OR 435; SOCI 405; and SYST 473.

■ BS/Accelerated MS in Statistical Science

This degree option provides a way for 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 IT&E major areas, or a BS in mathematics from CAS. 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 the student has taken two of the following three courses as part of his or her BS course work: STAT 544, 554, and 574.

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 they impinge upon 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 either the research or professional option. The research option is for students planning to continue with a PhD degree, or to 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 not wishing to pursue a research career. Such students might plan to work in applied 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 the 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 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 the 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 by 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; 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 chair, generally not to exceed 6 credits.

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. Twelve credits must be in the 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 wish 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 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 the 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 must 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 the general university requirements for a master's degree, candidates with the research option must do the following:
- 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.
- 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.

◆ Certificate in Biostatistics
(Joint program with the CNHS)

The certificate 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 to begin careers in such organizations. The certificate is taught jointly by faculty from the statistics and health science programs.

Admission Requirements
Students must hold a bachelor's degree and have earned a GPA of 3.00 in the last 60 credits. The degree must be from a regionally accredited institution of higher education in a discipline related to health science or statistics. Such fields include, but are not limited to, medicine, biology, nursing, health science, biostatistics, statistics, mathematics, and psychology. A course in statistics and a course in calculus at the undergraduate or graduate level with grades of B or higher are also required. Applications are made either through IT&E or CNHS.

Program of Study
Students must complete one course from each of the five groups:
- STAT 535 or 554
- STAT 660 or 665
- HSCI 800 or STAT 656
- HSCI 801 or STAT 662
- HSCI 730

A minimum of 3 credits in HSCI courses and 6 credits in STAT courses must be taken at Mason.

◆ 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, but 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 should 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; it does not count 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, with the exception of 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 computer science, economics, geography, information systems, operations research, public administration, sociology, and statistics. Only one course (3 credits) can be outside the STAT program, and must be approved by the AES department chair. 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 Applied and Engineering 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 IT&E.

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.

PhD Study in Statistical Science
Doctoral study in statistics is available through two of Mason’s PhD programs, both of which are interdisciplinary and allow a broad range of course and research options. Within the PhD in computational sciences and informatics, students can select a concentration in computational statistics. This program is described in the School of Computational Sciences chapter. Within the PhD in information technology, students may designate a concentration in statistical science in their doctoral degree title. In that case, the degree conferred upon a graduating student would be PhD in information technology with concentration in statistical science. This program is described below.

Requirements for PhD in Information Technology with Concentration in Statistical Science
Students must satisfy all the requirements for the PhD in information technology degree, as described later in this section. In addition, the following requirements must be met.

Admission Requirements
Students are usually required to have an MS degree in statistics, mathematics, operations research, biological or physical sciences, economics, electrical engineering, or some related engineering or information technology area. Students with an MS in statistics are expected to have completed course work equivalent to the MS core courses STAT 544, 554, 652, and 656 with a 3.50 GPA. Students with MS degrees in other fields typically have completed some of these courses but not all. They may be admitted provisionally on successful completion of the remaining courses.

Qualifying Exams
Students seeking the PhD in information technology must pass a set of four exams from three different degree programs. For the concentration in statistical science, two of these exams must be chosen from the following course list:

- STAT 544 Applied Probability
- STAT 554 Applied Statistics
- STAT 652 Statistical Inference

Advanced Emphasis Requirement
Students with a concentration in statistical science must complete the following four courses as part of their 24-credit doctoral plan of study:

- IT 876 Measure and Linear Spaces
- IT 971 Probability Theory
- IT 972 Mathematical Statistics I
- IT 973 Mathematical Statistics II

The remaining four courses (12 credits) must be independent of the qualifying exams taken by the student, and must be approved by the doctoral supervisory committee, AES chair, and associate dean of IT&E. The courses must be numbered 600 or above (655 or above for STAT courses, excluding STAT 700–701).

Doctoral Supervisory Committee
Upon admission to the doctoral program, students are assigned a temporary advisor. 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 committee must be a tenured faculty member in AES. (The chair is usually, but not necessarily, the dissertation director, if a tenured member of AES.) The doctoral supervisory committee, which consists of four members, must include at least two graduate faculty members from AES and at least one from another department in IT&E. The composition of the doctoral supervisory committee must be approved by the AES chair and IT&E associate dean. Permission for the comprehensive exam and the dissertation defense are requested from the IT&E associate dean on the basis of a written request and plan that has been approved by the supervisory committee and the AES chair.

For more information, see the section of this chapter titled Information Technology, PhD. E-mail specific questions to statistics@gmu.edu, or contact the graduate coordinator directly in Room 158, Science and Technology II, 703-993-3645.

Applied Information Technology

Phone: 703-993-3565
Web: ite.gmu.edu/bsit

Faculty
Professor: Gantz (chair)
Associate Professor: Dahl, Marchant
Assistant Professors: Bruno, Caraballo (associate chair), Rytkova
Instructors: Islam, Lyons, Sanghera
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 IT, including the opportunity to learn appropriate conceptual and computational tools essential for a successful career
- A broad background across functional areas of IT along with a depth of understanding in a particular area of interest
- Skills for effective written and oral communication with both technical and non-technical 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 impact of information technology on society, and an understanding of the ethical and social responsibilities of IT professionals

The BS degree in information technology aims to meet the existing and emerging needs of the information technology industry by educating new IT workers in current principles and practices in information technology and its applications. Graduates are versed in the technical aspects of IT, but their role in the modern enterprise will focus on the use and management of IT resources rather than on the development of leading-edge intellectual property. Graduates fill jobs that focus on the application of IT in an increasing number of emerging subdisciplines, including network administration, information security, information systems, telecommunications, web development, and computer graphics.

Admission Requirements

Students who meet Mason’s general eligibility requirements may apply for admission to the 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 IT 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, IT foundation and core courses, and courses required for the chosen IT concentration area. At least 30 credits toward the BS degree must be earned at Mason, and at least 45 credits must be level 300 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 three IT concentration areas:

- Information Security and Network Administration
- Database Management and Programming

Students also must select at least one course from three of the following seven categories, with a total of five courses from the three selected categories. Two out of the three selected categories are prescribed according to the chosen concentration, and at least three courses must come from these. Students must choose any third category to complement the concentration.

- Information Security
- Network Administration
- Database
- Programming
- Web Development
- Computer Graphics and Data Presentation
- Telecommunications

The two prescribed categories for each concentration are:

**Information Security and Network Administration**
- Information Security
- Network Administration

**Database Management and Programming**
- Database
- Programming

**Web Development and Computer Graphics**
- Web Development
- Computer Graphics and Data Presentation

An up-to-date list of courses associated with the above seven categories is available in the department.

Foundation, Core, and 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 IT foundation, core, and concentration courses as described below. The IT major also requires a 7-credit capstone design project, to be completed over a period of two consecutive semesters.

**Degree Requirements**

Students must complete requirements for at least one of the following three IT concentration areas:

- Information Security and Network Administration
- Database Management and Programming

Students also must select at least one course from three of the following seven categories, with a total of five courses from the three selected categories. Two out of the three selected categories are prescribed according to the chosen concentration, and at least three courses must come from these. Students must choose any third category to complement the concentration.

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- Network Administration
- Database
- Programming
- Web Development
- Computer Graphics and Data Presentation
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- Network Administration

**Database Management and Programming**
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- Network Administration
- Database
- Programming
- Web Development
- Computer Graphics and Data Presentation
- Telecommunications

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- Information Security
- Network Administration

**Database Management and Programming**
- Database
- Programming

**Web Development and Computer Graphics**
- Web Development
- Computer Graphics and Data Presentation

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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 IT foundation, core, and concentration courses as described below. The IT major also requires a 7-credit capstone design project, to be completed over a period of two consecutive semesters.

**Degree Requirements**

Students must complete requirements for at least one of the following three IT concentration areas:

- Information Security and Network Administration
- Database Management and Programming

Students also must select at least one course from three of the following seven categories, with a total of five courses from the three selected categories. Two out of the three selected categories are prescribed according to the chosen concentration, and at least three courses must come from these. Students must choose any third category to complement the concentration.

- Information Security
- Network Administration
- Database
- Programming
- Web Development
- Computer Graphics and Data Presentation
- Telecommunications

The two prescribed categories for each concentration are:

**Information Security and Network Administration**
- Information Security
- Network Administration

**Database Management and Programming**
- Database
- Programming

**Web Development and Computer Graphics**
- Web Development
- Computer Graphics and Data Presentation

An up-to-date list of courses associated with the above seven categories is available in the department.
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
- IT concentration courses (15 credits selected from the three categories of courses associated with the selected IT concentration area. Two out of the three categories are prescribed according to the concentration; the student must choose the third category to complement the concentration in consultation with an advisor. A list of courses in each category may be obtained from the department.
- Other requirements:
  - COMM 100 Oral Communication
  - 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 111 Linear Mathematical Modeling, MATH 125 Discrete Mathematics I, and IT/STAT 250 Introductory Statistics I (3 of these credits apply toward general education requirements).

Sample Schedule

First Semester
- IT 101 Introduction to Information Technology ........................................ 3
- IT 103 Introduction to Computing ........................................ 3
- HIST 100 History of Western Civilization ........................................ 3
- MATH 108 Introductory Calculus with Business Applications ................ 3
Total ................................................................. 15

Second Semester
- IT 108 Programming Fundamentals ........................................ 3
- IT 250/STAT 250 Introductory Statistics ........................................ 3
- Non Lab Natural Science ........................................ 3
- COMM 100 Oral Communication ........................................ 3
- Literature .......................................................... 3
Total ................................................................. 15

Third Semester
- IT 212 How Computers Work ........................................ 3
- IT 214 Database Fundamentals ........................................ 3
- MATH 125 Discrete Mathematics I ........................................ 3
- Natural science with lab ........................................ 4
- Social/behavioral science ........................................ 3
Total ................................................................. 16

Fourth Semester
- IT 213 Multimedia and Computer Graphics ........................................ 3
- IT 221 Introduction to Information Security Technologies .................. 3
- HIST 120 U.S. History ........................................ 3

Natural science with lab ........................................ 4
Fine arts .......................................................... 3
Total ................................................................. 16

Fifth Semester
- MSOM 302 Managing Information in a Global Environment ............. 3
- IT 492 Senior Design Project I ........................................ 3
- MATH 111 Linear Mathematical Modeling ........................................ 3
- ENGL 302 Advanced Composition ........................................ 3
- IT 341 Networking Essentials ........................................ 3
- Elective .......................................................... 3
Total ................................................................. 15

Sixth Semester
- IT 304 IT in the Global Economy ........................................ 3
- MSOM 303 Marketing in a Global Economy ........................................ 3
- IT 300 Introduction to Telecommunications ........................................ 3
- IT concentration course ........................................ 3
- SYST 469 Human Computer Interaction ........................................ 3
Total ................................................................. 15

Seventh Semester
- IT 443 IT Resources Planning ........................................ 3
- Global Understanding ........................................ 3
- IT 492 Senior Design Project I ........................................ 3
- IT concentration course ........................................ 3
- IT concentration course ........................................ 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.

- 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 IT certificate requires a minimum of 24 credits, including 15 credits of core courses. Beyond these requirements, the student is free to define a technical focus area. The focus area must be composed of at least three courses (9 credits). Elective courses selected for the technical focus area must be approved by an IT advisor.

Core Courses .......................................................... 9
IT 101 Introduction to Information Technology ... 3
IT 103 Introduction to Computing ..................... 3
or the following three, 1-credit courses:
IT 203 Electronic Documents and Presentation ........................................ 1
IT 204 Spreadsheets and Visualization of Information .................................... 1
IT 205 Database Management and Security .......... 1
IT 108 Programming Fundamentals .................... 3

Two of the following courses:
IT 212 How Computers Work ......................... 3
IT 213 Multimedia and Computer Graphics ....... 3
IT 214 Database Fundamentals ........................ 3
IT 250 Introductory Statistics I ........................ 3
Technical Focus Area ............................................. 6

Minor in Information Technology
The minor is designed primarily for those non-IT&E majors who desire 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 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 three courses (9 credits). Elective courses selected for the technical focus area must be approved by an IT advisor.

Core Courses .......................................................... 9
IT 101 Introduction to Information Technology ... 3
IT 103 Introduction to Computing ..................... 3
or the following three, 1-credit courses:
IT 203 Electronic Documents and Presentation ........................................ 1
IT 204 Spreadsheets and Visualization of Information .................................... 1
IT 205 Database Management and Security .......... 1
IT 108 Programming Fundamentals .................... 3
Technical Focus Area ............................................. 6

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 IT certificate requires a minimum of 24 credits, including 15 credits of core courses. Beyond these requirements, the student is free to define a technical focus area. The focus area must be composed of at least three courses (9 credits). Elective courses selected for the technical focus area must be approved by an IT advisor.

Core Courses .......................................................... 9
IT 101 Introduction to Information Technology ... 3
IT 103 Introduction to Computing ..................... 3
or the following three, 1-credit courses:
IT 203 Electronic Documents and Presentation ........................................ 1
IT 204 Spreadsheets and Visualization of Information .................................... 1
IT 205 Database Management and Security .......... 1
IT 108 Programming Fundamentals .................... 3
Technical Focus Area ............................................. 6

Minor in Information Technology
The minor is designed primarily for those non-IT&E majors who desire 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 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 three courses (9 credits). Elective courses selected for the technical focus area must be approved by an IT advisor.

Core Courses .......................................................... 9
IT 101 Introduction to Information Technology ... 3
IT 103 Introduction to Computing ..................... 3
or the following three, 1-credit courses:
IT 203 Electronic Documents and Presentation ........................................ 1
IT 204 Spreadsheets and Visualization of Information .................................... 1
IT 205 Database Management and Security .......... 1
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 (chair), Bronzini, Houck
Associate professor: deMonsabert
Assistant professors: Flannery, Venigalla
Adjunct professors: Binning, Chase, Freas, Gagne, Goode, Harrop-Williams, Liner, Matusik, Shacochis, Spencer, Ward, Zobel

Introduction
The Civil, Environmental, and Infrastructure Engineering (CEIE) Department administers two degree programs: the BS and MS in civil and infrastructure engineering. These degree programs complement the study of civil and environmental engineering with advances in information technology, 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; telephone, 410–347–7700.

Civil and infrastructure engineering is the study of land, transportation, water, structural, energy, and telecommunications systems from a civil engineering perspective and within a complex 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, and cost-effective infrastructure systems are provided. 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 includes 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 public 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, 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 following semester’s registration. Each student is expected to complete an approved plan of study, which constitutes a learning plan for the degree program.

A variety of classes will count for credit as CEIE technical electives. All electives must be selected with the advice and approval of the academic advisor. Paid internships during the summer (CEIE 197, 198, and 199; 297, 298, and 299; and 397, 398, and 399) may also be used as technical electives.

Writing-Intensive Requirement
The university’s writing-intensive requirement for civil and infrastructure engineering majors is satisfied by successful completion of CEIE 360.

Sample Schedule

<table>
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<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>MATH 113 Analytic Geometry and Calculus I</td>
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<tr>
<td>ENGR 107 Introduction to Engineering</td>
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<td>ENGL 101 Composition</td>
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<td>CHEM 251 General Chemistry for Engineers</td>
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<tr>
<td>ENGR 183 Engineering Computer Graphics</td>
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<tr>
<td>MATH 114 Analytic Geometry and Calculus II</td>
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<td>PHYS 160 University Physics I</td>
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<tr>
<td>CS 112 Computer Science I</td>
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</tr>
<tr>
<td>ECON 103 Microeconomic Principles</td>
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<tbody>
<tr>
<td>MATH 213 Analytic Geometry and Calculus III</td>
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<tr>
<td>PHYS 260 University Physics II</td>
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<td>PHYS 261 University Physics II Laboratory</td>
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<td>General education literature course</td>
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<tbody>
<tr>
<td>CEIE 290 Engineering Computation and Design</td>
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<td>MATH 214 Elementary Differential Equations</td>
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<tr>
<td>ENGR 210 Statics and Dynamics</td>
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<tr>
<td>STAT 344 Probability and Statistics for Engineers and Scientists I</td>
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<th>Fifth Semester</th>
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<tr>
<td>CEIE 301 Engineering and Economic Models in Civil Engineering</td>
<td>3</td>
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<tr>
<td>ENGL 302 Advanced Composition</td>
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<tr>
<td>ENGR 310 Mechanics of Materials</td>
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<tr>
<td>HIST 100 History of Western civilization general education course</td>
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<td>CEIE 305 Soil Mechanics</td>
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<tr>
<td>CEIE 311 Structural Analysis</td>
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<td>HIST 120 U.S. History general education</td>
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<td>PHYS 266 Introduction to Thermodynamics</td>
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<td>CEIE 360 Introduction to Transportation Engineering</td>
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<td>Global understanding general education course</td>
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<td>CEIE 367 Behavior of Concrete and Steel Structures</td>
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<td>CEIE 400 Civil Engineering Planning and Management</td>
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<td>CEIE 440 Water Supply and Distribution</td>
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<tr>
<td>CEIE 455 Introduction to Environmental Engineering</td>
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<td>CEIE technical elective*</td>
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<table>
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<th>Eighth Semester</th>
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<tr>
<td>CEIE 463 Construction Systems</td>
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<tr>
<td>CEIE 490 Senior Design Project</td>
<td>3</td>
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<tr>
<td>CEIE technical elective*</td>
<td>3</td>
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<tr>
<td>CEIE technical elective*</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
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</tbody>
</table>
* 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 both the requirements for the BS program and the MS program. Students will 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 will 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 will be granted upon completion of the MS requirements.

**GRADUATE PROGRAM**

**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 the 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
- Satisfy the general university requirements for admission
- Have earned a baccalaureate degree in engineering, physical sciences, economics, or other civil and infrastructure engineering-related field

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, the letters of reference, 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 for 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 5 or 6 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:

- Environmental engineering
- Information technology 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 who 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 to 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 to 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 credits)
• A minimum of two of the following specific sector courses:
  CEIE 681 Security of Structural Systems (3 credits)
  CEIE 683 Water and Wastewater Systems Security (3 credits)
  CEIE 686 Transportation System Security and Safety (3 credits)
• The remaining elective credits must be 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)
  PUPB 710 Pricing, Management, and Privatization of Public Assets
  PUAD 640 Public Policy Process
  PUAD 661 Public Budgeting Systems

Selection of courses is subject to the 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 who are currently in such graduate programs. Students may pursue the certificate concurrently with any of the graduate programs in IT&E; however the certificate is not awarded until all requirements have been completed. Certificate candidates must complete at least 15 credits with an average degree 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/SYST 664; SYST 781/STAT 781; STAT 652, 700, and 701; OR 671/SYST 672; 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, Menasce, Pullen, Rine, Sood (chair), Tecuci, Wechsler
Associate professors: Carver, J. Chen, Duric, Richards, Setia, Simon, Wang, White
Assistant professors: Aydin, S. Chen, Huang, Kosecka, Luke
Instructors: Maddox, Maney, McJunkin, Nordstrom
Adjunct professors: Baldo, Curts, Evans, Geldon, Hwang, Jamison, Kaznachey, Maddox, Mannucci, Nelson, Obaidi, Otten, Smeltzer, Snow, 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

Mason’s bachelor’s degree program in computer science is accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md. 21202-4012.

Applied Computer Science, BS*
*subject to SCHEV approval

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 sub-discipline.

In addition to university general education requirements, including humanities, social sciences 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 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 will include either STAT 344 Statistics and Probability, or a course in statistics relevant to the concentration. Current concentrations are biology and geography.

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, and 300; STAT 244
- Core: GEOG 310, 311, 411, 412, 416 and 463
- One GEOG course numbered above 300

Sample Schedule (Biology Concentration)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
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<tbody>
<tr>
<td>First</td>
<td>CS 112 Computer Science I .................................................. 4</td>
</tr>
<tr>
<td></td>
<td>MATH 113 Analytic Geometry and Calculus I .................................. 4</td>
</tr>
<tr>
<td></td>
<td>ENGL 101 Composition .................................................................. 3</td>
</tr>
<tr>
<td></td>
<td>BIOL 213 Cell Structure and Function ........................................ 4</td>
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<tr>
<td>Second</td>
<td>CS 211 Computer Science II .................................................... 3</td>
</tr>
<tr>
<td></td>
<td>MATH 114 Analytic Geometry and Calculus II .................................. 4</td>
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<tr>
<td></td>
<td>BIOL 303 Animal Biology ................................................................ 4</td>
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<tr>
<td></td>
<td>CS 105 Computer Ethics and Society ........................................... 1</td>
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<td>COMM 100 Oral Communications .................................................. 3</td>
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<td>Third</td>
<td>CS 310 Computer Science III .................................................... 3</td>
</tr>
<tr>
<td></td>
<td>ECE 303 Digital Logic .................................................................. 4</td>
</tr>
<tr>
<td></td>
<td>MATH 125 Discrete Mathematics .................................................. 3</td>
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<tr>
<td></td>
<td>CHEM 211 General Chemistry I .................................................. 4</td>
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<tr>
<td>Fourth</td>
<td>CS 330 Formal Methods and Models .............................................. 3</td>
</tr>
<tr>
<td></td>
<td>BIOL 304 Plant Biology .................................................................. 4</td>
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<tr>
<td></td>
<td>CHEM 212 General Chemistry II .................................................. 4</td>
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<td></td>
<td>Western Civics Elective ............................................................ 3</td>
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<tr>
<td>Fifth</td>
<td>CS 365 Computer Systems Architecture ......................................... 3</td>
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<td>CS 367 Computer Systems and Programming ..................................... 3</td>
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<td></td>
<td>MATH 203 Matrix Algebra ............................................................ 3</td>
</tr>
<tr>
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<td>BIOL 305/6 Biology of Micro-Organisms ........................................ 4</td>
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<td>Literature Elective .................................................................... 3</td>
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<tr>
<td>Sixth</td>
<td>CS 421 Introduction to Software Engineering .................................. 3</td>
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<td>BIOL 311 Genetics ........................................................................ 4</td>
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<td>BIOL 482 Introduction to Molecular Biology .................................. 3</td>
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<td>U.S. History elective ............................................................... 3</td>
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<td></td>
<td>ENGL 302 Intermediate Composition ............................................ 3</td>
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<tr>
<td>Seventh</td>
<td>BIOL 385 Biotechnology &amp; Genetic Engineering .................................. 3</td>
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<tr>
<td></td>
<td>BIOL 312 Biostatistics (or STAT 344) .......................................... 3</td>
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<td>Global Understanding .............................................................. 3</td>
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<td></td>
<td>Social Science .......................................................................... 3</td>
</tr>
<tr>
<td></td>
<td>CS 483 Data Structures and Analysis of Algorithms.......................... 3</td>
</tr>
</tbody>
</table>

*subject to SCHEV approval
Sample Schedule (Geography Concentration)

First semester
- CS 112 Computer Science I ............... 4
- MATH 113 Analytic Geometry and Calculus I ........................................ 4
- ENGL 101 Composition .......................... 3
- GEOG 102 Physical Geography .................. 3

Second semester
- CS 211 Computer Science II .................. 3
- MATH 114 Analytic Geometry and Calculus II ........................................ 4
- GEOG 103 Human Geography ................. 3
- CS 112 Computer Science I ....................... 4
- ENGL 101 Composition .......................... 3
- GEOG 102 Physical Geography .................. 3

Third semester
- CS 310 Computer Science III .................... 3
- ECE 303 Digital Logic .................................. 4
- MATH 125 Discrete Mathematics ............... 3
- COMM 100 Oral Communications ............... 3
- GEOG 101 Major World Regions ............... 3

Fourth semester
- CS 330 Formal Methods and Models .......... 3
- GEOG 311 Introduction to Geographic Information Systems .................. 3
- GEOG 110 Maps and Mapping ..................... 3
- U.S. History Elective ............................... 3
- MATH 203 Matrix Algebra .......................... 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 ........................................... 4

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 Elective ..................................... 3

Seventh semester
- GEOG 411 Advanced Digital Cartography ........................................ 3
- GEOG Senior ............................................. 3
- CS 483 Data Structures and Analysis of Algorithms .................................. 3
- ENGL 302 Advanced Composition ............... 3
- Elective .................................................. 3

Eighth semester
- BIOL 580 Computer Applications in the Life Sciences .................................. 3
- CS Senior ................................................. 3
- BIOL Senior .............................................. 3
- Synthesis .................................................. 3
- Elective .................................................. 3

Sample Schedule

First Semester
- MATH 113 Analytic Geometry and Calculus I ........................................ 4
- CS 112 Computer Science I ........................................ 4
- ENGL 101 Composition ............................... 3
- HIST 100 History of Western Civilization ........................................ 3

Total ........................................................................ 14
### Degree Requirements

**Change of Major**

Students requesting a change of major to computer science must have a GPA of at least 2.75 and have successfully completed two of these courses: 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 the student for credit in CS 211. A score of 4 on the International Baccalaureate (IB) program computer science exam qualifies the student for credit in CS 112, and a score of 5 or more qualifies the student 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 421 and 306. Faculty members provide feedback on students’ expository writing.

### Grades

A student 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 an unsatisfactory grade toward departmental requirements.

### Cooperative Education

A computer science major may participate in the Mason cooperative education program or in a work-study program in the Washington, D.C., metropolitan area.

## 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 the BS program 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 the criteria for admission to the MS program.

### Degree Requirements

- Students must complete 144 credits that satisfy requirements for the BS program as well as those for the MS program, with 6 credits overlap.
- Students register for 6 credits of CS 500-level core 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 core courses in their undergraduate programs. In such cases, they must satisfy core requirements for the MS by taking...
more advanced courses from the same concentration. For example, if CS 580 and 583 are the two overlapping core courses, and CS 540 is taken as part of the BS program, then the student needs to take a more advanced course from the concentration (systems) corresponding to CS 540 to satisfy the core 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 MS requirements, a master’s degree is granted.

■ **BS in Computer Science/Accelerated MS in Related Fields**
The BS program in computer science coordinates with the MS programs in information systems, software engineering and telecommunications. For information on these accelerated programs, please refer to the MS program in the appropriate section of this catalog.

◆ **Minor in Computer Science**
The minor requires the completion of 17 credits. Required courses are CS 105 or 305, 112, 211, and 310. Two additional computer science courses should be selected from the following: CS 265, 330, 332, 363, 365, 421, 450, 455, 471, 480, and 483. Students should pay careful attention to prerequisites when selecting courses.

◆ **Computer Science, Computer Engineering Double Major**
Computer science majors can earn a double major in computer science and computer engineering if they complete an additional 17 credits of courses beyond the 120 credits required for the computer science degree. The additional 17 credits must be part of an approved plan of study. For more information, go to ite.gmu.edu.

◆ **Post Bachelor in Computer Science Certificate**
This certificate targets students who are either 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 CS 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.

**Degree 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, 471, and 480
  - CS383; 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.

■ **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 core areas of algorithms, artificial intelligence, image processing and graphics, software engineering, and computer systems and networks. In addition, students have the opportunity to receive in-depth understanding in current technologies associated with adaptive systems, agent systems, distributed systems, embedded computing, graphics, image analysis, robotics, and web technologies. Certificates in computer networking, biometrics, and intelligent agents are available. 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 CS 310 Computer Science III, CS 330 Formal Methods and Models, CS 265 Assembly Language Programming, and CS 365 Computer Systems Architecture. Students also must have completed one year of mathematics beyond first-year calculus, including 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 the general university requirements, completion of this program requires 30 credits of graduate courses, as follows:
- Core Courses (12 credits):
  - CS 540 Language Processors
  - CS 571 Operating Systems
Certificate in Computer Networking

When brought together to form computer networks, the technologies of computing and communications exhibit a synergy that is revolutionizing our world. In-depth knowledge of the new discipline of computer networking increasingly is in demand as a basis for design and deployment of new information systems ranging from aspects of the global Internet to distributed systems in a variety of application domains. The courses for this certificate have been selected to provide a solid basis for understanding the core software and communications technologies upon which today’s networks are based, and how they may be combined to create effective computer networks. Courses included cover both mainstream and leading-edge technology considerations, ensuring that students are prepared to function at the professional level in this fast-moving and technologically challenging field. Course work toward the graduate certificate can be used for credit toward the MS in computer science with a specialization in networks. However, the certificate also may be pursued concurrently with any of the graduate degree programs in IT&E.

Admission Requirements

The certificate program in computer networking is open to all students who are eligible for entrance into the master’s degree program at Mason. In-depth knowledge of the new discipline of computer networking increasingly is in demand as a basis for design and deployment of new information systems ranging from aspects of the global Internet to distributed systems in a variety of application domains. The courses for this certificate have been selected to provide a solid basis for understanding the core software and communications technologies upon which today’s networks are based, and how they may be combined to create effective computer networks. Courses included cover both mainstream and leading-edge technology considerations, ensuring that students are prepared to function at the professional level in this fast-moving and technologically challenging field. Course work toward the graduate certificate can be used for credit toward the MS in computer science with a specialization in networks. However, the certificate also may be pursued concurrently with any of the graduate degree programs in IT&E.

Certificate Requirements

To obtain the certificate, candidates must complete the following courses, for a total of 15 credits:

- Required of all students (6 credits):
  - CS 580 Introduction to Artificial Intelligence
  - CS 583 Analysis of Algorithms
- Additional 18 credits of computer science or computer science-related courses. At least 15 of these credits must qualify as “advanced” by having suitable graduate courses as prerequisites. At least 12 of these credits must be in courses specifically designated CS. The courses must include entries in three different concentration areas. Courses listed under more than one concentration count only once for satisfying this requirement. (The Department of Computer Science maintains a list of computer science-related courses, indicating which are at an advanced level. These are available on the web and in the department office, as are lists of courses in the concentration areas.)
- Project/Thesis (optional): 3 to 6 of the advanced credits may be replaced by a project (3 credits of CS 798) or a thesis (3 to 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. Theses must meet relevant university requirements.

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 recognition or authentication.

Admission Requirements

The certificate 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

The certificate reflects depth rather than breadth in CS. It requires completion of 15 credits, and consists of two required courses and three additional courses. Project (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.

- Required Courses (6 credits):
  - CS 667 Biometrics
  - CS 844/IT 844 Pattern Recognition
- Three from the following list (9 credits):
  - CS 580 Introduction to Artificial Intelligence
  - CS 652 Computer Graphics
  - CS 673 Multimedia Computing and Systems
  - CS 682 Computer Vision
  - CS 686 Image Processing
  - BINF 739 Signal and Image Processing for Bioinformatics
  - CS 750 Theory and Applications of Data Mining
  - CS 777 Human-Computer Interaction
  - CS 780/IT 835 Computational Vision

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, and intelligent tutoring systems. Capturing, using, preserving, transferring, and sharing knowledge is of critical importance to any organization as the 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 both 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. Course work toward this certificate can be used for credit toward the MS or PhD in computer science or information technology.
However, the certificate also may be pursued concurrently with any of the graduate degree programs in IT&E.

**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 Principles of Machine Learning and Inference
  - CS 910 Advanced Topics in Artificial Intelligence

One of the four courses can be taken from another MS or PhD program in IT&E with advisor approval, provided that it belongs to the certificate area.

### Computer Science, PhD

Because research in computer science at Mason is distributed across the Department of Computer Science and the Department of Information and Software Engineering, the PhD program is coordinated by a committee drawn from these two departments. The program is designed for breadth, depth, flexibility, and interaction. In recognition of the diverse forms of preparation and experience that students may possess, the foundational breadth requirement takes the form of a qualifying exam rather than specified course work. Standard courses are available to help prepare for these exams, but not all students need all the courses. In the next phase, individuals pursue unique combinations of courses, including individual study, selected with the guidance of their advisory committee. This advanced work leads to a comprehensive exam, and culminates in a dissertation. The general doctoral requirements of Mason apply to this program.

**Admission Requirements**
Applicants are evaluated on an individual basis by the PhD Admissions Committee. A master of science degree with a very strong background in computer science or a closely related field, such as software engineering or information systems, is required. The admission process involves submitting the application for admission, all postsecondary transcripts, GRE scores in computer science, three letters of reference, a resume, and a short statement of career goals and aspirations. Application forms are available online at [www.admissions.gmu.edu](http://www.admissions.gmu.edu).

**Qualifying Exam**
Students take a written qualifying exam, given twice a year, in the fall and spring semesters. This must be done before continuing beyond 36 credits. Students must choose four areas in which to be examined, one of which must be algorithms and theory. The other three are chosen from among the following: language processing and formal models, artificial intelligence, computer systems, software engineering, and databases and information engineering. The exams are pass/fail. To qualify, a student must pass all four exams. A student who passes three of four at the first attempt is permitted to retake the one failed exam. A student who passes fewer than three exam must retake the entire set of exams. Any retaking must occur within a year of the original exam. Failure after two attempts is grounds for dismissal from the program.

**Course Requirements**
In addition to courses taken to prepare for the qualifying exam, students must take at least eight courses, including two computer science courses at the 600 level or above; CS 700 Quantitative Methods and Experimental Design in Computer Science; and five other courses in computer science at the 700 level or above, chosen from a list maintained by the program.

**Planning and Advising**
Each student forms a faculty advisory committee to advise in establishing and carrying out a plan of study that meets the above requirements, and to help prepare the student properly for the dissertation phase. The members and chair of this advising committee must qualify as a dissertation committee, as specified below. Usually some or all members will later belong to the student’s dissertation committee, so these individuals will be able to ensure relevance of the plan of study to an emerging dissertation topic.

**Seminar**
Each PhD student is required to attend a seminar series in the first year, at which faculty members present their own computer science research. The purpose of the seminar is to provide common experiences for new students, familiarize new students with the computer science research done at Mason, and help students choose a dissertation director and committee.

**Comprehensive Exam**
Each student must take a combined written and oral comprehensive exam after completion of all course requirements. The purpose of this exam is to evaluate the student’s knowledge and ability to complete a PhD dissertation. The student must pass both the written and oral parts. Each part can be retaken no more than once if it is failed.

**Dissertation Committee Selection**
The student forms a dissertation supervisory committee consisting of four or five appropriately qualified individuals, three of whom must be tenured or tenure-track faculty members in the Computer Science Department or Information and Software Engineering Department. Committee membership must transcend a single department. It is recommended that the committee include a member outside the two departments. The chair of the supervisory committee, who is also the dissertation director, must be tenured or tenure-track in IT&E. The committee must be approved by the chair of the Computer Science Department and the associate dean for graduate studies of IT&E.
Dissertation Proposal Defense
Each student prepares a written dissertation proposal, which is presented to the supervisory committee. The student may enroll in CS 998 Doctoral Dissertation Proposal to complete this effort. The committee assesses the proposal and assists the student in fulfilling the responsibility to have a clear topic with the potential to make a significant contribution to the field, along with a clear methodology. The committee also assesses whether the student has the intellectual background and resources to have a good chance of completing a successful dissertation in a timely manner. After successfully completing this requirement, the student is formally advanced to candidacy for the PhD.

Dissertation and Defense
The student must complete a minimum of 24 credits from CS 990, 998, and 999, with a minimum of 12 credits of CS 999. The work must represent an achievement in research; be a significant contribution to its field; and deemed publishable in refereed journals or conferences. The document must meet format guidelines specified by the Guide for Preparing Graduate Theses, Dissertations, and Projects.

The student prepares to defend the dissertation in consultation with the dissertation director. Usually, there is a predefense with only the committee members present. There must be a public defense at a date that is agreed upon by all members of the committee and preceded by at least two weeks of public announcement by the program. The dissertation must be made available to the committee at least two weeks in advance. If the candidate successfully defends the dissertation, the committee recommends that the final form of the dissertation be completed, and that the graduate faculty of Mason accept the candidate for the PhD.

Electrical and Computer Engineering

Phone: 703-993-1559
Web: ece.gmu.edu

Faculty
Professors: Allnutt, Black, Cook, Ephraim, Gertler, Griffths, Ioannou, Jabbari, Levis, Manitius (chair), Mulpuri, Tabak, Van Trees
Associate professors: Baraniecki, Beale, Berry, Ceperley, Chang, Gaj, Hintz, Kostic, Pachowicz, Paris, W. Sutton
Assistant professors: Mark, Wage
Adjunct professors: Beatty, Fuller, Gorman, Herman, LaPean, Lyons, Martin, Storey, Wasson

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 is to provide a quality education for electrical engineering and computer engineering students to support the needs of Virginia and the nation. The objectives are to provide students with the following:
- Fundamental knowledge and methodologies of electrical or computer engineering, including the opportunity to learn appropriate experimental and computational tools essential for a successful career
- Awareness of and skills in lifelong learning and self-education, and preparation for graduate studies in electrical or computer engineering or related areas
- Skills related to teamwork, technical writing, and oral communication
- Appreciation of engineering’s impact on society and the professional responsibilities of engineers
- Opportunities to acquire an understanding of the engineering profession, and to observe the use of cutting-edge technologies and advanced systems through direct interaction with industry through internships and cooperative education experiences

■ Computer Engineering, BS
The field of computer engineering can be described as a blend of electrical engineering and computer science. It is an amalgam of the computer hardware orientation of an electrical engineering program, and the operating systems and languages of a computer science program. Computer engineers are involved in research, development, design, production, and operation of a wide variety of digital systems, from integrated circuits to computer systems and large-scale computer networks. Reflecting the industry trend to integrate hardware and software development, the computer engineering program is built around software, running on advanced hardware, 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 hardware 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 (ABET), 111 Market Place, Suite 1050, Baltimore, Md., 21202-4012; telephone 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 to strongly software oriented. 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 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.

Degree Requirements
All computer engineering students are required 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, 442, 445, 447, 448, 465, 491
- 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)
- U.S. History: HIST 120 (3 credits)
- Global understanding general education course (3 credits)
- Mathematics: MATH 113, 114, 125, 203, 213, 214;
  STAT 346
- Physics: PHYS 160, 260, 261, 262
- Synthesis general education course: ECE 447

Note: General education courses should be selected from the department's list of approved courses. 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.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
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<td>MATH 113 Analytic Geometry and Calculus I ........................................</td>
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<tr>
<td>ENGR 107 Engineering Fundamentals .....................................................</td>
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</tr>
<tr>
<td>CS 112 Computer Science I .................................................................</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 101 Composition ...........................................................................</td>
<td>3</td>
</tr>
<tr>
<td>ECON 103 Contemporary Microeconomics Principles ...................................</td>
<td>3</td>
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<tr>
<td>Second Semester</td>
<td></td>
</tr>
<tr>
<td>MATH 114 Analytic Geometry and Calculus II .........................................</td>
<td>4</td>
</tr>
<tr>
<td>MATH 125 Discrete Mathematics I .........................................................</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 160 University Physics I ..............................................................</td>
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<td>Total ............................................................... 14</td>
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<tr>
<td>Third Semester</td>
<td></td>
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<tr>
<td>MATH 213 Analytic Geometry and Calculus III .........................................</td>
<td>3</td>
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<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 Electrical Engineering ......................................</td>
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</tr>
<tr>
<td>Literature general education course .................................................</td>
<td>3</td>
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<tr>
<td>Total ............................................................... 16</td>
<td></td>
</tr>
<tr>
<td>Fourth Semester</td>
<td></td>
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<tr>
<td>MATH 214 Elementary Differential Equations ..........................................</td>
<td>3</td>
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<tr>
<td>ECE 280 Electric Circuit Analysis .......................................................</td>
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<tr>
<td>ECE 220 Signals and Systems I ...............................................................</td>
<td>3</td>
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<tr>
<td>ECE 331 Digital System Design .............................................................</td>
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<tr>
<td>ECE 332 Digital Electronics and Logic Design Lab ...................................</td>
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<td>Total ............................................................... 15</td>
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<tr>
<td>Fifth Semester</td>
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<tr>
<td>ECE 333 Linear Electronics I ..................................................................</td>
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<tr>
<td>ECE 334 Linear Electronics I Lab ..........................................................</td>
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<tr>
<td>ECE 445 Computer Organization .............................................................</td>
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<tr>
<td>HIST 120 U.S. History general education ..............................................</td>
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<tr>
<td>STAT 346 Probability for Engineers .......................................................</td>
<td>3</td>
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<tr>
<td>ENGL 302 Advanced Computation (for natural sciences) ..........................</td>
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<tr>
<td>Total ............................................................... 16</td>
<td></td>
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<tr>
<td>Sixth Semester</td>
<td></td>
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<tr>
<td>CS 367 Computer Systems and Programming ............................................</td>
<td>3</td>
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<tr>
<td>ECE 465 Computer Networking Protocols .................................................</td>
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<tr>
<td>CS 471 Operating Systems .......................................................................</td>
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</tr>
<tr>
<td>ECE 442 Digital Computer Design and Interfacing ..................................</td>
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<td>COMM 100 Oral Communications ............................................................</td>
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<td>Total ............................................................... 15</td>
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<tr>
<td>Seventh Semester</td>
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<tr>
<td>ECE 447 Single-Chip Microcomputers ....................................................</td>
<td>4</td>
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<tr>
<td>HIST 100 History of Western Civilization general education ....................</td>
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<tr>
<td>Technical elective ...............................................................................</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 262 University Physics III ............................................................</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding general education course ....................................</td>
<td>3</td>
</tr>
<tr>
<td>Total ............................................................... 16</td>
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<tr>
<td>Eighth Semester</td>
<td></td>
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<tr>
<td>ECE 448 FPGA and ASIC Design with VHDL ..............................................</td>
<td>4</td>
</tr>
<tr>
<td>Technical elective ...............................................................................</td>
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</tr>
<tr>
<td>Technical elective ...............................................................................</td>
<td>3</td>
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<tr>
<td>ECE 491 Engineering Senior Seminar ..................................................</td>
<td>1</td>
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<tr>
<td>Total ............................................................... 12</td>
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</tbody>
</table>
Change of Major
Students who want to change their majors to computer engineering must have at least a 2.75 GPA in all math, physics, engineering, and computer science courses, and should have successfully completed MATH 114.

Writing-Intensive Requirement
Mason’s writing-intensive requirement is satisfied by completion of ECE 445 and 447, in which various aspects of project documentation and reports are prepared and critiqued. Faculty provide feedback on student writing. Drafts and revisions are required.

Electrical Engineering, BS
Electrical engineering is a major field of modern technology. Electrical engineers are involved in research, development, design, production, and operation of a wide variety of devices and systems, from integrated circuits and microwave and laser devices, to communication systems, control systems, radar, robots, large telecommunication networks, and power networks.

The bachelor’s program in electrical engineering at Mason is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md., 21202-4012; telephone, 410-347-7700. The electrical engineering program is staffed by 25 full-time professors, including five fellows of IEEE or other professional societies. The curriculum provides a strong background in the fundamentals of electrical engineering as well as senior-level courses in the important areas of electronics, networks, communications and signal processing, computer engineering, and controls and robotics. Further, the curriculum includes 9 credits of senior technical electives, 2 credits of advanced engineering labs, and 3 credits of Senior Advanced Design Project, which may be used for further concentration in one of these areas.

Career opportunities exist in engineering research and development, system design, system integration, engineering 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 upon graduation.

Degree Requirements
All electrical engineering students are required 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 at the Electrical and Computer Engineering 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, 367
- Advanced ECE labs (2 credits)
- ECE technical electives (9 credits)
- Engineering: ENGR 107
- English: ENGL 101, 302; COMM 100
- Literature (3 credits)
- Economics: ECON 103
- Western civilization: HIST 100 course (3 credits)
- U.S. history course: HIST 120 (3 credits)
- Mathematics: MATH 113, 114, 203, 213, 214; STAT 346
- Physics: PHYS 160, 260, 261, 262, 263
- Synthesis general education course: ECE 492/493

Note: General education courses should be selected from the department’s list of approved courses. ECE technical electives should be selected from the department’s list of approved courses. The required design content must be satisfied by these technical electives.

Sample Schedule
The following is a sample schedule that an undergraduate electrical engineering major would follow to obtain a bachelor’s degree.

First Semester
- MATH 113 Analytic Geometry and Calculus I ........................................ 4
- ENGR 107 Introduction to Engineering ........................................ 2
- CS 112 Computer Science I ................................................ 4
- ENGL 101 Composition .......................................................... 3
- ECON 103 Contemporary ...................................................... 3
- Microeconomic Principles ..................................................... 3
Total ........................................................................... 16

Second Semester
- MATH 114 Analytic Geometry and Calculus II ................................. 4
- ECE 101 Introduction to Information Technology .............................. 3
- PHYS 160 University Physics I .................................................. 4
- Global understanding general education course ............................ 3
Total ........................................................................... 14

Third Semester
- MATH 213 Analytic Geometry and Calculus III .............................. 3
- MATH 203 Matrix Algebra ....................................................... 3
- PHYS 260 University Physics II ................................................. 3

Total ........................................................................... 13
PHYS 261 University Physics II Laboratory ........................................ 1  
ECE 201 Introduction to Electrical Engineering ........................................ 3  
Literature general education course ...................................................... 3  
**Total** .................................................................................................. 16

**Fourth Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<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>
</tbody>
</table>
| **Total** .......................................................................................... 15

**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>
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<tr>
<td>ECE 331 Digital System Design ....................................................</td>
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<td>ECE 332 Digital Electronics and Logic Design Lab ........................................</td>
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<tr>
<td>ECE 333 Linear Electronics I .....................................................</td>
<td>3</td>
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<tr>
<td>ECE 334 Linear Electronics I Lab ..................................................</td>
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<tr>
<td>STAT 346 Probability for Engineers ..............................................</td>
<td>3</td>
</tr>
<tr>
<td>HIST 120 U.S. History general education ........................................</td>
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| **Total** .......................................................................................... 17

**Sixth Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<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>
<td>3</td>
</tr>
<tr>
<td>COMM 100 Oral Communication .....................................................</td>
<td>3</td>
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</tbody>
</table>
| **Total** .......................................................................................... 15

**Seventh Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 367 Computer Systems and Programming ......................................</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 302 Advanced Composition (for natural sciences) ......................</td>
<td>3</td>
</tr>
<tr>
<td>ECE 305 Electromagnetic Theory ..................................................</td>
<td>3</td>
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<tr>
<td>Advanced engineering lab ............................................................</td>
<td>1</td>
</tr>
<tr>
<td>Technical elective .........................................................................</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>
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</tbody>
</table>
| **Total** .......................................................................................... 15

**Eighth Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ECE 493 Senior Advanced Design Project II .....................................</td>
<td>2</td>
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<tr>
<td>Advanced engineering lab ............................................................</td>
<td>1</td>
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<tr>
<td>Technical elective .........................................................................</td>
<td>3</td>
</tr>
<tr>
<td>HIST 100 History of Western Civilization (general education) ...........</td>
<td>3</td>
</tr>
</tbody>
</table>
| **Total** .......................................................................................... 12

**Change of Major**

Students who want to change their major to electrical engineering must have at least a 2.75 GPA in all math, physics, engineering, and computer science courses, and should have successfully completed MATH 114.

**Writing-Intensive Requirement**

Mason’s writing-intensive requirement is satisfied by completing ECE 492 and 493 Senior Advanced Design Project I and II. Faculty provide feedback on student writing. Drafts and revisions are required.

**Double Major in Computer Engineering and Computer Science**

Computer engineering majors can earn a double major in computer engineering and computer science if they complete an additional 20 credits of courses according to an approved plan of study. Details are available in the departmental brochures or at the IT&E web site, ite.gmu.edu.

**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 in computer engineering in five years, with 144 credit hours.

**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 the criteria for admission to the MS in electrical engineering or MS in computer engineering program. Application is made using the accelerated graduate program application forms, and all usual requirements must be met. The accelerated program application form specifies the overlapping courses and details the 3.50 undergraduate GPA.

**Degree Requirements**

Students must complete 144 credits that satisfy all the requirements for both the BS and MS degrees, with 6 credits overlap. Students take 6 credits of 500-level courses either as part of their technical electives, or as substitutes for required courses as part of their 120-credit undergraduate program. The specific courses that may be taken and applied to the accelerated program will be specified by ECE. Students may take additional graduate-level courses as part of their BS technical electives, with advisor approval. These additional graduate-level courses will not count toward the MS degree. Students admitted to the accelerated program must maintain an overall GPA of at least 3.50 during the entire BS/MS program, and must present a GPA of at least 3.50 for the 24 credit hours of graduate work submitted for the MS degree.

**Degree Conferral**

Students may apply to have the BS (in electrical engineering or computer engineering) conferred during the semester in which they expect to complete the BS requirements. At the completion of the MS requirements, the MS degree will be awarded.
GRADUATE PROGRAMS

Graduate programs leading to the 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 IT&E 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 the vibrant areas of 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 information technology. 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, must remove all undergraduate deficiencies by completing the corresponding courses with grades of B or better, and must 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 from 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 score of 575 (paper-based) or 230 (computer-based) on the TOEFL. A minimum score of 600 (paper-based) or 250 (computer-based) 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 the 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.

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 Intro 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 between the computer science and electrical engineering disciplines,
as it involves knowledge of both 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:
  - ECE 548 Sequential Machine Theory
  - CS 571 Operating Systems
- Four required courses from one concentration area
- 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 (800–900 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.

A nonstandard emphasis may be created when appropriate, with the approval of the computer engineering graduate program coordinator. This emphasis must include components of both hardware and software development, and the corresponding plan of study must be composed of courses from both the ECE and Computer Science Departments.

Common Degree Requirements for MS in Computer Engineering, 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 a plan of study (approved by the academic advisor) to the graduate coordinator’s office. This plan should be kept up to date by regular consultation with the academic advisor. A final, signed version of this plan of study 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, 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 who contemplate subsequent enrollment in a PhD program. The thesis involves a research effort, which is conducted under the guidance of a faculty advisor. In some cases, permission may be granted to complete a portion of the work at the student’s place of employment. The final written thesis and oral defense are approved by the student’s advisory committee. For the electrical engineering program, this committee consists of at least three full-time faculty members, including two from the student’s major area and one from outside the area. For the computer engineering program, this committee includes faculty members from the ECE and Computer Science Departments, including at least one 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, 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 primary purpose of the certificate 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 all the requirements for the MS degree. The certificate may be pursued concurrently with any of the graduate degree programs in IT&E.

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 upon 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 746 Calculus of Random Signals
- 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 primary purpose of the certificate is to provide a well-defined target for students who want to advance or update their knowledge in this fast-moving field but do not necessarily wish to complete all the requirements for the MS degree. The certificate may be pursued concurrently with any of the graduate degree programs in IT&E.

Admission Requirements
The program is open to all students who hold BS degrees in scientific and engineering disciplines from accredited universities, and hold graduate status (either degree or nondegree) in IT&E.

Certificate Requirements
The certificate is awarded upon 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
  or STAT 544 Applied Probability
- ECE 535 Digital Signal Processing

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 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 665 Fourier Optics and Holography
- ECE 728 Random Processes in Electrical and Computer Engineering II
- ECE 734/IT 830 Detection and Estimation Theory
- ECE 735 Data Compression
  or IT 844 Pattern Recognition
- STAT 652 Statistical Inference
- STAT 658 Time Series Analysis and Forecasting
- STAT 662 Multivariate Statistical Methods
- IT 746 Calculus of Random Signals
- IT 837/ECE 754 Optimum Array Processing I
- IT 838 Signal Processing Algorithms and Architectures
  or ECE 638 Fast Algorithms and Architectures for Digital Signal Processing
- IT 841/ECE 722 Kalman Filtering with Applications
- IT 885/ECE 752 Spectral Estimation
- IT 886/ECE 751 Information Theory
- IT 930 Multichannel Statistical Signal Processing
- IT 934 Advanced Topics in Detection and Estimation
- IT 937/ECE 755 Optimum Array Processing II
- IT 941 System Identification and Adaptive Control
- IT 978/CSI 978 Statistical Analysis of Signals

Certificate in VLSI Design/Manufacturing
The primary purpose of the certificate is to provide a well-targeted graduate continuing education opportunity for people working in Northern Virginia’s semiconductor and
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 IT&E. Students with nonscientific and nonengineering degrees are required to take remedial courses before being admitted into the certificate program.

Certificate Requirements
The certificate is awarded upon 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, a research competency exam and dissertation proposal defense, dissertation research, and a dissertation defense. Students may choose to emphasize in such areas as communications, networking, computer engineering, control and robotics, signal processing, electronics, photonics, and electromagnetics. Mason’s general doctoral requirements apply to this program.

Admissions Requirements
All general Mason and specific IT&E 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 (paper based) or 230 (computer based). A minimum score of 600 (paper based) or 250 (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, upon admission to the program, is assigned a faculty member as advisor. Upon 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 24 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 24 hours.

Of the required 48 credits of course work, at most 6 credits may be at the 500 level and at least 9 credits must be at the 700 level or higher. For courses taken elsewhere, the equivalent levels are to be determined by the PhD advisor, subject to approval by the ECE department chair. Individualized reading courses at any level cannot account for more than 6 credits.

ECE 798 Research Project is primarily an MS course and is not intended to be part of the PhD course work. Research in
the PhD program should be included in ECE 998 and ECE 999 courses.

Students are required to take one graduate course (3 credits) at the 600 level outside the department in a subject considered foundational for their area of specialization. Typical examples are advanced mathematics or statistics courses for those pursuing an emphasis in signal processing or control, physics courses for those desiring an emphasis in electronics, and computer science courses for those pursuing the computer engineering emphasis. Since 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 can not 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. 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. 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. IT 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
Upon 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.

Students prepare 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 the 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. Upon completion of the dissertation, a public defense is administered by the dissertation committee. This may be preceded by a predefense in the presence of the committee members only, at the discretion of the committee. A copy of the dissertation must be placed in the university library four weeks prior to the public defense. Following a successful public defense and completion of the final form of the dissertation, the dissertation committee recommends the candidate for the degree of doctor of philosophy.
in information security and assurance, and a BS in computer science/accelerated MS in software engineering. See below for the descriptions.

**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 both the 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.

**Degrees 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**
  This program is for students interested in immediately continuing their 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 the criteria for admission to the MS in software engineering program.

**Degree Requirements**

Students must complete 144 credits that satisfy both the requirements for the BS in computer science program and those for the MS in software engineering program, with 6 credits overlap.

Students register for two of the following courses (6 credits of 500-level computer science core courses) in place of the corresponding 400-level computer science courses, as part of the undergraduate degree requirements: CS 540, 571, 580, and 583. Students complete all MS in software engineering core courses, and apply the two courses from the above list toward the MS in software engineering elective requirements.

**Degrees 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 software engineering 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 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 security and assurance program.

**Degree Requirements**

Students must complete 144 credits that satisfy both the 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.

**Degrees Conferral**

Students may apply to have the BS in computer science degree conferred during the semester in which they expect to complete BS degree requirements. At the completion of the MS in information security and assurance requirements, a master’s degree will be granted.

- **BSIT/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 BSIT 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 the criteria for admission to the MS program.
Degree Requirements
Students must complete all credits that satisfy both the requirements for the BSIT program and those for the MS program, with 6 credits overlapping for two of INFS 601, 612, or 614.

Degree Conferral
Students may apply to have the BSIT degree conferred during the semester in which they expect to complete the BSIT requirements. At the completion of the MS requirements, a master’s degree is granted.

■ BSIT/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 BSIT 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 program.

Degree Requirements
Students must complete all credits that satisfy both the requirements for the BSIT program and those for the MS program, with 6 credits overlapping with INFS 601 and 612.

Degree Conferral
Students may apply to have the BSIT degree conferred during the semester in which they expect to complete the BSIT requirements. At the completion of the MS requirements, a master’s degree is granted.

■ BSIT/Accelerated MS in Software Engineering
This program is for students interested in immediately continuing on to graduate studies in software engineering.

Admission Requirements
Students in the BSIT 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 program.

Degree Requirements
Students must complete all credits that satisfy both the requirements for the BSIT program and those for the MSSWE program, with 6 credits overlapping for two of INFS 601, 612, or 614.

Degree Conferral
Students may apply to have the BSIT degree conferred during the semester in which they expect to complete the BSIT requirements. At the completion of MS requirements, a master’s degree is granted.

■ Information Systems, MS
This program focuses on the underlying principles and practical issues associated with building computer-based information systems for modern organizations. Information is the lifeblood of every enterprise, both private and public, and the MS program addresses the theoretical and pragmatic aspects of specifying, designing, implementing, and deploying information systems. Students are prepared for professional practice and research in these areas.

The MS program is unique in two respects: It provides a balance between the theoretical and practical aspects of information systems, and it accepts students with baccalaureate degrees in such disciplines as business, arts and sciences, computer science, and engineering. MS students study the core topics of operating systems, database management, computer communication networks and distributed applications, systems analysis and design, and information systems policy and administration. Through elective courses, they acquire knowledge and skills in secure information systems; software engineering; information systems engineering; data engineering; knowledge engineering; information retrieval; decision support systems; user interface design; artificial intelligence; network management; and object-oriented analysis, design, and programming.

Graduates pursue careers in database administration, management and engineering, database application programming, systems analysis and design, information engineering, knowledge engineering, information security engineering, electronic commerce, network design and administration, systems integration, and the management of information systems.

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, computer technology, and business knowledge, the program requires the following five foundation courses or their equivalents:

• Introductory programming course, such as INFS 310
• INFS 501 Discrete and Logical Structures for Information Systems
• INFS 515 Computer Organization
• INFS 590 Program Design and Data Structures
• One course in one of the three following areas: accounting, management, or marketing

When applying to the MS program, applicants 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 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 photographic identification. Detailed information is available on the ISE site knowledge for those foundations of 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 photographic identification. Detailed information is available on the ISE
Electives

Students must select five elective courses. A list of pre-approved qualified electives is available from the department office. However, a student may choose other electives from offerings within IT&E with the consent of the faculty advisor. A thesis option is available; students may elect to complete a thesis for up to 6 elective credits. Only two 500-level electives can be selected.

Software Engineering, MS

This program provides specialized knowledge and experience in developing and modifying large, complex software systems. It emphasizes technical and managerial issues, but primary emphasis is placed on the technical aspects of developing and modifying high quality software systems.

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 both technical and managerial issues, but primary emphasis is placed on the technical aspects of building and modifying high quality software systems.

Successful applicants have a broad variety of undergraduate backgrounds, including computer science, science and mathematics, engineering, liberal arts, and business. Many students are working or have worked in the software industry.

The program is revised on a regular basis to stay abreast of the latest developments in information technology. The program introduced a major revision for fall 2005; recent additions include software construction with the object-oriented Java programming language, requirements analysis with use cases and the Unified Modeling Language (UML), object-oriented software design with the UML, graphical user interface design, software engineering for the web, software project management using the spiral life cycle model and the Capability Maturity Model (CMM), software architecture, design patterns, system testing and testing of object-oriented components, and formal methods using the Object Constraint Language (OCL). All classes are scheduled in the latest developments in information technology. The program introduced a major revision for fall 2005; recent additions include software construction with the object-oriented Java programming language, requirements analysis with use cases and the Unified Modeling Language (UML), object-oriented software design with the UML, graphical user interface design, software engineering for the web, software project management using the spiral life cycle model and the Capability Maturity Model (CMM), software architecture, design patterns, system testing and testing of object-oriented components, and formal methods using the Object Constraint Language (OCL). 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: a modern, block-structured programming language such as Java, Ada, C, C++ or Pascal; 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

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. 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 they have the requisite knowledge for those foundations of 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 photographic 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**

In addition to the general admission requirements of the university, each applicant to the MS program must hold a four-year (120 credits) 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; 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 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 home 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; 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 concentration courses, and 9 credits of elective courses.

- Four core courses (12 credits) are required of all SWE graduates:
  - 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

- Concentration courses (9 credits). Students may choose a concentration by taking three courses from one of the concentrations 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

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 a concentration.

- Elective courses (9 credits). Students may select the remaining courses from the list of approved courses, including other concentrations, available from ISE and at www.ise.gmu.edu. Students may choose other graduate electives with the consent of their faculty advisers. 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 current and future 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 to support the nation’s information infrastructure. The MS degree provides general and technical knowledge and 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 by 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:

- An introductory programming course, such as INFS 310
- INFS 501 Discrete and Logical Structures for Information Systems
- INFS 515 Computer Organization
- INFS 590 Program Design and Data Structures

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 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 with some form of photographic 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 credits) baccalaureate degree from an accredited institution, and have earned a GPA of 3.00 or better in the last 60 credits. Other requirements are as follows:

- Show proof of a satisfactory score on the GMAT or GRE, if required. The applicable test should have been taken within five years of applying for admission. The 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 a B 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 resume.
- 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 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 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:

- INFS 601 Operating Systems Theory and Practice
- INFS 612 Principles and Practices of Communication Networks
To provide the fundamentals of information systems security and assurance, the following two courses are required of all students:
• ISA 662 Information Systems Security
• ISA 666 Internet Security Protocols

Electives
Students may select six courses as electives. At least four are to be chosen from the selection of information security courses (available from the department office) that provide in-depth knowledge in selected areas. The list includes:
ISA 697 Topics in Information Security
ISA 765 Database and Distributed Systems Security
ISA 767 Secure Electronic Commerce
ISA 774 Intrusion Detection
ISA 780 Theoretical Foundations of System Security
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
ECE 646 Cryptography and Computer Network Security
ECE 746 Secure Telecommunication Systems
IT 862 Computer Security Models and Architectures
IT 865 Networks and Distributed Systems Security
IT 962 Advanced Topics in Computer Security

The remaining two courses may be chosen from a list of preapproved qualified electives available from the department office. A student may, however, choose other electives from courses offered within IT&E with the consent of the faculty advisor. A thesis option is available whereby a student may elect to complete a thesis for up to 6 elective credits.

◆ 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 515 Computer Organization
INFS 590 Program Design and Data Structures

Students not enrolled in a graduate degree program at Mason should apply for the database management certificate program through the IT&E 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 course 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 courses from the following:
  INFS 623 Classical and Web Information Retrieval
  INFS 755 Data Warehousing and Mining
  INFS 764 Object-Oriented Database Systems
  INFS 795 Special Topics in Data Mining Applications
  INFS 797 Advanced Topics in Database Management
  ISA 765 Database and Distributed Systems Security
  IT 861 Distributed Database Systems
  IT 864 Scientific and Statistical Databases

For more information, contact 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 IT&E.

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. Additionally, 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.

Each applicant must possess knowledge equivalent to that provided by the following courses:
STAT 344 Probability and Statistics for Engineers and Scientists
CS 310 Computer Science III

Students not enrolled in a graduate degree program at Mason should apply for the data mining certificate program through the Graduate Admissions Office of IT&E. Students enrolled in a graduate degree program at Mason 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. At least one course from three of the following groups must be taken to obtain the certificate:
• Group I
  CS750 Theory and Applications of Data Mining
  IT 844 Pattern Recognition
• Group II
  STAT 663/CSI 773 Statistical Graphics and Data Exploration
  STAT 753 Computer Intrusion Detection
  IT 875/CIS 703 Scientific and Statistical Visualization
  IT 871 Statistical Data Mining
• Group III
  INFS 755 Data Warehousing and Mining
  INFS 795 Data Mining Applications
Certificate in Electronic Commerce

The Internet is having a significant impact on the way people interact with each other, government, and business. This graduate certificate program is for people who are interested in the use of Internet-based technology by people, government, and industry. We are witnessing the emergence of e-tailing, e-government, e-business, and business-to-business applications that are transforming society. The impact of electronic commerce is also being felt across international boundaries where it affects the management and administration of international business. The goal of the certificate program in electronic commerce is to study the concepts, tools, policies, and underlying technology that enable Internet- and web-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 three Mason courses, which are considered foundation courses: INFS 501 Discrete and Logical Structures for Information Systems, INFS 515 Computer Organization, and INFS 590 Program Design and Data Structures. Applicants also must possess equivalent knowledge of INFS 601, 612, and 614; or of 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. This form provides summary information concerning background and preparation for the program.

For those students not enrolled in a Mason graduate degree program, application for the certificate program is made through the Graduate Admissions Office of IT&E. Students enrolled in a Mason graduate degree program should apply to ISE for admission to the certificate 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 662 Information Systems Security
    - ISA 666 Internet Security Protocols
    - ISA 767 Secure Electronic Commerce
  - Database Management
    - INFS 755 Data Warehousing and 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 Engineering
  - Health Medical Information Systems
    - HSCI 720 Management of Health Information Systems
    - HSCI 722 Tele-health and Electronic Commerce in the Health Industry
    - HSCI 768 Introduction to U.S. Health Care Systems*

* Course may be waived by a person with experience in health care systems management and permission of the instructor.

E-commerce master’s students who wish to obtain the certificate in electronic 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 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 providing 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/knowledge representation, and information 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. Additionally, 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.

Applicant must possess knowledge equivalent to that provided by the following courses:

- INFS 501 Discrete and Logical Structures for Information Systems
- INFS 515 Computer Organization
- INFS 590 Program Design and Data Structures

Students not enrolled in a Mason graduate degree program should apply for the information engineering certificate program through the Graduate Admissions Office of IT&E. 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. To obtain the certificate, students must complete the following:

- Information Security
  - ISA 662 Information Systems Security
  - ISA 666 Internet Security Protocols
  - ISA 767 Secure Electronic Commerce
- Database Management
  - INFS 755 Data Warehousing and 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 Engineering
- Health Medical Information Systems
  - HSCI 720 Management of Health Information Systems
  - HSCI 722 Tele-health and Electronic Commerce in the Health Industry
  - HSCI 768 Introduction to U.S. Health Care Systems*
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 may substitute SWE 620 for INFS 622 to obtain this certificate. Credit is not given for taking both INFS 622 and SWE 620; only 3 credits are 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 IT&E.

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. Additionally, 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

Students must also possess the equivalent knowledge of INFS 601 and 612, 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 IT&E. 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 662 Information Systems Security
  - ISA 666 Internet Security Protocols

- Three additional courses from the following:
  - ISA 765 Database and Distributed Systems Security
  - ISA 767 Secure Electronic Commerce
  - ISA 774 Intrusion Detection
  - ISA 780 Theoretical Foundations of System Security
  - INFS 614 Database Management
  - SWE 619 Object-Oriented Software Specification and Construction
  - SWE 781 Secure Software Design and Programming

IT 862 Formal Models for Computer Security (restricted to PhD students)
- ECE 646 Cryptology and Computer-Network Security
- ECE 746 Secure Telecommunication Systems

Students in the MS in computer science program can substitute CS 697 Independent Reading and Research in the information security area for one of the courses in the second list. Prior approval of the specific independent study course should be obtained. For more information, contact ISE, Science and Technology II, Room 330, 703-993-1640.

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 who do not want to complete all the requirements for a master’s degree in the field. The certificate may be pursued concurrently with any of the graduate degree programs in IT&E.

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. Additionally, 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 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, 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 IT&E. 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:
  - 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
CS 706 Concurrent Software Systems
CS 707 Distributed Software Systems
SWE 720 Advanced Software Requirements
SWE 721 Reusable Software Architecture
SWE 723 Precise Modeling
CS 735 Concurrency
SWE 763 Software Engineering Experimentation
SWE 781 Secure Software Design and Programming

Note: Students enrolled in the MS in information systems program may substitute SWE 620 for INFS 622 to obtain this certificate. Credit is not given for taking both INFS 622 and SWE 620; only 3 credits are 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 IT&E 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 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
Students not enrolled in a Mason graduate degree program should apply for the certificate program through the IT&E 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:
  SWE 619 Object-Oriented Software Specification and Construction
  SWE 621 Software Modeling and Architectural Design
  SWE 637 Software Testing
  SWE 645 Component-Based Software Engineering
  INFS 614 Database Management
  ISA 666 Internet Security Protocols
  CS 707 Distributed Software Systems

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 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 and Information and Software Engineering Departments.

PhD Study in Information Systems
Students may designate a concentration in information systems in their doctoral degree title. The degree conferred upon 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 degree. In addition, the following requirements must be met.

Plan of Study
All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of ISE doctoral coordinator.

Doctoral Supervisory Committee
The dissertation director must be a faculty member of ISE or CS. The composition of the doctoral supervisory committee is to be approved by the ISE doctoral coordinator, ISE chair, and IT&E associate dean for graduate studies and research. Permission for the comprehensive exam and dissertation defense is requested from the IT&E 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 IT PhD 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:
  CS 571/656 Computer Systems
  INFS 601 Operating Systems Theory and Practice
  INFS 612 Principles and Practices of Communication Networks
  INFS 614 Database Management

• Two exams from software engineering, computer science, and statistical science (at most one exam may be taken from each of these three master’s programs):

  **Software Engineering**
  SWE 619 Object-Oriented Software Specification and Construction
  SWE 621 Software Modeling and Architectural Design
  SWE 637 Software Testing

  **Computer Science**
  CS 540 Language Processing
  CS 580 Artificial Intelligence
  CS 583 Algorithms and Theory of Computation

  **Statistical Science**
  STAT 544 Applied Probability
  STAT 554 Applied Statistics

Restrictions: Only one from CS 571 and INFS 601; only one from CS 656 and INFS 612; only one from SWE 620 and SWE 620/621.

**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

Proposed lists in these three groups are listed below:

• 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 662 Information Systems Security
  ISA 666 Internet Security Protocols
  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
  SWE 720 Advanced Software Requirements
  SWE 721 Reusable Software Architectures
  SWE 763 Software Engineering Experimentation
  SWE 796 Directed Readings 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)

• 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 upon 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 the requirements for the PhD in information technology degree. In addition, the following requirements must be met.

**Plan of Study**
All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of ISE’s doctoral coordi

**Doctoral Supervisory Committee**
The dissertation director must be a faculty member of IT&E. The composition of the doctoral supervisory committee is to be approved by the ISE doctoral coordinator, ISE department chair, and IT&E associate dean for graduate studies and research. Permission for the comprehensive exam and dissertation defense is requested from the IT&E 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 IT requirement is that each student must take four exams from three different master’s programs.

The exams for the information security track are as follows:

• ISA 662 Information Systems Security

• One exam from INFS 601, 612, 614; or CS 571/656
• Two exams from the following, at most one from each master’s program:
  INFS 601, 612, 614
  ECE 548
  CS 540, 580, 583
  SWE 619, SWE 621, SWE 637
  STAT 544, 554
Restrictions: CS 571/CS 656 and INFS 601 cannot both be taken; CS 571/CS 656 and INFS 612 cannot both be taken.

Advanced Emphasis Requirement
In addition to courses taken to prepare for the qualifying exam, students must take at least eight courses (24 credits), including:
• Two required courses:
  ISA 780 Theoretical Foundations of System Security
  IT 862 Computer Security Models and Architectures
• At least three courses (9 credits) from the following:
  ISA 666 Internet Security Protocols
  ISA 765 Database and Distributed Systems Security
  ISA 767 Secure Electronic Commerce
  ISA 774 Intrusion Detection
  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
  ECE 746 Secure Telecommunication Systems

Where appropriate, one or two relevant courses may be substituted with courses from other IT&E 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 upon 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 the requirements for the PhD in information technology degree. In addition, the following requirements must be met.

Plan of Study
All decisions concerning the student’s course requirements and plan of study must be approved by the advisor or director, with the consent of the ISE doctoral coordinator.

Doctoral Supervisory Committee
The dissertation director must be a faculty member of either ISE or the Computer Science Department. The composition of the doctoral supervisory committee is to be approved by the ISE doctoral coordinator, ISE chair, and IT&E associate dean for graduate studies and research. Permission for the comprehensive exam and dissertation defense is requested from the IT&E 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 IT PhD 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 SWE exams from SWE 619, SWE 621, SWE 637
• Two exams from the following, at most one from each master’s program:
  CS 540, 571/656, 580, or 583
  INFS 601, 612, or 614
  STAT 554
  ECE 542
Restrictions: Only one from CS 571 and INFS 601; only one from CS 656, INFS 612, and ECE 542.

Advanced Emphasis Requirement
In addition to the IT PhD requirements, the software engineering track requirements are as follows:
• 3 credits of 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 SWE 619 qualifying exam was taken)
  SWE 620 Software Requirements Analysis and Specification
  SWE 621 Software Modeling and Architectural Design (unless the SWE 621 qualifying exam was taken)
  SWE 622 Distributed Software Engineering
  SWE 623 Formal Methods and Models in Software Engineering (unless the SWE 623 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 763 Software Engineering Experimentation
  SWE 781 Secure Software Design and Programming
  SWE 796 Directed Readings in Software Engineering

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
One of the unique features of the degree program is an electronic 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 from a diverse set of backgrounds.

**Admission Requirements**
Applications must be submitted to the Graduate Admissions Office of the School of Information Technology and Engineering. 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 either 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 reports of the GRE, GMAT, or LSAT. TOEFL scores are required from non-native English speakers who did not use English as the official language in their college education.

**Degree Requirements**
In addition to meeting the general requirements that apply to all master’s degrees at the university, completion of this program requires the following:

- The following core courses (3 credits each; total of 18 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
  - 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.
  - 3 credits in EC 600 Group Project in Electronic Commerce.

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**Interdisciplinary Programs**

**E-commerce, MS**

**Phone:** 703-993-1530  
**Web:** ite.gmu.edu/msecomm/

This program is managed by IT&E and is a joint degree with the School of Management, School of Public Policy, School of Law, College of Arts and Sciences, and the College of Nursing and Health Science. The program prepares graduates with the depth and breadth they need to take advantage of electronic commerce opportunities in commercial and enterprise management in the new economy. They will be able to understand management, public policy, and information technology aspects, and effectively integrate these in developing electronic commerce solutions in a wide variety of specialized applications from electronic government to electronic banking and telehealth. More importantly, they will respond to the demand for professionals to work in a wide variety of capacities in digital age organizations in Northern Virginia and elsewhere. This program is composed of a few new courses, with the designation EC in the “Course Descriptions” chapter of this catalog, as well as existing courses as indicated in the “Degree Requirements” section that follows.

**Format**
Completion of the degree program requires 36 credits. All students complete an e-commerce core, the breadth requirement, comprising six courses from four interdisciplinary foundation disciplines totaling 18 credits. Following completion of these core courses, students take specialized application 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 from all concentrations deepen their theoretical and practical knowledge through courses in the concentration, the depth requirement, building upon a common core of knowledge.

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**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
- INFS 764 Object-Oriented Database Systems
- INFS 770 Knowledge Management for E-Business
- INFS 796 Directed Readings in Information Systems
- INFS 797 Advanced Topics in Information Systems
- INFS 798 Research Project
- ISA 662 Information Systems Security
- ISA 666 Internet Security Protocols
- ISA 765 Database and Distributed Systems Security
- ISA 767 Secure Electronic Commerce
- IT 861 Distributed Database Management Systems
- IT 862 Formal Models for Computer Security
- IT 864 Scientific Databases
- IT 865 Networks and Distributed Systems Security
- IT 867 Intelligent Databases

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Information Technology Concentration

Students who select this concentration must take 15 credits, which must include 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
- INFS 762 Information Systems Security

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.

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:
- HSCI 707 Health Care Management Policy, Law, and Ethics
- HSCI 709 Health/Medical Informatics for Health System Managers
- HSCI 720 Health Databases and Data Integration
- HSCI 722 Electronic Commerce and Online Marketing of Health Services

Note: If HSCI 722 was taken to satisfy the core requirement, another course must be selected from List D in consultation with the advisor.

HSCI 678 Introduction to the U.S. Health System (3 credits) is required, in addition to the 15-credit application courses, if students do not have recent relevant working experience in the U.S. health system. Determination is made at the time of program admission.

List of 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/INF 750, CS 755; ECE 646, 741; INFS 601, 623, 740, 755, 760, 765, 766, 767; CS 809/IT 809; OR 635; SWE 619/CS 619, SWE 620/CS 620, SWE 621/CS 621, SWE 632/CS 632, SWE 642; SYST 781/INFS 781/STAT 781. CS 571 and INFS 601 are mutually exclusive.

Only one of them can be used for the MS in E-commerce program. CS 650 and INFS 614 are mutually exclusive. Only one of them 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): HSCI 678, 703, 704, 705, 706, 708, 712, 714, 715

Engineer Degree in Information Technology

The engineer degree in information technology allows students to combine the advanced course work of the PhD degree in information technology with an applied project. It is suitable for students seeking specialized training who do not wish to complete an extended research project.

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 IT&E associate dean for graduate studies and research 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 IT&E. 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 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

Upon 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.
The general doctoral requirements of Mason apply to this program.

When the term information technology (IT) and engineering is used at Mason to describe the school and its activities, it is intended to mean information technology and the branches of engineering most closely associated with information use and management. These aspects of technology are emphasized in this geographic region, and the relevance of the IT doctoral program has grown with the increasing dependence of the nation's commerce on the effective use of information. Our focus on the science and technology of information processing complements and enhances the more traditional approaches to engineering that are more strongly based on the physical and material sciences.

## Course work

The information technology doctoral 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, three letters of reference, a resume 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. All of an applicant's 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 the 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 qualifying exams designed to test fundamental knowledge. These exams correspond to the individual master’s programs in IT&E. For each program, at least two written exams will be offered. Each exam is based on a reading list that corresponds roughly to one 3-credit course (students need not take the corresponding course). These exams are offered twice a year in specified locations on campus, typically near the beginning of the fall and spring semesters. Each exam is allocated 2 hours and 45 minutes. The exams are graded on a pass or fail basis.

Each student must take a set of four exams from three different degree programs 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. Students who pass all four exams in the first attempt pass the qualifying exam. Students who pass three of the four exams in the first attempt must either retake and pass the failed exam within one year, or pass an exam in a new subject within one year. Students who pass fewer than three exams in the first attempt must retake and pass an entire set of four exams within one year. After two unsuccessful attempts, a student is dismissed from the PhD program. Such students may re-apply after either receipt of the engineer degree in information technology, or a period of three years, whichever is shorter.

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 at most 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 to any of these rules 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 IT&E. For more information, see departmental sections.

Concentrations
Within the information technology PhD program, seven concentrations are offered:

- Statistical science, 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 upon graduation.

Choosing a concentration narrows the 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
Upon 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 plus a faculty member from the student’s intended major who is selected by the student to become chair of the doctoral supervisory committee. This chair of the doctoral supervisory committee need not be the dissertation director, but should be selected from a list of approved chairs established by the associate dean. The dissertation director must be a member of the Mason graduate faculty. Other committee members are selected to form a committee of at least four people from the Mason graduate faculty. At least three of these faculty members must be from IT&E, and at least two of the departments of IT&E must be represented on this committee. In addition, industrial representatives and faculty members from departments outside of 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 IT&E associate...
The comprehensive exam is taken after students have satisfactorily completed all the course work requirements in their approved plan of study. To initiate the exam process, the student meets with the supervisory committee to prepare a memorandum to be forwarded to the associate dean requesting the comprehensive exam and the appointment of an exam committee. The supervisory committee plus any outside examiners considered appropriate. The requesting memorandum lists all courses taken by the student that form the plan of study for the PhD. The memorandum shall also propose dates for the comprehensive exam. This exam is based on all the course work taken by the student, and consists of an oral exam and a written exam of up to eight hours in length, to be taken at a designated place on campus.

The exam committee determines the specific details of the exam. 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 who fail the comprehensive exam may request a re-exam within 60 days of receiving notice of the exam result. The request should be made in writing to the associate dean. The student may request a new exam in a different format, but the request must comply with the rules specified above. The exam committee will decide on the format of the new exam, but the decision may be appealed in writing to the associate dean. If the student fails again, or does not request a re-exam within 60 days, the student will be dismissed from the PhD program.

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 the 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 a satisfactory evaluation of the oral defense of the dissertation by the supervisory committee, the student must prepare, with supervision from the dissertation director, a final publishable dissertation that represents a definitive contribution to knowledge in information technology. This document must meet format guidelines specified by the Guide for Preparing Graduate Theses and Dissertations. If the candidate successfully defends the dissertation, the dissertation defense committee recommends that the final form of the dissertation be completed, and that the faculty of IT&E 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 the general time limits for the doctoral degree. An additional predefense is not required, but the student is strongly advised to consult with the committee before scheduling a second defense. If the student fails on the second attempt to defend the dissertation, the student will be dismissed from the PhD program.

Telecommunications, MS

The MS in telecommunications degree is an innovative, interdisciplinary program that 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 who are working in the field and want to advance their knowledge of telecommunications. It concentrates on the practical applications of telecommunications rather than on the theoretical approach, and focuses on the engineering and information technology aspects of telecommunications in combination with the interdisciplinary knowledge offered by some of the courses in the MA in telecommunications program. More than 30 new engineering and information technology courses have been designed specially for this program.

A novelty of the program is its structure, 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 various specialties within telecommunications technology. Students enjoy considerable flexibility because they are able to design their master’s programs to fit their technical preferences.

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 multicompuser systems, client-server architectures, and network management; and wireless communications such as digital communications, satellite communications, mobile communications, PCS, and...
GPS. 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 and computer engineering program. Those courses may also be taken for credit under the MS in telecommunications program, provided the student has 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) will be 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 MA in telecommunications (PUBP 726, LAW 181, and TELE 750 or TCOM 750) and a basic switching lecture/laboratory course (TCOM 514); and five specialty modules (areas of concentration).

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 the 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 of 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 of 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 permit 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 and 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 to 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. A minimum undergraduate GPA of 3.00 is usually required.

Students may be admitted to the MS program, or they may be admitted for nondegree study within the program, which allows them to take individual courses. Students in the nondegree program have the option of transferring into 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.

### 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:

- **Mandatory courses**:
  - TCOM 500 Modern Telecommunications (3 credits)
  - TCOM 501 Data Communications and Local Area Networks (1.5 credits)
  - TCOM 502 Wide Area Networks and Internet (1.5 credits)
  - TCOM 521 Systems Engineering for Telecommunications Management (3 credits)

- **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)
  - TELE 750 Coordinating Seminar (3 credits) or TCOM 750 Coordinating Seminar (3 credits) *Note: TELE 750 and TCOM 750 may not both be taken for credit*
  - TCOM 514 Basic Switching Lecture/Laboratory (3 credits)

- Minimum of 15 credits of courses listed below under 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 either within that module or in another module to bring the total number of credits in the specialty modules to 15.

### Specialty Modules

- **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 both module 1, network technologies, and module 2, network applications. Half-semester, 1.5-credit hour 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 module 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 IT&E. Other courses, which are marked with asterisks, are from other MS programs in IT&E 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.

Some alternatives to completion of 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 courses, reading and research courses may be taken within 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 (U.Va.) that allows up to 12 credits of the informational systems management certificate program from U.Va. 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 the information security certificate program of NDU.

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 IT&E 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, 548, 551, 556, 562, 609, 610, 660, and 661; ECE 513*, 542*, 565*, 642*, and 643*; CS 571*, 656*, and 756*

**Module 2 Network Applications**

TCOM 505, 509, 510, 513, 515, 519, 540, 541, 548, 555, 556, 562, 603, 609, 610, 611, 660, and 662; ECE 646*; CS 656*, and 756*; INFS 612*, 640*, 762*

**Module 3 Wireless Communications**

TCOM 506, 516, 517, 518, 526, 551, 552, 562, 607, 660, and 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, and 699; SYST 510*, 513*, 520*, 542*, and 562; INFS 612*, 614*, and 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; BS in computer science; BS in information technology; and BS in 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 in telecommunications program, completing the two degrees with 144 credits. Students must satisfy requirements for the BS (total of 120 credits) and the MS (total of 30 credits), with 6 credits of overlap permitted. The MS is on an accelerated track, with 6 credits taken as an undergraduate and 24 credits completed as a graduate student. The 6 undergraduate credits must be selected from those given in the 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, with the exception 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 average 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 degree. If students are dropped from the accelerated program and have taken and 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 B or above in those courses. However, they will need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in telecommunications degree.

Similarly, if students are dropped from the accelerated program and have taken and applied noncore telecommunications courses toward their BS degree, then they do not need to repeat those courses for the regular MS in telecommunications program if they earned a grade C or above 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 degree.

Telecommunications courses that may be taken as a systems engineering undergraduate student as part of the accelerated program are TCOM 500, 501, 502, 503, 504, 505, 509, 510, 513, 521, and 60

BS in Computer Science/Accelerated MS in Telecommunications Program

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 both the requirements for the BS in computer science undergraduate degree (total of 120 credits) and the MS in telecommunications graduate degree (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 in the computer science program. Students may apply for the accelerated program during a semester after which they will have completed 90 or more credits applicable toward the BS degree. Students must have an overall GPA of at least 3.25 to apply for the program. Students who have not yet finished 90 credits may be accepted provisionally subject to satisfactory completion of 90 credits. Criteria for admission into the accelerated program are identical to criteria for admission into the MS in telecommunications program, with the exception that students do not need to have completed an undergraduate degree prior to admission.

Accepted students must maintain a minimum 3.25 GPA in the undergraduate segment of the accelerated program and a 3.00 GPA in the graduate segment of the accelerated program. That is, they must maintain a 3.25 average until they have satisfied all of the requirements for the BS in computer science. They must then maintain a minimum 3.00 average in the graduate segment of the accelerated program.

Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program, and those graduate telecommunications courses taken and applied to their BS in computer science program will no longer be admissible for the MS in telecommunications degree. If students are dropped from the accelerated program and they have taken and applied telecommunications core courses toward the BS degree, they do not need to repeat those courses for the regular MS in telecommunications program if they obtained a grade of B or above in those courses. However, they will need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in telecommunications degree.

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 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 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 degree.

Students must complete all requirements for the BS in systems engineering degree. 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 degree is granted upon completion of all requirements for the accelerated degree.

Telecommunications courses may be taken as a systems engineering undergraduate student as part of the accelerated program are TCOM 500, 501, 502, 503, 504, 505, 509, 510, 513, 521, and 60

**Telecommunications courses**

TCOM 500 Modern Telecommunications *(Prerequisite: ECE 301, or equivalent)*

TCOM 502 Wide Area Networks and Internet *(Prerequisites: TCOM 501 or CS 455, or equivalent)*

TCOM 503 Fiber Optic Communications *(Prerequisite: TCOM 500, or equivalent)*

TCOM 504 Asynchronous Transfer Mode Network *(Prerequisites: TCOM 501 and TCOM 502, or equivalent)*

TCOM 505 Networked Multicomputer Systems *(Prerequisite: TCOM 501, CS 455, ECE 462, 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 *(Prerequisite: TCOM 509, CS 455, or equivalent)*

TCOM 551 Digital Communication Systems *(Prerequisite: TCOM 500, or equivalent)*
TCOM 607 Satellite Communications *(Prerequisite: ECE 463, or equivalent)*

Note: Students in the accelerated BS in computer science/MS in telecommunications program who have passed CS 455 with a grade of B will not be required to take TCOM 501 in the MS in telecommunications core, and may take an elective 1.5 credit-hour course instead.

### BS in Information Technology/ Accelerated MS in TCOM Program

Students in the bachelor of science in information technology (BSIT) program may elect to enter the accelerated master of science 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 BSIT undergraduate degree (total of 120 credits) as well as 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 BSIT concentration electives, subject to prior approval by a BSIT advisor. Note that students in the accelerated program must take ECE 301 as one of their BSIT concentration electives.

Applicants must be Mason undergraduate students in the BSIT program. Students may apply for the accelerated program during the semester after which they will have completed 90 or more credits applicable toward the BSIT. 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, with the exception that students do not need to have completed an undergraduate degree prior to admission.

Accepted students must maintain a minimum 3.25 GPA in the undergraduate segment of the accelerated program, and a 3.00 GPA in the graduate segment. That is, after students have been accepted into the accelerated program, they must maintain a 3.25 average until they have satisfied all of the requirements for the BSIT undergraduate degree. They must then maintain a minimum 3.00 average in the graduate segment of the accelerated program. Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program, and those graduate TCOM courses taken and applied to the BSIT program will no longer be admissible for their MS in TCOM degree. If students are dropped from the accelerated program and have taken and applied TCOM core courses toward the BSIT degree, then they need not repeat those courses for the regular MS in TCOM program if they obtained a grade B or above in those courses. However, they will need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in TCOM degree.

Similarly, if students are dropped from the accelerated program and they have taken and applied noncore TCOM courses toward the BSIT 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 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 degree.

Students must complete all requirements for the BSIT degree. Students in the accelerated program may apply to have the BSIT degree conferred during the semester in which they expect to complete those requirements. The MS in TCOM degree is granted upon completion of all requirements for the accelerated degree.

TCOM courses that may be taken as a BSIT undergraduate student as part of the accelerated BSIT/MS in TCOM program are noted in the table below. Note: All of the prerequisites courses indicated below must be passed with a grade B, or higher.

#### Telecommunications courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCOM 500</td>
<td>Modern Telecommunications</td>
<td>(Prerequisite: ECE 301, or equivalent)</td>
</tr>
<tr>
<td>TCOM 501</td>
<td>Data Communications and LANs</td>
<td>(Prerequisite: acceptance into the accelerated BSIT/MS TCOM program)</td>
</tr>
<tr>
<td>TCOM 502</td>
<td>Wide Area Networks and Internet</td>
<td>(Prerequisite: TCOM 501, IT 341, or equivalent)</td>
</tr>
<tr>
<td>TCOM 503</td>
<td>Fiber Optic Communications</td>
<td>(Prerequisite: TCOM 500, or equivalent)</td>
</tr>
<tr>
<td>TCOM 504</td>
<td>Asynchronous Transfer Mode Network</td>
<td>(Prerequisite: TCOM 501 and 502, IT 341, or equivalent)</td>
</tr>
<tr>
<td>TCOM 505</td>
<td>Networked Multicomputer Systems</td>
<td>(Prerequisite: TCOM 501, IT 341, or equivalent)</td>
</tr>
<tr>
<td>TCOM 509</td>
<td>Internet Protocols</td>
<td>(Prerequisite: TCOM 501 and 502, IT 341, 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>(Prerequisite: TCOM 509, IT 341, or equivalent)</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: ECE 463, or equivalent)</td>
</tr>
</tbody>
</table>

Note: Students in the accelerated program who have passed IT 341 with a grade of B or better 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 TCOM Program

Students who are in the bachelor of individualized study (BIS) program may elect to enter an accelerated master of science in telecommunications (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 both 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 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, and will be substituted for BIS concentration courses, subject to prior approval by a BIS advisor. Note that accelerated students must take ECE 301 or ECE 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, with the exception 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 average until they have satisfied all requirements for the BIS undergraduate degree. They must then maintain a minimum 3.00 average in the graduate segment of the accelerated program. Should their GPA fall below 3.00 while a graduate student, they will be dropped from the accelerated program to the regular program, and those graduate 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. However, they need to take elective courses in their place to satisfy the 30-credit requirement for the regular MS in TCOM degree.

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 degree.

Students must complete all requirements for the BIS degree. 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 degree is granted upon completion of all requirements for the accelerated degree.

TCOM courses that may be taken as 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 B or higher.

### Telecommunications courses

- **TCOM 500 Modern Telecommunications (Prerequisite: ECE 301 or 303, or equivalent)**
- **TCOM 501 Data Communications and LANs (Prerequisite: acceptance to accelerated program)**
- **TCOM 502 Wide Area Networks and Internet (Prerequisite: TCOM 501, IT 341, or equivalent)**
- **TCOM 503 Fiber Optic Communications (Prerequisite: TCOM 500, or equivalent)**
- **TCOM 504 Asynchronous Transfer Mode Network (Prerequisite: TCOM 501 and 502, IT 341, or equivalent)**
- **TCOM 505 Networked Multicomputer Systems (Prerequisite: TCOM 501, IT 341, or equivalent)**
- **TCOM 509 Internet Protocols (Prerequisite: 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 (Prerequisite: TCOM 509, IT 341, or equivalent)**
- **TCOM 551 Digital Communication Systems (Prerequisite: TCOM 500, or equivalent)**
- **TCOM 607 Satellite Communications (Prerequisite: 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.

### Telecommunications Certificates

Five, 15-credit certificates may be taken within the MS in telecommunications program. Students may take these certificates as stand-alone items, or as part of their degree program. For the former, they are required to enroll in a certificate program; for the latter, since they are already enrolled in a degree program, they need only apply for the appropriate certificate after they have satisfied requirements. The courses within the certificates are drawn directly from the MS in telecommunications program. If a student initially signs up for only a certificate program, it is possible to transfer into the degree program later, with up to 12 credits transferring into the degree program. Students must therefore ensure they have transferred into the degree program prior to starting course work beyond 12 credits in the certificate program to ensure that all credits from the certificate program may transfer into the degree program. Students who transfer from a certificate program into the...
degree program may earn both certificate and degree on satisfactory completion of the respective requirements. Applicable courses may count for both the certificate and the degree program.

Students may transfer in one, 3-credit course from another program or institution toward their TCOM certificate, provided the course in question was passed with a B grade or higher. Students are permitted to carry one C grade within their certificate program, provided the overall GPA is 3.00 or above.

◆ 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, the student must complete the following, for a total of 15 credits:

• 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 555 Network Management (3 credits)

• Elective Courses (6 credits):
  Student 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 their 9 credits of core courses for the certificate.

◆ Certificate in Wireless Communications

This certificate provides a broad understanding of the technologies, applications, and systems used in all forms of wireless communications. Students must complete the following, for a total of 15 credits:

• Core Courses (choose 9 credits from the following):
  TCOM 506 Personal Communication Systems (PCS) (1.5 credits)
  TCOM 518 Third Generation Cellular Telephony (1.5 credits)
  TCOM 551 Digital Communications Systems (3 credits)
  TCOM 552 Introduction to Mobile Communications (3 credits)
  TCOM 607 Satellite Communications (3 credits)

• Elective Courses (6 credits):
  Students may take any additional 6 credits of courses from specialty modules 1, 2, and 3, including those in the mandatory course list that are not part of their 9 credits of core courses for the certificate.

◆ Certificate in Telecommunications Systems Modeling

This certificate provides a broad understanding of the end-to-end systems engineering approach to telecommunications projects. Students must complete the following, for a total of 15 credits:

• Core Courses (choose 9 credits from the following):
  TCOM 521 Systems Engineering for Telecommunications Management (3 credits)
  TCOM 540 Telecommunications Network Optimization: Routing, Flow Management, and Capacity Modeling (1.5 credits)
  TCOM 541 Network Design and Pricing (1.5 credits)
  TCOM 545 Reliability and Maintainability of Networks (3 credits)
  TCOM 546 Financial Models of Telecommunications Systems (3 credits)

• Elective Courses (6 credits):
  Students may take any additional 6 credits of courses from specialty modules 1 and 2, including those in the mandatory course list that are not part of their 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 both to networks and to digital storage media. Students must complete the following, for a total of 15 credits:

• Core Courses (9 credits from the following):
  TCOM 548/556 Security Issues in Telecom/Cryptography and Net. Security (1.5 credits each)
  TCOM 545/556 Security Issues in Telecom/Cryptography and Net. Security (1.5 credits each)
  TCOM 546 Financial Models of Telecommunications Networks (3 credits)

• Elective Courses (6 credits from the following):
  TCOM 660 Network Forensics (3 credits)
  TCOM 661 Digital Media Forensics (3 credits)
  TCOM 662 Advanced Secure Networking (3 credits)
  ISA 662 Information Systems Security (formerly INFS 762; 3 credits)

Note: TCOM 660 and 661 cannot be taken twice for credit. If either course 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 (9 credits from the following):
  TCOM 609 Interior Gateway Protocols (IGP) (3 credits)
  TCOM 610 Border Gateway Protocols (BGP) (3 credits)
  TCOM 509/519 Internet Protocols/Voice over IP (1.5 credits each)
  TCOM 515 Internet Protocol Routing (3 credits)

• Elective Courses (6 credits from following):
  TCOM 509/519 Internet Protocols/Voice over IP (1.5 credits each)
  TCOM 515 Internet Protocol Routing (3 credits)
  TCOM 611 Multiple Protocol Label Switching (MPLS) (3 credits)
  TCOM 662 Advanced Secure Networking (3 credits)

Note: TCOM 509/519 and TCOM 515 cannot be taken twice for credit. If any of these courses are taken in the core element, they cannot be taken again in the elective element.
Systems Engineering and Operations Research

Phone: 703-993-1670
Web: www.seor.gmu.edu

Faculty
Professors: Adelman, Donohue, Hoffman, Nash, Polyak, Sage, Schum, Sofer (chair)
Associate professors: Brouse, Chang, Chen, Laskey, Loech, White
Assistant professors: Shortle
Affiliated faculty members: Gulledge, Houck, VanTrees
Research and term professors: Gross, Klein, Sherry, Wagenhals, Wagner, Wolman
Adjunct professors: Adams, Alexander, Barry, Camp, Carley, Fischer, Healy, Killam, Masi, McDevitt, Nguyen, Patel, Wieland, Yost, Youngren

Introduction
The Systems Engineering and Operations Research (SEOR) Department offers a bachelor’s degree in systems and industrial 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, and intelligence (C3I); 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, 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 a computer network, an automobile, an intelligent robot, a stereo, 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 the use of 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 www.gmu.edu/departments/seor.

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 systems, telecommunication systems, defense systems, health delivery systems, transportation systems, manufacturing systems, and corporate processes.

Specifically, the objectives of the program are to provide an academic environment that facilitates and motivates learning the knowledge, principles, practices, and perspectives that will enable graduates to do the following:

• Apply fundamental concepts of mathematics, science, information technology, and engineering. This core curriculum is designed to develop the skills and understanding that form the basis for systems engineering now and in the future.
• Participate meaningfully in the development of systems using systems engineering methods, models, and tools.
• Achieve depth of knowledge in a technical area by completing a sequence of technical electives that constitute an emphasis.
• Work effectively as a leader and member of multidisciplinary and cross-functional teams and behave in a professional, ethical, and responsible manner. This includes establishing a foundation for lifelong learning in systems engineering and related areas.
• Communicate effectively with peers and others 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 or industrial 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 year-long 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; telephone 410-347-7700. 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.

Writing-Intensive Requirement
Mason’s writing-intensive requirement for systems engineering majors is satisfied by successful completion of SYST 489.

Synthesis Requirement
Mason’s synthesis requirement for systems engineering majors is satisfied by the successful completion of SYST 495.

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, 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, 260, 261; CHEM 251 or CHEM 211
- Computer science: CS 112, 211
- Humanities and social sciences: COMM 100; ENGL 101, 302; ECON 103; approved courses in literature, history, global understanding, and synthesis to satisfy the university’s general education requirement.
- Engineering: ENGR 107
- Systems engineering: SYST 101, 201, 202, 301, 302, 335, 371, 470, 473, 489, 490, 495, OR 441, 442 and three approved technical electives.

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
- COMM 100 Oral Communication .......... 3
- ECON 103 Contemporary Microeconomic Principles ........................................... 3
- ENGL 101 Composition ......................... 3
- ENGR 107 Introduction to Engineering .... 2
- MATH 113 Analytic Geometry and Calculus I ....................................................... 4

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

Second Semester
- CS 112 Computer Science I .................. 4
- MATH 114 Analytic Geometry and Calculus II ....................................................... 3
- PHYS 160 University Physics I ............... 4
- SYST 101 Understanding Systems Engineering ....................................................... 3

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

Third Semester
- CS 211 Computer Science II ................. 3
- MATH 213 Analytic Geometry and Calculus III ....................................................... 3
- PHYS 260 University Physics II Lab ........ 1
- PHYS 261 University Physics II Lab ......... 1
- SYST 201 Discrete Dynamic Systems Modeling ..................................................... 3
- SYST 203 Systems Design ....................... 3
- Statistical general education course .......... 3

Total ........................................................................ 16

Fourth Semester
- CHEM 251 General Chemistry for Engineers or Chem 211 General Chemistry .......... 4
- MATH 203 Matrix Algebra ...................... 3
- MATH 214 Elementary Differential Equations ....................................................... 3
- SYST 202 Continuous Dynamic Systems Modeling ................................................ 3

Total ........................................................................ 14

Fifth Semester
- ENGL 302 Advanced Composition .......... 3
- CHEM 441 Deterministic Operations Research ....................................................... 3
- SYST 301 Systems Design ....................... 3
- Technical Elective ........................................ 3

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

Sixth Semester
- SYST 302 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
- STAT 354 Engineering Statistics ............. 3

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

Seventh Semester
- SYST 470 Human Factors Engineering ...... 3
- SYST 489 Senior Seminar ....................... 3
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 Systems Engineering and Operations Research 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 following 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**
- SYST 420 Network Analysis
- SYST 465 Pricing in Optimization and Game Theory
- OR 481 Numerical Methods

**Control Systems**
- ECE 201 Intro to EE
- ECE 220 Signals & Systems I
- SYST 421 Classical Systems & Control Theory

**Computer Network Systems**
- ECE 301 Digital Electronics
- ECE 462 Data and Computer Communication
- ECE 465 Computer Networking Protocols

**Software-Intensive Systems**
- CS 310 Computer Science III
- CS 332 Object-oriented Specification and Implementation
- CS 421 Software Engineering

**Engineering Systems**
- ENGR 210 Statics and Dynamics
- CEIE 230 Hydraulics
- ENGR 310 Mechanics of Materials

**Economic Systems Design**
- SYST 465 Pricing in Optimization and Game Theory
- SYST 480/Econ 440 Economics Systems Design 1
- SYST 481/Econ 441 Economics Systems Design 2

In addition to receiving a BS degree, students may wish to select a sequence that contributes toward a minor or certificate program as described below.

◆ **Certificate in Operations Research and Engineering**
This certificate program is open to students enrolled in the computer science, decision sciences, mathematics, and systems engineering undergraduate degree programs. The certificate augments the standard curriculum 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**
  - STAT 344 Probability and Statistics for Engineers and Scientists I
  - OR 498 Independent Study in Operations Research
  - MATH 313 Introduction to Applied Mathematics

- **Plus two of the following courses:**
  - OR 481 Numerical Methods in Engineering
  - STAT 354 Statistical Methods for Engineers and Scientists
  - Any 400-level STAT class

Students seeking the certificate must apply to the Systems Engineering and Operations Research 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 bachelor of science in an engineering discipline and an MS degree 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. Students must have an overall GPA of at least 3.00, and must have completed all their 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 in the accelerated program may apply to have the BS degree from the appropriate IT&E program conferred during the semester during which they expect to complete BS requirements. The MS degree is granted upon completion of the 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>
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<tbody>
<tr>
<td>SYST 520</td>
<td>SYST 301</td>
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<td>SYST 521</td>
<td>SYST 420</td>
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<td>SYST 530</td>
<td>SYST 371</td>
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<tr>
<td>SYST 573</td>
<td>SYST 473</td>
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</table>

Any other 500-level SYST course may be applied to both the undergraduate and graduate degrees with the approval of the advisor and the department chair.

**BS/Accelerated MS Program in Operations Research**

Qualified undergraduate students may apply for this five-year program leading to a bachelor of science 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. Students must have an overall GPA of at least 3.00, and must have completed all their 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 majors. Students may apply to have the BS degree from the appropriate IT&E program conferred during the semester during which they expect to complete BS requirements. The MS degree is granted upon completion of the 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 toward the MS degree. Systems engineering majors in the accelerated program are required to take OR 541 and 542 in place of OR 441 and 442.

**GRADUATE PROGRAMS**

**Operations Research, MS**

This program prepares students for research and professional practice associated with the formulation and analysis of mathematical models for decision making, and their computer implementation. Major components include optimization, 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 344), and a scientific programming language (CS 112). Other requirements are as follows:

- Provide evidence of satisfactory educational achievement in at least one of the following forms: a GPA of at least 3.00 as an undergraduate, or an acceptable GPA in graduate courses. International students must also achieve satisfactory scores on the GRE. Non-native English speakers must have a satisfactory score on the TOEFL.
- Provide three letters of recommendation submitted by former professors or supervisors.

The department offers SYST 500 as an intensive review of undergraduate engineering mathematics, including matrix algebra, transforms, differential equations, probability, and statistics. Upon 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).

- OR 541 Operations Research: Deterministic Models
- OR 542 Operations Research: Stochastic Models
- OR 635 Discrete Event Simulation
- STAT 544 Applied Probability

(Students who have performed well in their undergraduate calculus-based probability class may instead take OR 645 Stochastic Processes.)
Students whose primary interest is in decision analysis, and military operations research. Electives available are optimization, stochastic modeling, 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

Up to two additional elective courses may be chosen with written concurrence of the advisor. These courses should be taken in an area appropriate to the student’s interests, such as operations research statistics, computer science, information systems, systems engineering, electrical and computer engineering, economics, and mathematics. At least one of these electives must be taken from SEOR’s course offerings.

With the advisor’s permission, a qualified student may elect to write a thesis in place of 3 credits of course work from the methodological or applications area.

Students may construct concentration areas by choosing electives from among special groupings. The four concentrations available are 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 the written concurrence of the advisor, 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, from appropriate offerings in other departments within IT&E, and from appropriate courses in other university departments. A sample of possible courses outside the Systems Engineering and Operations Research Department is available from the department office.

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 the 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 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 for pursuing advanced graduate study leading to the PhD in information technology.

Each student is assigned a faculty advisor to work with in completing 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 baccalaureate degree from an accredited institution in engineering, mathematics, computer science, physical sciences, economics, or a related field. They also should have completed courses in calculus (MATH 113, 114, and 213), matrix algebra (MATH 203), differential equations (MATH 214), applied probability and statistics (STAT 344), and a scientific programming language (CS 112). Other requirements are as follows:

- Provide evidence of satisfactory educational achievement in at least one of the following forms: a GPA of at least 3.00 as an undergraduate, or an acceptable GPA in graduate courses. International students must also achieve satisfactory scores on the GRE. Non-native English speakers must have achieved a satisfactory score on the TOEFL exam.
- Provide three letters of recommendation submitted by former professors or supervisors.

Students who enter the program must have a working background in engineering mathematics and computer systems. Students with minor deficiencies in preparation may apply for admission to the program, but will be required to take one or more foundation courses. The department offers SYST 500 as an intensive review of undergraduate engineering mathematics, including matrix algebra, transforms, differential equations, probability, and statistics.

Students who have not completed a basic engineering undergraduate mathematics sequence will be required to complete courses in engineering calculus and matrix algebra prior to acceptance. Upon 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 direction of a systems engineering faculty member. Under the project option, students complete 3 credits of SYST 798 or OR 680. For SYST 798, 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 SEOR 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, and the final written thesis and oral defense are approved by a three-member faculty committee and submitted to IT&E. The thesis work is expected to be completed while taking 6 credits of SYST 799. Although a student 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 Design and Integration
- 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:

- 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
- ECE 528 Introduction to Random Processes in Electrical and Computer Engineering

**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, C3I, 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:** Students must complete SYST 611 System Methodology and Modeling, and 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.

- 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
- SYST 672/CS 685 Intelligent Systems for Robots
- 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

**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 costs, 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:** Students must complete SYST 611 System Methodology and Modeling, and 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:

- SYST 512 Systems Engineering for Design and Development
- SYST 513 Total Systems Engineering, Reengineering, and Enterprise Integration
- SYST 542 Decision Support Systems Engineering
- SYST 571 Systems Engineering Management
- SYST 619 Introduction to Architecture-Based Systems Engineering
SYST 621 Systems Architecture Design
SYST 622 System Integration and Architecture Evaluation
SYST 671/OR 671 Judgment and Choice Processing and Decision Making
SYST 677/OR 677/STAT 677 Statistical Process Control
CEIE 610 Construction Systems and Management

**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, the definition of architecture frameworks, the 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**: Students must complete SYST 611 System Methodology and Modeling and 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 513 Total Systems Engineering, Reengineering, and Enterprise Integration
- SYST 571 Systems Engineering Management
- SYST 683 Modeling, Simulation, and Gaming
- SYST 691 Introduction to Enterprise Engineering: Engineering and Policy
- SYST 692 Decision Support for Enterprise Integration
- SYST 694 E-commerce Architectures

**Command, Control, Communications, and Intelligence (C3I)**

Command, control, communications, and intelligence (C3I) 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 the air-traffic control systems, the drug enforcement C3I systems, law enforcement agency systems, and various emergency preparedness systems. Military systems include national-level crisis management systems, the global command and control system, the NATO command and control systems, and various tactical C3I 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 C3I, and prepares students for careers in research, design, and development, in the use and management, of C3I systems. Courses emphasize the analytical and behavioral aspects of engineering complex C3I systems.

**Basic Methods Courses**: Students must complete SYST 611 System Methodology and Modeling and one of the following:

- ECE 528 Introduction to Random Processes in Electrical and Computer Engineering
  or OR 542 Operations Research: Stochastic Models

**Elective Courses**: The set of elective courses must constitute a well-defined concentration area. Examples of concentration areas include C3I architectures, C3I software, communications, decision support, modeling and simulation, or sensing and fusion.

Students in the C3I specialization area must complete the following course:

- SYST 680/ECE 670/OR 683 Principles of C3I

They may select their remaining electives from the list of basic methods courses or the following:

- 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 C3I Systems Engineering
- ECE 542 Computer Network Architectures and Protocols
- ECE 630 Statistical Communication Theory
- ECE 731 Digital Communications
- ECE 737 Spread Spectrum Communications
- ECE 739 Satellite Communications
- ECE 642 Design and Analysis of Computer Communication Networks
- ECE 734/IT 830 Detection and Estimation Theory
- OR 647 Queuing Theory
- OR 651 Military Operations Research I: Cost Analysis
- OR 652 Military Operations Research Modeling II: Effectiveness Analysis

**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 social impact of computer systems that are both effective and efficient.

**Basic methods courses**: Students must complete SYST 611 System Methodology and Modeling, and 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:

- SYST 512 Systems Engineering for Design and Development
- 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
- CS 571 Operating Systems
- CS 631 Object-Oriented Design Patterns
- INF 622 Information Systems Analysis and Design

One of the following:

- CS 656 Computer Communications and Networking
- ECE 542 Computer Network Architectures and Protocols
- INF 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 give an awareness of how future transportation systems will evolve.

**Basic methods courses:** Students must complete SYST 611 System Methodology and Modeling, and one additional course from the list of basic methods courses.

**Elective courses:** Two of the elective courses should be taken from the following list:

- CEIE 560 Public Transportation Systems
- CEIE 660 Urban Transportation Planning
- SYST 560 Introduction to Air Traffic Control
- SYST 660/OR 660 Air Transportation Systems Modeling
- SYST 512 Systems Engineering for Design and Development
- SYST 513 Total Systems Engineering, Reengineering, and Enterprise Integration
- 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
- OR 647 Queuing Theory
- INF 612 Principles and Practices of Communication Networks
- INF 500/ECE 540 Modern Telecommunications

**Systems Engineering Management, MS**

* Subject to SCHEV approval.

Systems engineering management is concerned with managing the effective design, production, deployment, operation, maintenance, refinement, and retirement of reliable systems within cost and time constraints. The graduate program leading to the MS in systems engineering management provides the skills necessary to be successful in managing the progression of systems through these life cycle phases, and expertise in architecting and integrating complex systems for government and commercial clients. Students are introduced to the core competencies for systems of systems, integration and management, the processes, the new technologies, and the disciplines needed for successful delivery of executable systems.

Students progress through a series of classes that build the foundation for the successful performance of systems engineering management tasks associated with all phases of the system lifecycle. The core courses include study in requirements engineering, cost modeling, architecture design, and systems management. This program is not intended for students pursuing advanced graduate study leading to the PhD in information technology.

Each student is assigned a faculty advisor to work with in completing an approved plan of study. This plan of study must include three core courses, two methods courses, four electives, and a systems engineering project. The plan of study must include 30 graduate credits.

**Foundation and Admission Requirements**

Applicants should hold a bachelor’s degree from an accredited institution in engineering, mathematics, computer science, physical sciences, economics, or a related technical field, and must have a minimum of two years of appropriate full-time work experience in that field. Applicants with a bachelor’s degree in a non-technical discipline must have completed a college-level calculus course (MATH 113), and a probability course (STAT 250), and have a minimum of five years of appropriate full-time work experience in a systems engineering related field. Applicants should have a GPA of 3.00 as an undergraduate. Other indicators such as a satisfactory score on the GRE, or a strong GPA in graduate courses, may strengthen the application. Non-native English speakers should show satisfactory performance on the TOEFL.

**Core Courses**

Students must complete the following three core courses (9 credits):

- SYST 510 Systems Definition and Cost Modeling
- SYST 520 System Design and Integration
- SYST 530 System Management and Evaluation

**Basic Methods Courses:** Students must complete SYST 573 Decision and Risk Analysis and one of the following:

- SYST 563 Research Methods in Systems Engineering and Information Technology
- OR 540 Management Science

**Elective Courses:** A set of approved elective courses is given below. Basic methods courses above the two required methods courses may also be counted as elective courses. At least three of the courses must come from SEOR offerings.
SYST 512 Systems Engineering for Design and Development
SYST 513 Total Systems Engineering, Re-engineering and Enterprise Integration
SYST 542 Decision Support Systems Engineering
SYST 571 Systems Engineering Management
SYST 619 Introduction to Architecture-based Systems Engineering
SYST 671 Judgment and Choice Processing and Decision Making
SYST 691/PUBP 771 Introduction to Enterprise Engineering: Engineering and Policy
SYST 692/PUBP 772 Decision Support for Enterprise Integration
SYST 694/PUBP 774 E-Commerce Architecture
SYST 697/PUBP 777 Critical Information Technology Infrastructure
CEIE 610 Construction Systems and Management
SWSE 625 Software Project Management
TCOM 500 Modern Telecommunications

Project: Student teams must complete a project, SYST 798 (3 credits).

◆ Certificate in Architecture-Based Systems Integration (ABSI)

This program is available to students who hold bachelor’s degrees in engineering and scientific disciplines, or who are currently 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 611 or ECE 542, SYST 619, 620, 621, and 622; and one elective from the list of electives for the ABSI 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 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, and Intelligence (C3I)

This certificate program is available to students who hold bachelor’s degrees in engineering and scientific disciplines, or who are currently 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 680; ECE 528 or OR 542; and three electives from the list of electives for the C3I 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, and ECE 528 or OR 542
Elective courses: SYST 680; three C3I 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 a scientific discipline, or who has graduate status in such a program. Admission requirements are identical to those for the master’s degree in systems engineering management. To be eligible for a certificate, students must complete SYST 510, 512, 513, and 530; and one of these elective courses: ECE 542; CS 656; INFS 612; SYST 542, 619, 620, and 621; SWSE 620; and INFS 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, 513; 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 planning to work, in the field of military operations research. It is appropriate for students who cannot complete all the requirements for a master’s degree in operations research, but who want a concentrated study of military modeling. Admissions requirements are identical to those for the master’s degree in operations research. Certificate candidates must complete six courses, with an average grade of B or better, for a total of 18 graduate credits. To obtain the certificate, a student needs to complete the following: OR 541, 542, 635, 651, and 652; and SYST 683. Students who already have 3 credits of deterministic operations research can receive the certificate with 15 graduate credits. Those who already have taken a course equivalent to OR 542 should substitute OR 681.

◆ Certificate in Computational Modeling

This certificate program provides knowledge, tools, and techniques to those who are working, or planning to work, in the field of computational modeling. Courses taken for this certificate program can count toward a master’s 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 both the certificate and the other degree. For admission into the certificate program, applicants must meet the minimum entrance requirements for the MS in operations research, MS in statistical science, or PhD in computational sciences and informatics. Certificate candidates must complete the following courses: CSI 700/OR 682; OR 541 and 635; and STAT 634. In addition, candidates must choose any two of the following electives: CSI 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 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 master’s degrees in engineering and scientific disciplines, or who are currently in such graduate programs. Students may pursue the certificate concurrently with any of the graduate programs in IT&E; 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 in 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 upon a graduating student is PhD in information technology with concentration in operations research, or 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 the requirements for the PhD in information technology degree. 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.

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 chair of the committee 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 IT&E 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:

- SYST 520 System Design and Integration
- SYST 573 Decision and Risk Analysis
- OR 541 Deterministic Models in Operations Research
- OR 542 Stochastic Models in Operations Research
- STAT 544 Applied Probability
- STAT 554 Applied Statistics

Advanced Emphasis Requirement

For students specializing in operations research, at least 18 of the 24 credits in the advanced emphasis requirement must either 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 either be in SYST courses numbered 600 or higher, or in IT courses with a SYST designation. All exceptions to this rule must be approved by the student’s doctoral supervisory committee and the department’s doctoral coordinator. The doctoral supervisory committee and the associate dean for graduate studies and research of IT&E 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), University of Virginia (U.Va.), and Virginia Commonwealth University (VCU). 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 U.Va. and Tech’s Northern Virginia Center.

Master’s degree programs are offered by U.Va., Tech, ODU, and Mason. The degree programs from U.Va. 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. Mason offers the master of science programs described in this chapter. Also offered by Mason are the PhD in computer science, PhD in electrical and computer engineering, and PhD in information technology, as well as a variety of certificate programs. For more information, go to ite.gmu.edu/degree/commonwealth_main.htm.
Enterprise Hall
Phone: 703-993-1807
Web: www.som.gmu.edu

**Programs**
The School of Management (SOM) offers the following academic programs:

**Undergraduate**
- Accounting (ACCT)
- Decision Sciences and Management Information Systems (DMIS)
- Finance (FNAN)
- Management (MGMT)
- Marketing (MKTG)
- Business Minor (MSOM)

**Graduate**
- MBA (Master of Business Administration)
- EMBA (Executive Master of Business Administration)
- MS in Technology Management
- MS in Bioscience Management
- Postbaccalaureate Accounting Certificate

**Administration**
Richard J. Klimoski, Dean
David J. Harr, Senior Associate Dean
Alison O’Brien, Associate Dean, Undergraduate Programs
Phillip G. Buchanan, Director of MBA Program
Jean-Pierre Auffret, Director of Bioscience Management Program and the MS in Technology Management Program
Karen Hallows, Director of Executive MBA Program
Daniel Mackeben, Director of Marketing Communications
Pamela Allen, Assistant Dean of Student Services
Daniel Robb, Assistant Dean of Graduate Enrollment Management

**Introduction**
The School of Management (SOM) has provided high-quality business education to the region since 1972. SOM faculty members bring both theoretical and applied expertise to the classroom. Nearly one-third of the faculty is bilingual. SOM faculty members have international reputations 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 provided testimony before nearly every federal agency, and have served as consultants to industry and organizations such as NASDAQ, the FDIC, and the Department of Defense.

Today, more than 3,800 students are studying in five undergraduate majors, the business minor, and four graduate programs. The MBA, EMBA, MS in technology management, and MS in bioscience management are pioneers nationwide. Mason’s management programs provide a solid business core emphasizing information technologies and
communication, entrepreneurial thinking, and global business strategy. We prepare students to lead with initiative, imagination, and innovation.

Of more than 2,100 business programs in the nation, only one-fifth are fully accredited by AACSB (Association to Advance Collegiate Schools of Business) International. Mason’s SOM is one of only 165 schools in the nation with both business and accounting programs fully accredited by AACSB International.

A Mason business degree delivers in-depth exposure in an area of specialization as well as the skills required for success in a global business world. The school’s unique undergraduate keystone and capstone courses develop skills and provide students with opportunities to interact with regional business leaders. More than 90 percent of the school’s graduate students study while employed. Since 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. Graduate students experience global business through an international residency. 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, Leary, Moraglio, Nutter, Parsons, Visvanathan

Decision Sciences and Management Information Systems
Auffret, C. Chen, M. Chen, Das, Dutta, Hsu, Hughes, Hutchison, Kim, Kinsley, Mazumdar, Meixell, Singer, Talalayevsky

Finance
Brown-Hruska, Christophe, Crockett, Ferri, Hallows, Hanweck, Hsieh, Johnston, Nikolova, Stahl, Zhidanov

Management
Coffinberger, Cramton, Cronin, Demory, Eland, Joshi, Klimoski, Kravitz, Lee, Ling, Marks, O’Brien, Rockmann, Samuels, Wolf, Yasai

Marketing
Entrikin, Harvey, Joiner, Jaju, Martin, McCrohan, Meamber, Philpot, Saini, Schneider, Stanbury

Course Work
SOM offers all course work designated ACCT, BULE, DESC, EMBA, FNAN, MBA, MGMT, MIS, MKTG, MSBM, MSOM, SOM, and TECM in the “Course Descriptions” chapter of this catalog.

UNDERGRADUATE PROGRAMS

Because all organizations face constant change driven largely by information technology, new organizations and new business models are continually evolving. SOM faculty and students are intellectually curious about what information technology, 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. SOM prepares students to be successful in the fast-paced world of business.

Bachelor of Science Degree
Office of the 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, decision sciences and management information systems, finance, 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 for information concerning literacy, general education, residence, and other academic requirements.

In addition, students should carefully examine prerequisites for SOM courses. Students may be removed from courses if they enroll without having fulfilled them.

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 Capstone Course: Advanced Business Models. A grade of C or higher must be earned in SOM core and major requirements.

SOM students pursuing a BS degree must complete the university-wide general education program plus 1 additional credit of natural science, for a total of 44 credits. The natural science requirement must be fulfilled by completing two, 4-credit laboratory sciences. All degree applicants must complete the following SOM degree requirements:

- ECON 103* .................................................. 3
- ECON 104* .................................................. 3
- ECON 300–400 ............................................. 3
- ANTH, PSYC, or SOCI (satisfies university requirement for Social and Behavioral Science) ......................................................... 3
- MATH 108 or 113* (satisfies university requirement for quantitative reasoning) ............... 3

School of Management Core * ............................ 35
- ACCT 203 .................................................. 3
- ACCT 301 .................................................. 3
- BULE 302 .................................................. 3
- DESC 210 .................................................. 4
- DESC 301 .................................................. 3
- FNAN 301 .................................................. 3
- MGMT 301 .................................................. 3
- MIS 102 ................................................... 1
- MIS 301 ................................................... 3

Web: som.gmu.edu
Phone: 703-993-1880
Office of the Associate Dean for Undergraduate Programs
MKTG 301 .............................................................. 3
SOM 301 .............................................................. 3
SOM 498 .............................................................. 3

Major* ..................................................................... 18

General Electives .................................................... 17

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 more specific information. A minimum of 9 credits must come from courses outside the SOM or the Department of Economics.

Total Credits
University General Education and SOM .......... 120

*Completion with a grade of C or better is required for graduation.

Acceptance into SOM
A student interested in pursuing a major in accounting, decision sciences and management information systems, finance, management, or marketing must apply for acceptance to the SOM during the semester in which they will complete the 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 2.500 or higher at the end of the semester of application, 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); DESC 210 (Prerequisite: C or better in MATH 108); SOM 301 (Prerequisite/corequisite: C or better in ACCT 203, DESC 210, and ENGL 302)
• A minimum Mason cumulative and semester GPA of 2.00 at the end of the semester of application.

Please note: Students must meet the admission requirements in effect at the time of application to the school.

Applications must be submitted by November 1 for the following spring semester; by April 1 for the following Summer Term; and by 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.

Academic Advising
Academic planning for undergraduate students is available in the SOM Office of Academic and Career Services, Enterprise Hall, Room 908. Students are encouraged to consult with an advisor regularly. Any student who wishes to change to a major in the SOM must consult an SOM academic advisor for degree requirements. For more information about making an appointment or walk-in advising hours, call 703-993-1880 or go to www.som.gmu.edu.

Accounting, BS

Degree Requirements
The BS in accounting (ACCT) prepares students for professional careers in the private and public sectors of the economy. 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 decision-making purposes. Students also learn how to design and test information systems that provide reliable and relevant information for planning and control. Further, students learn how to identify value-creating opportunities and choose 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 degree is separately accredited by AACSB International.

In addition to the 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 321 Financial Reporting and Analysis
• ACCT 351 Taxation and Managerial Decision Making
• ACCT 361 Accounting Information Systems
• ACCT 421 Advanced Financial Accounting Topics
• ACCT 461 Assurance and Audit Services

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.

Note: Students who anticipate taking the Uniform CPA exam in Virginia after June 30, 2006, will be required to complete a minimum of 150 credits, including a baccalaureate or higher degree conferred by an accredited college.

Decision Sciences and Management Information Systems, BS

Degree Requirements
The BS in decision sciences and management information systems (DMIS) prepares students for a range of career options that involve applying information technology and quantitative methods to business problems. Knowledge of business functions as well as information technology is necessary to assess information requirements and leverage technology to design and improve business processes. The content of the DMIS major is at the intersection of technology, process, and people.

In addition to the general degree requirements for the major, students who major in DMIS must complete 18 credits of upper-level DMIS courses with a grade of C or better in each course. Of these, 9 credits are taken up by the required
courses for the major as listed below. Students have considerable flexibility in their choice of electives, and may choose from two tracks of study: one in management information systems, which prepares students for a career in the information technology industry; and the other in management of business operations, which develops expertise in areas such as quality, project, and supply chain management and business process analysis. Students are strongly urged to discuss their choice of electives and programs of study with their advisor. It is also strongly recommended that students planning to major in DMIS take MIS 302 as part of their program.

Required courses
MIS 310 Introduction to Database Management Systems
MIS 320 Business Data Communications
MIS 330 Computer Systems Analysis and Design

Electives (choose three)
DESC 320, 352, 435, 452, 456, 493, or 499
MIS 302, 411, 412, 430, 435, 440, 450, 491, or 499

Finance, BS

Degree Requirements
The BS in finance (FNAN) prepares students for professional careers by providing a solid foundation in financial principles necessary to make operating decisions for an organization. In addition to the general degree requirements for the major, students must complete 18 credits in upper-level finance courses with a grade of C or better in each course.

Required courses (choose three)
FNAN 302 Financial Analysis and Forecasting
FNAN 311 Principles of Investment
FNAN 321 Financial Institutions
FNAN 401 Advanced Financial Management

Electives (choose three)
FNAN 302, 311, 321, or 401, if not taken as a required course
FNAN 351, 411, 412, 421, 440, 451, or 491

Management, BS

Degree Requirements
The BS in management prepares students for management and leadership in the public and private sectors. In addition to the general degree requirements for the BS, students must complete 18 credits in upper-level management courses with a grade of C or better in each course.

Required courses
MGMT 312 Principles and Practices of Management
MGMT 321 Introduction to Human Resource Management

Electives (choose four)
Recommended for students focusing on human resource management or personnel: MGMT 412, 413, 421, 431, 463, or 464.
Recommended for students interested in pursuing a career as a manager, executive, or management consultant: MGMT 413, 451, 461, 463, 464, or 471.
Recommended for students with entrepreneurial interests: MGMT 421, 451, 463, or 471

Enrollment in the Honors Seminar (MGMT 462) is by management faculty invitation. To be eligible for an invitation, a student must be accepted into SOM with a management major; have a cumulative GPA of at least 3.00 with a minimum of 75 semester hours of course work; and have a minimum GPA of 3.00 in course work completed for the management major. The size of the Honors Seminar will be kept small. If the number of interested and qualified students exceeds the number of available spots, management faculty will enact a selection process.

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 nonprofits 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.

In addition to the required core courses for the BS degree, students must complete 18 credits of upper-level marketing courses with a grade of C or better in each course.

Required Courses
MKTG 311 Principles of Marketing
MKTG 315 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
MIS 320 Business Data Communications
MKTG 315 Internet Marketing
MKTG 451 Competitive Intelligence and Information Security
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 nonmatriculated students to earn the academic credit necessary to sit for and pass the Uniform CPA Examination for Virginia. The
requirement for enrollment is a bachelor’s degree or higher from an accredited college or university.

Candidates are required to complete a minimum of 24 credits of accounting courses, 15 of which must be taken at Mason. The additional recommended credits (up to a maximum of 18 credits) that are required to meet the minimum academic requirements to sit for the Uniform CPA Examination for Virginia may be completed 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.

Required courses
- ACCT 203 Survey of Accounting
- ACCT 301 Financial Accounting and Decision Making
- ACCT 311 Managerial and Cost Accounting
- ACCT 321 Financial Reporting and Analysis
- ACCT 351 Taxation and Managerial Decision Making
- ACCT 361 Accounting Information Systems
- ACCT 421 Advanced Financial Accounting
- ACCT 461 Assurance and Audit Services

Recommended courses (courses are consistent with content specification outline for the CPA exam)
- BULE 302 Legal Environment of Business
- BULE 402 Commercial Law
- DESC 210 Statistical Analysis for Management
- FNAN 301 Financial Management
- FNAN 302 Financial Analysis and Forecasting
- MIS 301 Introduction to Business Information Systems

■ 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 information technology. Strong written and oral communication skills are expected of students. Prior to beginning the minor in business, students must have completed 29 credits. The minor in business consists of the following seven courses. Students must complete five of the seven courses for a total of 15 credit hours*. 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 global understanding requirement.

*Students that have already taken and received credit for MGMT 301, MIS 301, MKTG 301, or DESC 301 shall substitute courses as follows: MGMT 301 for MSOM 301, MIS 301 for MSOM 302, MKTG 301 for MSOM 303, and DESC 301 for MSOM 306. Both courses cannot be taken for credit. Students that 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. The same policies for like substitutions apply.

GRADUATE PROGRAMS
Graduate Admissions
4400 University Drive, MS 5A2
Fairfax, VA 22030-4444
Phone: 703-993-2136
Fax: 703-993-1778
Web: som.gmu.edu
E-mail: somgrad@gmu.edu

SOM offers the MS in bioscience management, MBA, the executive MBA, and the MS in technology management. Graduate programs are accredited by AACSB International.

■ Bioscience Management, MS
Phone: 703-993-2136
E-mail: bioman@gmu.edu

The MS in bioscience management is designed to provide students with a graduate management education that will help them further their leadership career in bioscience-oriented firms and organizations, including those in the biotechnology, biodefense, and pharmaceutical industries. The bioscience industry today is undergoing rapid scientific and business change. Genomics and proteomics are moving to the forefront, while medicine is becoming more personalized and bioscience businesses are competing globally. To prepare bioscience leaders to compete in this environment, the SOM and a consortium of Washington, D.C., area bioscience firms and organizations established this program. It addresses how to succeed in the market-place, and emphasizes leadership and management; the special considerations of bioscience entrepreneurship, product development and regulation, and systems thinking.

Students are from the major bioscience firms in the Washington, D.C., region and from across the country. They average 10 years of work experience, with a mix of business and science academic and work backgrounds.

Admissions Requirements
Applicants 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 uses the ClassroomPlus™ approach to facilitate the participation of a national student body from the major biotechnology industry regions. Two to four days of face-to-face class meetings are held at the beginning and end of each semester. These meetings are held at Mason’s Arlington Campus, and usually span the end of a week and the weekend. In addition, two-hour video conference sessions are held every other week for each course. The professor and the Washington-area students meet at the
Fairfax Campus, and students from across the country participate from their home location.

**Academic Year I**

**Fall semester**
- MSBM 603 Managerial Economics and Decisions of the Firm
- MSBM 613 Financial Reporting and Decision Making

**Spring semester**
- MSBM 643 Managerial Finance
- MSBM 653 Organizational Behavior

**Summer session**
- MSBM 623 Marketing Management
- MSBM 712 Project Management

**Academic Year II**

**Fall semester**
- MSBM 650 Legal and Ethical Aspects of Bioscience Management
- MSBM 735 Bioscience Management Capstone Project—Start
- MSBM 745 Life Science Product Development and Risk Management

**Spring semester**
- MSBM 703 Best Practices in R&D Management
- MSBM 720 Analysis of the Bioscience Industries

**Summer Session (includes one-week international residency)**
- MSBM 735 Bioscience Management Capstone Project—End
- MSBM 750 Global Aspects Bioscience Management

**Business Administration, MBA**

703-993-2136

E-mail: somgrad@gmu.edu

The Mason MBA program provides a high-level professional education in business administration. It is offered as both a part-time and a traditional full-time program. 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 is 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. Further, technological proficiency must be demonstrated through prior academic course work or professional work experience. Applicants are evaluated primarily on undergraduate record and GMAT performance. For information on the GMAT, go to www.mba.com. A minimum of two years of professional work experience before entering the program is required. Preference is also based on strength of professional background and leadership potential. These criteria are applied with a reasonable amount of flexibility to ensure that individuals with unusual academic and professional qualifications are considered. Priority is given to applicants submitting their application by November 1 for the following spring semester, and by 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.

Students are admitted in fall and spring semesters to commence course work. The curriculum effectively integrates functional areas with the use of information technology, 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 either two or three years depending upon the cohort selected. Due to the cohort structure, part-time students must commit to attending classes a minimum of two times per week, and full-time students are expected to attend classes in the late afternoon three or four days each week. Part-time students are expected to enroll in classes during the summer session to complete their degrees on a timely basis.

**Core Courses, 30 Credits**

The core courses usually must be 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 normally enroll in 12 credits per semester, with no expectation for enrollment in the summer session.

All MBA students must complete the following core courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBA 612</td>
<td>Managing Costs and Evaluating Performance</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 613</td>
<td>Financial Reporting and Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>MBA 623</td>
<td>Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 633</td>
<td>Statistics for Business</td>
<td>3</td>
</tr>
<tr>
<td>MBA 643</td>
<td>Managerial Finance</td>
<td>3</td>
</tr>
<tr>
<td>MBA 653</td>
<td>Organizational Behavior and Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>MBA 673</td>
<td>Legal Environment for Management</td>
<td>1.5</td>
</tr>
<tr>
<td>MBA 678</td>
<td>Strategy and Organizational Leadership</td>
<td>3</td>
</tr>
<tr>
<td>MBA 798</td>
<td>Global Business Perspectives*</td>
<td>3</td>
</tr>
</tbody>
</table>

*Travel outside the United States is required.

**Elective courses, 18 Credits**

After completing the core courses, students must complete a series of market-driven elective courses. A limited number of courses from outside of the MBA program 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 financial management, entrepreneurship, market and business development, or information systems management.

**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 Strategies
- 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 Valuation and Analysis
- MBA 708 Taxes and Business Strategies
- MBA 712 Project and Cost Management
- MBA 713 Human Resource Management
- MBA 721 Marketing Decision Systems
- MBA 725 Leadership
- MBA 736 Managing Digital Business
- MBA 719 Entrepreneurship Laboratory (1 credit, may be repeated 3 times)

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

Note: One elective must be taken outside this concentration.

Information Systems Management

**Required courses**
- MBA 731 Business Systems Development
- MBA 732 Knowledge Management
- MBA 733 Business Data Communications

Two courses from the following:
- MBA 711 Entrepreneurship
- MBA 734 Electronic Commerce
- MBA 735 Systems Thinking and Business Simulation
- MBA 736 Managing Digital Business
- MBA 737 Corporate Information Systems Policy

Note: One elective must be taken outside this concentration.

◆ CIO Certification

**Contact:**
- Phone: 703-993-2136
- E-mail: somgrad@gmu.edu

The certificate consists of a minimum of seven courses. Mason MBA students may fulfill the requirements as part of the information systems management concentration; Mason MBA and EMBA alumni may also complete the certificate, but must take any additional required courses that were not taken as part of their degree program. In addition, graduates of any other MBA or EMBA program accredited by AACSB International may complete the certificate by enrollment in the MBA Plus program.

**Required courses**
- MBA 731 Business Systems Development (or equivalent)
- MBA 732 Knowledge Management (or equivalent)
- MBA 799 Corporate Information Systems Policy

Two additional courses from the following:
- MBA 733 Business Data Communications (or equivalent)
- MBA 734 Electronic Commerce
- MBA 735 Systems Thinking and Business Simulation
- MBA 736 Managing Digital Business

Two additional courses from the following:
- MBA 712 Project and Cost Management (or equivalent)
- MBA 713 Human Resource Management (or equivalent)
- MBA 725 Leadership (or equivalent)

If alumni from other AACSB International programs have taken any of these courses in their MBA program as an upper-level elective, they may submit evidence of having taken the course and will be given credit for up to two courses in the seven courses required for the certificate. They will be waived from having to repeat a course they have taken, and must choose from the remaining electives for a minimum total of five courses, which is a Mason requirement for a graduate, credit-bearing certificate.

**Executive MBA**

Phone: 703-993-2136

E-mail: emba@gmu.edu

This 21-month, general management program leads to the MBA degree. It is for mid- to senior-level executives who have a deep functional knowledge in one or more areas and want to broaden their knowledge and skills in all business functional areas. The program’s focus is leadership growth and strategic management of business resources, technology, and operations.

The class schedule of alternating Fridays and Saturdays is designed to allow participants to continue their careers while they study and master a broad range of functional and leadership skills.

The curriculum incorporates three distinctive elements: a focus on services as the dominant context, competencies needed to transition to executive rank, and an understanding of the transformational impact of technology.

**Participants**

The Executive MBA is designed for those with significant business and professional experience. Participants must have the support of their organizations (such as being given the time to attend class). Financial sponsorship is desired but not required.

Sponsoring organizations include ATPCO, AMS, Apple Federal Credit Union, Blue Cross/Blue Shield, Booz Allen Hamilton, Case New Holland, Center for Naval Analyses, Cisco, CSC, DISA, Department of Defense, Department of Homeland Security, EDS, Ernst & Young, ExxonMobil, Fannie Mae, Freddie Mac, GE Healthcare Financial Services, General Dynamics, HP, IBM, KPMG, Level (3)

Methods of Instruction
Study groups, an essential part of the Executive MBA experience, are arranged by the program director. The groups usually meet independently once a week to discuss course work and prepare class presentations. Between classes and study group sessions, group members continue to work collaboratively through a groupware platform provided by the program.

The faculty encourages classroom discussions in which opinions are shared and experiences reviewed for the benefit of the whole class. The program is designed to combine the theoretical with the practical, making each person’s contribution to the discussion essential.

Residency Weeks
Four residency sessions complete the Executive MBA experience: a four-day orientation residency, a two-week global residency, a one-week joint cohort residency in New York City, and a one-week Oxford University “Doing Business in the EU” residency.

The global residency is scheduled at the end of the first year. It is a two-week international program to help students integrate the managerial disciplines learned during the year. The global residency focuses on developing an increased understanding of global markets, competition, business strategy, and business opportunities. This residency will be held in Asia, South America, or some other area in the world where there is relevant business activity.

The one-week joint cohort residency in New York City, held the third week of January every other year, focuses on financial markets, regulatory effects on business decision-making, ethical financial market considerations, and entrepreneurship within the financial sector. During the week, students hear from prominent speakers and visit many financial institutions including NYMEX, NASD, and the Stock Exchange.

The one-week Oxford University “Doing Business in the EU” residency, held the third week of March in the last semester of a student’s program, focuses on EU business and regulation. Students stay at Mansfield College at Oxford University, and attend seminars with Oxford professors and EU business representatives. One day is spent in London on site visits to appropriate EU regulatory agencies.

Program Schedule

**Academic Year I**
- EMBA 603 Managerial Economics
- EMBA 613 Financial Reporting and Decision Making
- EMBA 633 Statistics for Business Decision Making
- EMBA 653 Organizational Behavior
- EMBA 638 Operations Management in a Digital World
- EMBA 623 Marketing Management
- EMBA 643 Managerial Finance
- EMBA 791 Business, Government, and Regulatory Interface
- EMBA 798 International Business Environment

**Academic Year II**
- EMBA 612 Managing Costs and Evaluating Performance
- EMBA 660 Information Technology Management
- EMBA 673 Legal Environment for Managers
- EMBA 778 Strategic Management
- EMBA 791 Business, Government, and Regulatory Interface
- EMBA 713 Human Resource Management
- 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 work for federal government agencies or departments.

**Admissions 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 the student 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

Full 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
- 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
- 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.
The State Council of Higher Education for Virginia and the State Board of Nursing approved the baccalaureate nursing program in 1974. Since that time, 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 (CNHS) to provide the breadth needed to respond to dramatic and dynamic fundamental changes occurring in healthcare. The college’s community-based curriculum has become a national and international model, serving to inform and guide curriculum change as decentralization trends move the focus of healthcare from the institutional to regional and local community-based care.

The mission of CNHS 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 the citizens of the Commonwealth of Virginia.

**Administration**
- Shirley Travis, Dean
- Rosemarie C. Brenkus, Assistant Dean for Student Academic Affairs
- Christena Langley, Assistant Dean for Undergraduate Programs
- Teresa Panniers, Assistant Dean for Graduate Programs in Nursing
- Farrokh Alemi, Acting Assistant Dean for Graduate Programs in Health Science

**Faculty**
- **Professors:** Ailinger, Butler, Carty, Feeg, Johnson-Brown, Maddox, Meiners, Metcalf, Silva, Sorrell, Travis, Wakefield
- **Associate professors:** Alemi, Baghi, Chong, Dawson, Douglas, Fisher, Gaffney, Jennings, Moore, Noble, Panniers, Redmond, Vail, Wu
- **Assistant professors:** Atherton, Boland, Boyd, Brenkus, Carle, Cangelosi, Cofer, Davidson, Holaday, Kodadke, Langley, McDaniel, Normile, Pawloski, Roberts, Rudowski, Smoczynski, Willis, Young
- **Instructors:** Alsace, Blasser, Boyd, Davis, Dickman, Durham, Durr, Gillette, Liss, Maradiegue, McClean, Merritt, Miklancie, Moss, O’Donnell, Obalde, Robertson, Stoehr, Urban, Venske
- **Lecturers:** Brown, Courtney-Jenkins, Heddleston, Henry, McGihon, Morton, Sharp
Student Health Services
The George Mason University Student Health Services is operated through a partnership between CNHS and University Life.

Course Work
CNHS offers all course work designated NURS and HSCI in the “Course Descriptions” chapter of this catalog.

ACADEMIC PROGRAMS

Undergraduate Degrees and Pathways
• Bachelor of Science in Nursing (BSN)
• Traditional
• Accelerated Master’s Degree for Traditional Students
• LPN-BSN
• Second Degree
• Bachelor of Science in Health Science
• Health Systems Management (traditional and accelerated pathways)
• Healthcare Coordination (traditional and accelerated pathways)
• Assisted Living
• Gerontology

Graduate Degrees and Pathways
• Master of Science in Nursing (MSN)
• Nurse Administration
• Advanced Clinical Nursing
• Nurse Practitioner
• RN-MSN
• Master of Science in Health Science
• Gerontology
• Master of Science in Health Systems Management
• Health Systems Management
• Health Policy Analysis
• Health Information Systems
• Assisted Living Management
• MSN/MBA
• Nursing, PhD

Certificates
• Nutrition (undergraduate)
• Gerontology (undergraduate and graduate)
• International Health (graduate)
• Nursing Administration (graduate)
• Nursing Education (graduate)
• Conflict Resolution for Health Professionals (graduate)
• Quality Improvement and Outcomes Management in Healthcare Systems (graduate)
• Health Information Systems (graduate)
• Assisted Living Administration (graduate)
• George Mason/George Washington University Post Master’s Nurse Practitioner (adult and family)
• Biostatistics
• Healthcare Security and Privacy

Nursing, BSN
The BSN degree prepares graduates to function as professional nurses in hospitals, long-term care facilities, and the community. The community-based program may be completed on a full- or part-time basis. Special accelerated pathways for registered nurses (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. (The Saudi Scholarship Project students complete this program in a 15-month sequence.) 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 to one of the accelerated pathways. This does not apply to students who are already registered nurses.

Acceptance Into Junior Standing in Nursing
Students who are interested in pursuing a major in nursing must make an additional and separate application for junior standing through CNHS. (This does not apply to students who are already RNs.) To be eligible to apply for junior standing, traditional prenursing students must complete the specified general education requirements, which apply to the degree, by the end of the spring semester. LPN students who desire to be full-time students must complete all prerequisite general education requirements by the end of the semester preceding entry into the nursing major. Students must earn a C or better in psychology (6 credits); sociology or anthropology (3 credits); BIOL 124 and 125 (8 credits); and BIOL 246 and 306 (4 credits).

Admission to the nursing program is competitive. It is based on a minimum cumulative GPA of 3.00 in the prerequisite university general education course work (wherever taken) required for the degree (excluding electives, U.S. history, western civilization, global understanding, information
technology, and English 302). 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.

Students are accepted for junior standing each fall. The application deadline is April 1, and students are notified of their status in early June. LPN students desiring to be full-time students in the spring semester must submit an application by November 15. Part-time LPN students are admitted in the fall and spring semesters. Permission to register for NURS 330, 331, 332, and 333 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.

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

<table>
<thead>
<tr>
<th>Credits</th>
<th>Language arts, culture, and global understanding</th>
<th>ENGL 101 and 302 (3 credits of humanities are a prerequisite to ENGL 302)</th>
<th>Communication</th>
<th>Ethics</th>
<th>Literature (at 200 level or above, does not include ENGL 101 and 302)</th>
<th>U.S. history</th>
<th>Western civilization</th>
<th>Global understanding</th>
<th>Social and behavioral sciences</th>
<th>Sociology or anthropology</th>
<th>Psychology (PSYC 100 and 211)</th>
<th>(Any psychology for RNs and LPNs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural sciences and mathematics</td>
<td>BIOL 124 and 125</td>
<td>Microbiology (BIOL 246 and 306)</td>
<td>Statistics (STAT 250)</td>
<td>Normal nutrition (HSCI 295)</td>
<td>Information technology</td>
<td>Nursing major</td>
<td>NURS 330, 331, 332, 334, 335, 337, 340, 341, 342, 343, 344, 345, 346, 410, 425, 436, 440, 441, 442, 451, 453, 455, 465</td>
<td>Nursing major</td>
<td>58–62</td>
<td>Electives</td>
<td>(No more than 3 credits of nursing electives may be used to satisfy this requirement.)</td>
<td>Total</td>
</tr>
</tbody>
</table>

Students pursuing a BSN must take BIOL 124 and 125. This will meet the natural science portion of Mason’s general education requirements. Nursing students are exempt from the general education requirement of a fine arts course.

Nursing students must take an approved synthesis course (NURS 465, 3 credits). Mason provides opportunity for credit by exam in several courses for students presenting evidence of previous education. Programs of study are based on student needs.

**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 nursing course final grade lower than C must repeat the course and earn a grade of C or higher. In these cases, students are placed on “nursing academic warning.” They must notify the assistant dean for undergraduate programs in writing, within two weeks of final exams, of their intent to repeat the course. 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.

Students may repeat only one time a nursing course in which they earned a grade lower than C. 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.

Nursing majors who fail a course must repeat the course and earn a C or higher to resume progression in classes with NURS/HSCI prefixes. Before the course is repeated, the student may not register for any other courses with a NURS or HSCI prefix.

**Professional Conduct Policy**
CNHS reserves the right to place on probation, suspend, or dismiss any student from the program who does not demonstrate professional conduct. This includes, but is not limited to, verbal abuse and insubordination as well as behavior that threatens the safety of a client, another student, a faculty member, or other healthcare provider when the behavior occurs within the context of the academic program. The student has the right to appeal. The process for implementation of this Professional Conduct Policy is documented in the CNHS handbook.

**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 undergraduate programs 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 upon readmission. Students meeting the above criteria are considered for readmission on a space-available basis. Students have the right to appeal unfavorable decisions.

**Leave of Absence**
Students in good standing may request a leave of absence from the nursing program of up to two semesters.
Readmission following the leave of absence is granted only on a space-available basis.

**Appeal Process**

Faculty members in the nursing program are generally the best judges of a student’s professional performance. However, some students may feel that their 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 dean. If the dean believes the student may have a legitimate complaint, the dean 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 dean with a copy to the assistant dean.

**Background Check**

Clinical agencies mandate that all students have a criminal background check. Information obtained from the background check may result in a student’s inability to perform clinical activities in the healthcare facilities and therefore, will disqualify the student from entering or continuing in the nursing program. Students must pay a fee for the background check. Students also are responsible for notifying the assistant dean of student academic affairs 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 academic affairs may be grounds for dismissal from the nursing program.

**Undergraduate Honors Program**

The undergraduate honors program provides opportunities for highly motivated, self-directed students seeking enriched course work and research involvement. Highly qualified students in any of the nursing and health science programs are eligible to participate in specialized course work while working closely with an honors faculty advisor and graduate students. The undergraduate honors program includes a minimum of 6 credits, or two to three semesters, accomplished through nursing courses designated as honors courses. These courses could be a section of an existing course or special courses developed for the honors program, such as Honors Colloquium. Other honors course work includes independent study courses designated as honors courses, and add-on honors credits completed in conjunction with an existing required nursing course (up to 2 credits are earned for additional work required of an honors student). All honors courses include the word “honors” so they are easily identified in the catalog, Schedule of Classes, and registration forms for specialized courses, and on student transcripts.

Criteria for admission to the undergraduate nursing honors program are as follows:

- Mason students awarded general education honors and achieving a 3.00 GPA in the prerequisite course work for junior standing are accepted into the nursing honors program. All other interested traditional students apply during the first semester of junior-level nursing course work. Interested LPN and RN pathway students apply while taking NURS 334.
- Applicants must have a GPA of 3.500 or better. They must submit a short essay; a letter of reference from a teacher familiar with their academic abilities; and a letter of reference from a colleague able to speak to the applicant’s leadership potential, and past and future community involvement.

Final decisions on acceptance are made by the College of Nursing and Health Science Honors Admissions Committee. Students admitted to the nursing honors program do not constitute more than 10 percent of the graduating students receiving BSN degrees each year.

**Student Learning Portfolio**

All students in CNHS initiate a learning portfolio during the first semester of their senior year. The purpose is to provide 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 are required to take a computerized version of a practice NCLEX-RN exam in the first semester of their senior year. Students must achieve a score of 80 percent or higher. Students who do not achieve this score must complete an individualized study program, repeat the NCLEX review exam, and score 80 percent or above. Successful completion of the NCLEX review exam 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 is required of all students before beginning the first semester of nursing. A one-time health records review fee of $10 is required for all students before their first clinical rotations.

Nursing students are required to obtain a health examination and immunizations before registering for their first clinical course. Students must complete two of 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. Student immunization records are monitored at CNHS’s Office of Student Academic Affairs, which charges a small fee for this service.

Clinical agencies sometimes require additional records and documentation, such as criminal background checks, 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, 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 healthcare situations. A complete and detailed HIV/HBV policy is available in the CNHS’s Office of Student Academic Affairs.

Academic Affairs
All students are required to have an active Mason e-mail account. Students are responsible for their own uniforms and transportation. Student liability insurance is provided by the university. Students are strongly advised to maintain health insurance coverage at all times. An accident and health insurance plan is available through Mason. Students are responsible for their own healthcare, including emergency care. The nursing program assumes no financial responsibility for the healthcare of students.

All students must have CPR certification before entering the first clinical nursing course, and maintain it through the remainder of the program. Either the American Red Cross Professional Rescuer or the American Heart Association Basic Life Support is required.

The drop period for nursing courses offered for fewer than 14 weeks is three weeks.

Because knowledge, skills, and behavior patterns in the major field of this program are so vital to the health and perhaps even the survival of individuals or groups being served, failure or borderline achievement cannot be tolerated. Therefore, the faculty of the nursing program has established, with approval of university faculty and administration, special major field quality standards that go beyond the general university quality standards printed elsewhere in this catalog.

RN and LPN Licensure Requirement
RN and LPN students are required to submit a copy of their license prior to entering the first nursing course.

Health Science, BS
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; insurance industry; and financial consultant services. Two pathways are available: health systems management and healthcare coordination.

The program may be completed on a full- or part-time basis; special accelerated pathways for graduates of allied health technical programs take into account the needs of the adult learner. Interested students should contact the health science program before admission. All pathways lead to completion of the objectives of the undergraduate health science program. The major begins at the junior year. A minimum grade of C must be obtained in all health science courses.

Students must check with their advisor to ensure that all university general education requirements have been met prior to graduation. Students may substitute three, 3-credit health science courses for the internship with the approval of the advisor, depending on work experiences.

**Program Requirements**

**Health Systems Management Traditional Pathway**

<table>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language arts and humanities</td>
<td>27</td>
</tr>
<tr>
<td>ENGL 101 and 302</td>
<td>6</td>
</tr>
<tr>
<td>COMM 101</td>
<td>6</td>
</tr>
<tr>
<td>PHIL 309</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>U.S. history</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Fine arts</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Behavioral and social sciences</td>
<td>6</td>
</tr>
<tr>
<td>SOCI 101 or ANTH 114</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 100</td>
<td>3</td>
</tr>
<tr>
<td>Natural science and mathematics</td>
<td>14</td>
</tr>
<tr>
<td>BIOL 103 and 104</td>
<td>8</td>
</tr>
<tr>
<td>STAT 250</td>
<td>3</td>
</tr>
<tr>
<td>Information technology</td>
<td>3</td>
</tr>
<tr>
<td>Business and management</td>
<td>21</td>
</tr>
<tr>
<td>ECON 100 or 103</td>
<td>3</td>
</tr>
<tr>
<td>MSOM 300, 301, 302, 303 and 304 or 305</td>
<td>15</td>
</tr>
<tr>
<td>BULE 302</td>
<td>3</td>
</tr>
<tr>
<td>Health science major</td>
<td>33</td>
</tr>
<tr>
<td>HSCI 302, 303, 332, 378, 436, 440, 453, 465, 498</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>19</td>
</tr>
<tr>
<td>(two must be in HSCI)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
</tr>
</tbody>
</table>

**Concentration in Assisted Living Administration**

Students must meet all requirements listed in the health systems management traditional pathway with the exception of the two health science electives and 3 credits of general electives. These courses are replaced with the following courses: HSCI 307, 480, and either 492 or 585. An internship is required. Students complete this internship either in Senior Services (HSCI 498, 9 credits) or Hospitality Services (15 credits; 9 credits for HSCI 498 and 6 credits independent study).

**Healthcare Coordination Traditional Pathway**

<table>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language arts and humanities</td>
<td>33</td>
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<tr>
<td>ENGL 101 and 302</td>
<td>6</td>
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<tr>
<td>COMM 101, 305, and 320</td>
<td>9</td>
</tr>
<tr>
<td>PHIL 309</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>Fine arts</td>
<td>3</td>
</tr>
<tr>
<td>U.S. history</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Behavioral and social sciences</td>
<td>12</td>
</tr>
<tr>
<td>SOCI 101 or ANTH 114</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 100, 211, and 321</td>
<td>9</td>
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</tbody>
</table>
### Degree Requirements

Students pursuing the healthcare coordination pathway in the health science major must take BIOL 124 and 125 to meet the natural science portion of Mason’s general education requirements.

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language arts and humanities</td>
<td>27</td>
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<tr>
<td>COMM 101</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 309</td>
<td>3</td>
</tr>
<tr>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td>U.S. history</td>
<td>3</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Fine arts</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Behavioral and social sciences</td>
<td>6</td>
</tr>
<tr>
<td>PSYC 100</td>
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</tr>
<tr>
<td>Natural science and mathematics</td>
<td>14</td>
</tr>
<tr>
<td>BIOL 103 and 104</td>
<td>8</td>
</tr>
<tr>
<td>Information technology</td>
<td>3</td>
</tr>
<tr>
<td>STAT 250</td>
<td>3</td>
</tr>
<tr>
<td>Business and management</td>
<td>21</td>
</tr>
<tr>
<td>ECON 101 or 103</td>
<td>3</td>
</tr>
<tr>
<td>MSOM 300, 301, 302, 303, and 304</td>
<td>15</td>
</tr>
<tr>
<td>or 305</td>
<td></td>
</tr>
<tr>
<td>BULE 302</td>
<td>3</td>
</tr>
<tr>
<td>Health science major</td>
<td>55</td>
</tr>
<tr>
<td>HSCI 302, 303, 332, 334*, 344, 436, 440, 465, 498</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
</tr>
</tbody>
</table>

* Upon completion of bridge course HSCI 334, students are awarded 13 advanced placement credits from the associate’s degree program.

### Gerontology Track

**Admission Requirements**

The gerontology concentration is designed for students interested in providing services to the elderly in a variety of settings including hospitals, clinics, community health centers, home health and senior centers, senior housing, and long-term care centers. The program provides foundational knowledge in health science and aging, and is suitable for students who wish to function as clinicians, managers, and advocates for the elderly. Students will be able to synthesize health science knowledge with gerontological knowledge and skills and apply it to the rapidly developing field of aging to improve the quality of life for a growing population. The degree is desirable for students who wish to prepare for a beginning career in gerontology, for workers already in the field, and individuals seeking to increase their understanding of the aging process and human development.

Students from a variety of disciplines may be admitted to this program. Students must show a capacity for undergraduate work, and must be prepared to complete a 128-credit practicum experience of six to eight hours per week in an appropriate organization.

Students must submit a completed Mason application and satisfy university-wide general admission requirements as specified in this catalog.

Applicants must also submit certified copies of all secondary and college transcripts, and proof of satisfactory scores on the SAT or ACT. Applicants whose native language is not English should submit TOEFL results. Other requirements for international applicants are specified in this catalog.

**Degree Requirements**

Students must satisfy Mason’s general education requirements for the BS degree, and CNHS requirements for the BL in health science degree, gerontology track. They must complete 120 credits of undergraduate course work. This
includes 41 credits of general education requirements, 6 credits of CNHS prerequisites, 36 credits of health science and gerontology specialization core requirements (including 9 credits of gerontology internship), and 37 credits of electives for health science and gerontology specialization.

Program of Study

Please refer to the “Course Descriptions” chapter of this catalog for descriptions.

<table>
<thead>
<tr>
<th>Credits</th>
<th>General Education</th>
<th>41</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ENGL 101 and 302</td>
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<tr>
<td></td>
<td>COMM 101</td>
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</tr>
<tr>
<td></td>
<td>Statistics 250</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Literature</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Fine Arts</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Anatomy and Physiology</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>U.S. History</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Western Civilization</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Global Understanding</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Psychology 101</td>
<td>3</td>
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<tr>
<td>IT3</td>
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</tr>
</tbody>
</table>

CNHS Additional Prerequisites | 6
Sociology 101 | 3
Philosophy 151 or 309 (Ethics) | 3

Health Science and Gerontology Specialization Core Requirements | 36
HSCI 480 Health Aspects of Aging | 3
SOCI 441 Sociology of Aging | 3
PSYC 415 Psychology of Aging | 3
HSCI 307 Philosophy and Management of Assisted Living | 3
HSCI 453 Healthcare Research | 3
HSCI 332 Health Promotion and Disease Prevention | 3
HSCI 436 Leadership and Management in Healthcare | 3
HSCI 440 Community Health and Epidemiology | 3
HSCI 490 Gerontology Internship | 9
HSCI 465 Professional Transition Seminar | 3

Electives for Health Science and Gerontology Specialization | 37
Gerontology Electives | 6
Non-Gerontology Electives | 3

Total credits | 120

Minor in Nutrition

The minor in nutrition offers a variety of courses for students pursuing undergraduate degrees at Mason. Students who may be interested in completing the minor include those pursuing degrees related to nutrition, health and education. The minor is intended to increase knowledge of nutrition issues. This minor is not equivalent to the registered dietitian license, and does not provide a license to practice therapeutic nutrition.

Minor Requirements

Applications are encouraged from all areas at Mason. Application is made through CNHS. Students are required to take an introductory nutrition course such as HSCI 295. To complete the minor, students are required to pass 15 credits of undergraduate or graduate course work. At least 6 credits must be completed at Mason, and no more than 3 credits of C- or D in the minor are accepted.

Course Requirements

<table>
<thead>
<tr>
<th>Credits</th>
<th>Required Courses</th>
<th>12</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>HSCI 420 Strategies for Nutrition</td>
<td>3</td>
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<tr>
<td></td>
<td>HSCI 421 Community Nutrition</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HSCI 422 Nutrition Throughout the Lifecycle</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HSCI 423 Nutrition and Chronic Illness</td>
<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
<th>Electives (select one)</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHEM 102 Introduction to Organic and Biological Chemistry</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHEM 463 General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HSCI 530 Nutrition: A Global Perspective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>HSCI/NURS 583 Food and Culture: Biocultural Perspectives on Food and Nutrition</td>
<td>3</td>
</tr>
</tbody>
</table>

Certificate in Gerontology

The undergraduate certificate program in gerontology prepares students for work with older adults, as well as with professionals who are already working with the elderly. The program provides a background of basic knowledge in gerontology, and prepares students in professional skill areas such as counseling, recreation, social work, nursing, and administration.

The certificate program is administered by the CNHS. Three other academic units participate in the program: the College of Education and Human Development, Department of Psychology, and Department of Sociology and Anthropology. A Gerontology Certificate Committee determines program policy and curriculum. Academic advising and an application form are available through CNHS.

Certificate Requirements

The certificate program consists of 24 credits. Students receiving the certificate must already hold a baccalaureate degree, or have earned one from Mason by the time they receive the certificate.

The 24 credits are divided as follows:
- A minimum of 12 credits selected from the following: HSCI 480; NURS 505, 570; PRLS 315, 415; PSYC 415; SOCI 441; and SOCW 483
- 6 credits in a practicum in gerontology: PSYC 548, 549. Students must have completed at least 9 credits of core courses before enrolling in the practicum.
- 6 credits of electives selected from the following: HEAL 110, 323, 480; HSCI 332; PHED 415, 450, 499; PRLS 210, 310; PSYC 211, 325, 326, 415, 423; PUAD 502, SOCI 350, 390, 599; SOCW 300, 351, 352; reading and research in gerontology from any department

Undergraduate Certificate in Nutrition

This program offers a variety of courses in nutrition for future and present healthcare professionals, researchers, and others who are commonly faced with community-related nutrition issues. The program is intended to help healthcare 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 in nursing. Applications are encouraged from all areas of nursing and health sciences. Application is made through CNHS. A requirement for the certificate is 24 credits of undergraduate or graduate coursework.

Program of Study

Credits
Required Courses ................................................ 21
HSCI 295 Nutrition for Health Professionals 3
HSCI 420 Strategies for Nutrition Education 3
HSCI 421 Community Nutrition 3
HSCI 422 Nutrition Throughout the Lifecycle ................. 3
HSCI 423 Nutrition and Chronic Illness .......... 3
One sociology or anthropology course
(which may include HSCI/NURS 583) ...... 3
One developmental course such as psychology or education. ...................... 3

General Nutrition Electives ................................. 3
(Select one that has not been taken as a required course)
CHEM 102 Introduction to Organic and Biological Chemistry ....................... 3
CHEM 463 General Biochemistry ................. 3
HSCI 530 Nutrition: A Global Perspective .... 3
HSCI/NURS 583 Food and Culture: Biocultural Perspectives on Food and Nutrition .............................................. 3

GRADUATE PROGRAMS

Nursing, MSN
The MSN program is accredited by the Virginia State Board of Nursing and the National League for Nursing. The program prepares nurses for a variety of leadership roles in the healthcare delivery system. The adult, adult and 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 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.

Admission Requirements
In addition to meeting graduate admission requirements, applicants program 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 three 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 as well as a graduate bivariate statistics course.

Students applying to the tracks in advanced clinical nursing and all the nurse practitioner tracks must have a health assessment skills continuing education course 18 months prior to taking NURS 514. 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. 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.

Students applying to any nurse practitioner track are required to have a minimum of one year experience in direct patient care.

Special Requirements
Graduate students are required to have annual health examinations and immunizations before enrolling in practicum courses. Students enrolled in the advanced clinical nursing, adult, adult and gerontological, and family nurse practitioner primary care tracks must be in the process of completing a hepatitis B immunization series when they enroll for their first practicum course. Nursing administration students who have practicum placements in healthcare agencies also 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 CNHS’s Office of Student Academic Affairs, which charges a small fee for this service. All students are required to have an active Mason e-mail account.

Degree Requirements
The master’s program in nursing requires 37–48 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 healthcare, and a course on the organization of nursing and healthcare delivery systems. The nursing administration and advanced clinical nursing tracks require an additional 25 credits. The adult, adult and gerontological, and family nurse practitioner primary care tracks require an additional 29 credits; the family nurse practitioner track requires 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-MSN Pathway
This pathway allows registered nurses who have completed 63 general education credits and have demonstrated substantial involvement in professional nursing within the past two years to earn the MSN degree with a minimum of undergraduate course work. Three credits of the 63 credits are earned from a computer course. Students entering a major through this pathway must meet all the requirements for admission to that major.

Admission Requirements
In addition to fulfilling admission requirements for degree status at Mason, applicants to this pathway must hold a current license to practice nursing; be graduates of an accredited nursing program; have earned a 3.00 GPA in 63 general education credits at an accredited institution; and demonstrate substantial involvement in professional nursing within the past two years as a registered nurse in clinical practice.
Program of Study

Bridge (established course)
NURS 623 Clinical Concepts in Community-Oriented Primary Care ............... 3
After completion of the bridge course, students choose one of the three tracks and meet all requirements of the graduate program.

Core Courses (required of all students)
NURS 660 Seminar in the Ethics of Healthcare .... 3
NURS 680 Theoretical Foundations Related to Nursing ............................. 2
NURS 685 Applications in Nursing Research .......... 3
NURS 686 Projects in Nursing Research ............. 2
NURS 688 Organization of Nursing and Healthcare Delivery Systems ............ 3

Nursing Tracks (select one):
Nurse Practitioner, Advanced Clinical Nursing, or Nursing Administration

Adult Nurse Practitioner in Primary Care
NURS 623 Clinical Concepts in Community-Oriented Primary Care ............... 3
NURS 746 Practicum in Adult Primary Care Nursing I .................................. 6
NURS 748 Practicum in Adult Primary Care Nursing II ................................ 8

Adult and Gerontological Nurse Practitioner in Primary Care
NURS 623 Clinical Concepts and Community-Oriented Primary Care ............ 3
NURS 746 Practicum in Adult Primary Care Nursing I .................................. 6
NURS 748 Practicum in Adult Primary Care Nursing II ................................ 8
NURS 780 Practicum in Gerontological Primary Care Nursing I .................... 3
NURS 781 Practicum in Gerontological Primary Care Nursing II .................... 3

Family Nurse Practitioner in Primary Care
NURS 623 Clinical Concepts in Community-Oriented Primary Care ............ 3
NURS 720 Practicum in Family Primary Care Nursing I .................................. 4
NURS 721 Practicum in Assessment and Management of the Developing Family 8
NURS 722 Practicum in Family Primary Care Nursing I .................................. 4

Related Discipline Support Courses (at George Washington University)
NURS 552/HCS 205 Advanced Physiology and Pathophysiology .................. 4
NURS 554/HCS 207 Practicum in Advanced Health Assessment* ................... 2
NURS 561 Clinical Decision Making* ............................................. 2
NURS 547 Pharmacology* ...................................................... 4
NURS 548 Advanced Pharmacology in Disease and Pathophysiology* .......... 1

*Co-listed with George Washington University School of Medicine and Health Sciences. All courses offered at GWU are charged at GWU tuition rates.

Advanced Clinical Nursing Major

Advanced Clinical Nursing Core ........................................ 7
NURS 514* Advanced Health Assessment, Advanced Clinical Major ............. 1
NURS 550 Pathophysiology Bases for Major Health Deviations .................... 3
NURS 513 Advanced Pharmacology, Advanced Clinical Major ..................... 3

* Students need a continuing education health assessment course before taking the credit health assessment course.

Choose from one of the following concentrations

Basic Concentration .................................................. 18
NURS 773 Advanced Clinical Nursing I .................. 3
NURS 776 Advanced Clinical Nursing II ................ 3
NURS 775 Advanced Specialty Practice I ............ 3
NURS 778 Advanced Specialty Practice II ........... 3
Elective ............................................................... 3

Clinical Nurse Specialist Concentration .............. 24
NURS 773 Advanced Clinical Nursing I .................. 3
NURS 776 Advanced Clinical Nursing II ................ 3
NURS 775 Advanced Specialty Practice I ............ 6
NURS 778* Advanced Specialty Practice II .......... 6
Elective ............................................................... 3

Note: A continuing education health assessment course with a skills component is required within 18 months of beginning the first clinical practicum.

*Students need a continuing education health assessment course before taking the credit health assessment course.

Advanced Clinical Nursing Electives
Elective courses supporting the clinical focus ............................................. 6

Nursing Administration
NURS 763 Administrative Theory in Nursing ................ 3
NURS 765 Practicum in Nursing Administration I .................. 3
NURS 766 Administrative Strategies in Nursing ................ 3
NURS 768 Practicum in Nursing Administration II ........... 3

Nursing Support Courses
NURS 654 Nursing Administration Financial Management ......................... 3
or HSCI 703 Financial Management of Health Systems .............. 3
Management/organizational theory ................................ 3
Recommended courses include LRNG 601, PUAD 620, PSYC 632, or SOCI 602
Nursing or related discipline support course ........ 6

Master’s International

The MSN prepares nurses for a variety of leadership roles in the healthcare delivery systems. Courses are scheduled on the Fairfax Campus and in 12 distributed local healthcare 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 rated in the top 50 graduate nursing programs by the 2004 US 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 three tracks, but two are more appropriate to the Peace Corps experience; the MSN in advanced clinical nursing is a 38-credit program, and the MSN in nursing administration is 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 BS in nursing. They must submit a completed application for graduate admission along with the nonrefundable application fee; application for Virginia in-state rates for those claiming eligibility; original transcripts from all previously attended colleges or universities, GRE scores (cumulative undergraduate GPA may allow for waiver of entrance exam requirement); two letters of recommendation from professional sources; resume; and a goals statement.

Applications are reviewed throughout the year for admission to either the fall or spring semester, although new students make 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, prepares nurses for mid- and top-level administrative, leadership, and health policy roles in health and health-related organizations. A variety of healthcare and health-related settings are used for clinical practice experiences. The MSN/MBA 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 CNHS and the School of Management.

**MSN Courses**

- NURS 660 Seminar in the Ethics of Healthcare .... 3
- NURS 680 Theoretical Foundations Related to Nursing ..................................... 2
- NURS 685 Applications in Nursing Research .... 3
- NURS 686 Projects in Nursing Research .............. 2
- NURS 763 Administrative Theory in Nursing ....... 3
- NURS 765 Practicum in Nursing Administration I 3
- NURS 766 Administrative Strategies in Nursing . 3
- NURS 768 Practicum in Nursing Administration II .................................................. 3
- NURS 794 Organization of Nursing and Healthcare Delivery Systems ................. 3
- HSCI 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 Resources Management .............. 3
- MBA 663 Introduction to Information Technology and Management ..................... 3
- MBA 673 Legal Environment for Management .............................................. 3
- MBA 678 Strategy and Policy ................................................................. 3

**Health Systems Management, MS**

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 healthcare and allied health professionals.

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 in a variety of settings. Graduates are prepared to work in public and private healthcare systems; legislative arenas and public health agencies; health management and policy-related trade and consumer organizations; and health accreditation and regulatory organizations. The curriculum integrates concepts from a variety of disciplines with application in health management and policy endeavors, business management, economics, philosophy, organizational behavior, information technology, social psychology, public policy, law, and ethics as they uniquely apply to health management and health policy analysis.

The interdisciplinary curriculum is designed to prepare graduates with an understanding of the larger sociopolitical and economic context of which the health system is a part. It prepares working professionals with leadership knowledge, skills, and abilities that improve efficiency and effectiveness of health systems by alignment of decisions and resource management that optimizes organizational and health-related public policy objectives and goals. Students examine issues and mechanisms of universal access as a social imperative and the feasibility, need, and mechanisms of strengthening market factors. They create linkages and alignment between public and private sectors, and among
Admission Procedures and Requirements

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 lower than a 3.00 undergraduate GPA. 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 (usually HSCI 701, 708, 709, and 715.)

Program Format and Curriculum Features

The program is scheduled to be convenient for 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 the impact on individual health status and enrolled populations, and how these groups affect utilization of health services. 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.

- Breaking from traditional curriculum, management skills are taught from the contexts of leadership in learning organizations and as team leaders managing professionals across functional and clinical units. Business and clinical decisions are integrated with competencies in computer application in healthcare and clinical decision support systems, clinical case management, evaluation of clinical outcomes, and interorganizational relations.

- Orientation of integrated managed care is based on the organization and delivery of community-based service networks. The curriculum prepares graduates to assess health risk, evaluate and understand consumer behavior, and structure and optimize community-based networks and fully integrated health systems.

- Curriculum teaches applied public health policy skills that support the development and analysis of health policy, and the management of political processes involving the health industry and health professionals in the United States. Health policy analysis concentration courses build on and integrate content from courses in the degree program to prepare graduates for midlevel policy advisor or health policy analyst positions in government agencies, public policy and legislative arenas, and the health sector.

Degree Requirements

The program of study comprises 39 credits (three concentrations). Twenty-four credits form the common core of the degree, and another 15 form each of the three 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—HSCI 678 Introduction to the U.S. Health System—bringing the number of credits required to 39.

Core Courses .................................................. 24–27

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCI 678</td>
<td>Introduction to the U.S. Health System</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 501</td>
<td>Introduction to Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 707</td>
<td>Healthcare Law and Ethics</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 586</td>
<td>Process Improvement for Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 740</td>
<td>Management of Health Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 710</td>
<td>Health Policy and Management</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 712</td>
<td>Epidemiology and Health Service Research</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 715</td>
<td>Health Economics</td>
<td>3</td>
</tr>
<tr>
<td>PUAD 620</td>
<td>Organizational Behavior</td>
<td>3</td>
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</tbody>
</table>

Concentration in Health Systems Management (15 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>HSCI 702</td>
<td>Managerial Accounting in Healthcare Organizations</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 703</td>
<td>Financial Management of Health Systems</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 704</td>
<td>Contemporary Issues in Health Policy and Management</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 705</td>
<td>Strategic Management and Marketing in Healthcare</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 706</td>
<td>Integrated Health Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Concentration in Health Policy Analysis (15 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>HSCI 542</td>
<td>Health Policy</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 866</td>
<td>Healthcare Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>PUAD 640</td>
<td>Public Policy Process</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 730</td>
<td>Healthcare Decision Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose one of the following:

- PUBP 711 Rational Choice and Uncertainty: Modeling Judgment
- PUBP 713 Policy and Program Evaluation
- PUBP 730 National Policy Systems and Theory
- PUBP 762 Social Institutions and Public Policy
- PUBP 753 Ethics in Public Policy

Concentration in Health Information Systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCI 720</td>
<td>Health Data Integration</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 601</td>
<td>Electronic Commerce and Online Marketing Health Services</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 709</td>
<td>Healthcare Databases</td>
<td>3</td>
</tr>
<tr>
<td>HSCI 745</td>
<td>Healthcare Security Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

One additional non-health science elective course or year-long independent project in development and management of a health information system.

Concentration in Assisted Living Administration

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCI 650</td>
<td>Assisted Living and Operations Management</td>
<td></td>
</tr>
<tr>
<td>HSCI 651</td>
<td>Assisted Living Sales and Marketing</td>
<td></td>
</tr>
</tbody>
</table>
HSCI 702 Managerial Accounting in Healthcare Organizations
HSCI 703 Financial Management of Health Systems
An elective from the following list:
HSCI 637 Normal Aging and Health Deviation
HSCI 585 Core Management of Persons with Alzheimer’s Disease and Related Disorders

- **International MS in Health Systems Management**

The MS in health systems management offers high-quality academic preparation in healthcare management, policy analysis, health information systems, and assisted living management. Courses are scheduled at the Fairfax Campus and are offered evening, weekend, 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 CNHS will be eligible for a 45.5 percent reduction in tuition rates. Students benefit from the university’s proximity to Washington, D.C., by taking classes from leading professors in health policy and from adjunct instructors working in government management or non-profit settings. The Northern Virginia technology corridor provides an excellent background for students who wish to focus on 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 39-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 program. 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.

- **Certificate in Healthcare Security and Privacy**

The curriculum is expected to enhance the skills of directors responsible for information and physical security at area hospitals, nursing homes, public agencies, insurance companies, and other healthcare agencies. The curriculum improves the effectiveness of those directors in bringing about change within their own organization, and in coordinating activities with counterparts in public and private agencies.

- **Certificate in Conflict Resolution for Health Professionals**

This is a joint graduate certificate program offered through CNHS and the Institute for Conflict Analysis and Resolution. It enriches understanding of disputes that are specific to the healthcare 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 CNHS.

<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>9</td>
</tr>
<tr>
<td>CONF 713 Lab and Simulation I: Interpersonal and Intergroup Conflict</td>
<td>3</td>
</tr>
<tr>
<td>CONF 738/HSCI 635 Research Seminar in Health and Conflict (final course)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electives (suggested)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 631 Refugees in Contemporary Society</td>
<td>3</td>
</tr>
<tr>
<td>CONF 703 Conceptions of Practice</td>
<td>3</td>
</tr>
<tr>
<td>CONF 709 War, Violence, and Conflict Resolution</td>
<td>3</td>
</tr>
<tr>
<td>CONF 734 Conflict in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>CONF 745 Leadership Roles in Conflict and Conflict Resolution</td>
<td>3</td>
</tr>
</tbody>
</table>

For more information, contact the Peace Corps regional office at 1-800-424-8580. For the Fellows/USA program, call the above number and then extension 1440.
Certificate Requirements

Applicants must hold a bachelor's degree. To earn the certificate, students must complete all courses with a 3.00 GPA.

**Required courses**
- HSCI/NURS 542 Health Policy ................. 3
- PHIL 510/NURS 660 Ethics in Healthcare ... 3

**Total** .......................................................... 15

To earn the certificate, students must complete all courses with a 3.00 GPA. Students who have already taken the regular section of CONF 501 may apply it to the certificate.

**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 Department of Psychology and the Department of Sociology and Anthropology. The program is administered by CNHS and supervised by a committee with representatives from the participating academic units.

Certificate Requirements

Applicants must have a bachelor's degree in nursing or a related discipline. Application is made through CNHS. It requires 18 graduate credits. To earn the certificate, students must complete all courses with a 3.00 GPA.

**Required Core Course** ........................................ 6
- HSCI 637 Normal Aging and Health Deviations ................................................. 3
- SOCI 686 Sociology of Aging ....................... 3

**Gerontological Electives (minimum 3 credits)**
- HSCI 505 Case Management ......................... 3
- PSYC 592 Death, Dying, and Grieving .......... 3

**Other Electives (minimum 3 credits)**
- HSCI 580 Alternative Healthcare Practices .................................................. 3
- EDCD 525 Advanced Human Growth and Development .................................. 3
- EDCD 605 Introduction to Counseling Theory and Practice ................................ 3
- EDCD 607 Advanced Counseling and Development ........................................... 3
- PHED 630 Exercise, Health & Fitness Program Development ............................ 3
- SOCI 651 Health Systems Delivery

**Practicum Requirements** ........................................ 6
- HSCI 770 Gerontology Practicum 1
- HSCI 771 Gerontology Practicum 2

**Total** .......................................................... 18 credits

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

**Certificate in Nursing Administration**

This program offers formal study in theory and practice in nursing administration in the healthcare delivery system.

Certificate Requirements

Applicants must hold a bachelor's degree in nursing. Application is made through CNHS.

**Required courses**
- NURS 763 Administrative Theory in Nursing ....................................................... 3
- NURS 765 Practicum in Nursing Administration I ................................................. 3
- or NURS 768 Practicum in Nursing Administration II ........................................ 3

**Electives** .......................................................... 9
- Graduate courses as approved by the student's advisor

**Total** .......................................................... 15

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

**Certificate in International 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 CNHS.

**Required courses** ........................................... 12
- HSCI 699 International Healthcare Practicum .................................................... 3

**NURS 543/HSCI 543 Global Health: Trends and Policy** .......................................... 3
- NURS 583 Food and Culture: Biocultural Perspectives on Food and Nutrition ........ 3
- ANTH 631 Refugees in Contemporary Society .................................................. 3

**Electives** .......................................................... 6
- CONF 501, 709, 720
- HSCI 530, GEOG 581
- SOCI 523; NURS 577, 578

**Total** .......................................................... 18

(Those who qualify for a 3-credit practicum because of their educational experiences may choose the remaining 3 credits from courses designated by the graduate nursing program.)
To earn the certificate, students must complete all courses with a 3.00 GPA.

◆ Adult Nurse Practitioner Certificate
A post master's adult nurse practitioner certificate program is offered jointly with CNHS and GWU's School of Medicine and Health Sciences. This program is designed for nurses who have already earned a master's degree in nursing. The curriculum includes didactic, seminar, and practicum course work. Upon successful completion of the 16-credit course work and a minimum of 500 documented supervised clinical hours, students earn the certificate of adult nurse practitioner. Graduates are eligible to take a national nurse practitioner certification exam through the American Nurses' Credentialing Center (ANCC) or the American Academy of Nurse Practitioners (AANP) and become certified as an adult nurse practitioner. Application is made through the Mason graduate application process and CNHS as well as through GWU graduate programs. Courses are offered at GWU's Washington, D.C., campus; tuition is based on GWU tuition rates.

Course of Study

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 552/HSCI 205 Advanced Physiology and Pathophysiology</td>
<td>4</td>
</tr>
<tr>
<td>NURS 561/HSCI 206 Clinical Decision Making</td>
<td>2</td>
</tr>
<tr>
<td>NURS 554/PHARM 207 Practicum in Advanced Health Assessment</td>
<td>2</td>
</tr>
<tr>
<td>NURS 547/PHARM 208 Pharmacology for Health Science Students</td>
<td>3</td>
</tr>
<tr>
<td>NURS 548/HSCI 208 Pharmacology in Disease and Pathophysiology</td>
<td>1</td>
</tr>
<tr>
<td>NURS 754/HSCI 209 Advanced Adult Primary Care*</td>
<td>4</td>
</tr>
<tr>
<td>NURS 754/HSCI 209: Due to GWU tuition structure, both didactic and practicum are included in this 4-credit course.</td>
<td></td>
</tr>
</tbody>
</table>

◆ Family Nurse Practitioner Certificate
This post master's advanced family nurse practitioner certificate program is offered jointly with CNHS and the GWU School of Medicine and Health Sciences. It is for master's prepared nurses who have already been certified as nurse practitioners. The program helps expand the scope of practice using the present practice site as a clinical practicum while students acquire the knowledge and skills needed to provide primary care for families, including children and parents. Classes and seminars are scheduled to allow students to study via distance learning from a Washington, D.C., campus located at GWU. Students are required to attend a one-week intensive didactic session on GWU's Washington, D.C., campus. The session usually is held in the early part of September. Upon successful completion of 17 credits of didactic work via distance learning and a minimum of 500 documented, supervised clinical hours, students earn a certificate as a family nurse practitioner and will be able to apply for certification as a family nurse practitioner through the American Nurse's Credentialing Committee (ANCC) or the American Academy of Nurse Practitioners (AANP). Application is made through the Mason's graduate application process and CNHS as well as through GWU. Courses are offered at GWU's Washington, D.C., campus. Tuition is based on GWU distance learning tuition rates.

Certificate Requirements

The following courses (3 credits each):

- HSCI 585 Care and Management of Persons with Alzheimer's Disease and Related Disorders
- HSCI 637 Normal Aging and Health Deviations
- HSCI 650 Assisted Living Management and Operations
- HSCI 651 Assisted Living Sales and Marketing
- HSCI 678 Introduction to the U.S. Health System

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 healthcare industry. Students must complete all courses with a 3.00 GPA to earn the certificate.

◆ Graduate Certificate in Assisted Living Administration
This 15-credit certificate is offered as part of the overall Program in Assisted Living Administration within CNHS. It provides multidisciplinary education in assisted living and senior housing management and marketing, gerontology, and health science. 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. Additional focus is on biological, psychological, and social aspects of aging, including Alzheimer's disease and related dementias.

Certificate Requirements

The following courses (3 credits each):

- HSCI 585 Care and Management of Persons with Alzheimer's Disease and Related Disorders
- HSCI 637 Normal Aging and Health Deviations
- HSCI 650 Assisted Living Management and Operations
- HSCI 651 Assisted Living Sales and Marketing
- HSCI 678 Introduction to the U.S. Health System

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 healthcare industry. Students must complete all courses with a 3.00 GPA to earn the certificate.
HSCI 709 Healthcare Databases .......................... 3
HSCI 730 Healthcare Decision Analysis .............. 3
Electives .......................................................... 3–6

Graduate courses as approved by the student’s advisor. For the elective, students are encouraged to take HSCI 547 Regulatory Requirements for Healthcare Systems.

Note: A course in basic computer skills (credit or non-credit) and HSCI 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.

Total .............................................................. 15–18

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

◆ Certificate for Health Information Systems

This certificate prepares clinicians and healthcare 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 healthcare industry and wish to enhance their understanding of healthcare 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 CNHS.

Program of Study

The certificate is comprised of 15 credits (five, 3-credit courses.) If the student does not have recent, relevant experience in the U.S. health industry, HSCI 678 The U.S. Health System (3 credits) is required, thus bringing the number of required credits to 18.

Courses are as follows:

Prerequisite: Course in U.S. health systems

Required 3-credit courses

- HSCI 586 Process Improvement for Health Services
- HSCI 709 Healthcare Databases
- HSCI 720 Health Data Integration
- HSCI 601 Electronic Commerce and Online Marketing for Health Services
- HSCI 740 Management of Healthcare Information Systems

◆ Certificate in Biostatistics

This program prepares participants to apply statistical methods to quantitative analysis of healthcare issues. It is aimed at health scientists and professionals in government agencies, such as the National Institutes of Health, as well as professionals in pharmaceutical companies, research hospitals, public health agencies, and other medical research organizations who design medical experiments and analyze and interpret increasingly complex healthcare data. The program will also help prepare students to begin careers in such organizations.

The certificate is a joint graduate certificate program from the Department of Applied and Engineering Statistics in the School of Information Technology and Engineering and the graduate health science program in CNHS. 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, but are not limited to, medicine, biology, nursing, health science, biostatistics, statistics, mathematics, and psychology. A course in mathematics (calculus is recommended) at the undergraduate level with a grade of B or higher is required for admission to the program.

Program Requirements

The student must complete one course from each of the five groups.

- STAT 535 or 554
- STAT 665 or 668
- HSCI 800 or STAT 656
- HSCI 801 or STAT 662
- HSCI 730

A minimum of 6 credits must be taken through the health science program.

◆ Master of Science in Health Science, Gerontology Track

Admission Requirements

This program is designed for students interested in providing services to elderly, conducting research, or influencing public policy concerning aging and the elderly, as program planners and evaluators, and administrators or managers in the field of aging. Opportunities are provided to develop leadership skills in this rapidly developing field, and to advocate for a fast growing population of elderly. The degree is suitable for students to 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.

Students from a variety of disciplines may be admitted to this program. Students must show a capacity for graduate work, and must be prepared to complete a 128-credit practicum experience or six to eight hours per week in an appropriate organization.

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. Students may be admitted provisionally if their GPA is less than 3.00, but they are also required to submit GRE or MAT test 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.
**Degree Requirements**

Students must complete 36 credits of graduate course work: 12 credits of gerontology concentration, 12 credits of health science concentration, 6 credits of practicum, and 6 credits of electives. 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**

- **Health Science Core (minimum of 12 credits)**
  - HSCI 501 Introduction to Biostatistics ............ 3
  - HSCI 712 Epidemiology and Health Services Research ........................................ 3
  - PUAD 620 Organizational Behavior ................ 3
  - NURS 660 Ethics of Healthcare .................... 3

- **Gerontology Track (minimum of 12 credits)**
  - HSCI 578 Cultural Competence and Diversity in Healthcare 3
  - HSCI 637 Normal Aging and Health Deviation 3
  - HSCI 762 Aging and health Policy 3
  - SOCI 686 The Sociology of Aging 3

- **Gerontology Practicum (minimum of 6 credits)**
  - HSCI 770 Gerontology Practicum I .................. 3
  - HSCI 771 Gerontology Practicum II ............... 3

- **Electives (minimum of 6 credits)**
  Electives should be selected to provide a focus in a particular 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.

**Nursing, PhD**

The PhD program in nursing builds on the MSN degree and requires 61 credits beyond the master’s degree. The objective of the program is to prepare nurses for executive roles in selected areas of nursing and healthcare. Graduates of the program will do the following:

- Exemplify administrative and leadership characteristics essential to assuming executive roles
- Conduct and support research in nursing and healthcare ethics, healthcare administration, health policy, and nursing education
- Influence the formation and implementation of public policy in healthcare through analysis of sociocultural, economic, fiscal, political, ethical, and governmental processes

**Admission Requirements**

In addition to fulfilling admission requirements for degree status in CNHS, 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:

- GRE scores and 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 last two years
- Interview with one or more members of the Graduate 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) and organizational behavior (past five years)

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**

To earn the PhD in nursing, students must have earned a minimum of 91 graduate-level semester credits beyond the baccalaureate degree, and a minimum of 61 graduate-level semester credits beyond the master’s degree. Of the 61 credits, 49 must have been earned at Mason; 12 may be transferred and applied with approval. 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. All transfer credits must receive 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 CNHS dean. This is submitted in the approved format to the Mason library and director of the doctoral program.
- Complete application material for graduation and the PhD degree in accordance with prevailing Mason policies.

**Program of Study**

The curriculum includes the nursing core (21 credits), research core (19 credits), and nursing and related discipline electives (9 credits). Before advancing to candidacy and enrolling for dissertation credit (12 credits), students must have their program of study approved by CNHS and the director of the CNHS doctoral program.

**Internship in Healthcare Administration/Policy/Ethics**

Students are required to enroll in NURS 874 Internship in Healthcare Administration/Policy/Ethics, a one-semester, 4-credit internship that includes seminars, for experiential learning in healthcare administration. Students are assigned to a doctorally prepared executive, who serves as the pre-
ceptor in the student’s field of emphasis. A field experience of at least 120 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 CNHS doctoral program approves advancement to candidacy.

Dissertation Proposal
The proposal must focus on a topic in nursing, and must be approved by the Doctoral Dissertation Committee, doctoral program director, and CNHS dean. The dissertation proposal and written dissertation must be consistent with the guidelines outlined in *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 CNHS dean.

Final Oral Doctoral Exam
The chair of the Doctoral Dissertation Committee, upon preliminary approval of the doctoral dissertation by the committee, petitions the doctoral program director in the CNHS 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, excluding electives, and must 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.

Continuing Professional Development
Continuing nursing education is a commitment of CNHS and the university. Activities are planned to meet the special needs of individuals and groups in the community. CNHS offers opportunities for credit and noncredit courses. Contract courses are offered in a variety of healthcare agencies in the Northern Virginia area. These credits can be applied to a program of study in nursing.
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 policymaking. 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 policymaking 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: Organizational Development and Knowledge Management, MS
- New Professional Studies: Peace Operations, MS
- New Professional Studies: Knowledge Management, MA

The school also offers nondegree certificate programs. For the most current information regarding SPP, go to policy.gmu.edu.

Administration
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, Hecko, 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, Riggle, Rikbye, Robb, Spalding, Wheeler, Woodcock

Adjunct Faculty
Asel, Bensimon, Brown, Gaske, Gianturco, King, Novins, Perito, Ravera, Robinson, Rogowski, Rubenstein, Sando, Sullivan, Thompson, Varkonyi, Visco

Faculty Emeritus
Kash, Lipset, Warfield

Course Work
SPP offers courses designated PUBP, ITRN, MNPS, and LRNG 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
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 should hold a master’s degree from an accredited institution, with a GPA of 3.00 or higher. Prospective students are encouraged to meet with the program director.

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 resume or vita
• Two letters of recommendation, with at least one from an individual qualified to attest to the candidate’s academic potential
• GRE or GMAT results; scores should not be older than five years
• Two official transcripts of all university work. International students are also required to submit a translation of all international transcripts into English, if applicable.
• A writing sample (approximately 10–20 pages in length) such as a technical report, professional publication, or term or seminar paper
• TOEFL scores (for international applicants) with a minimum score of 600 (paper-based) or 250 (computer-based). 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 discretion of the program director. 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 usually are drawn widely not only from SPP, but also from other programs throughout 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 in 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 both 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, published annually.

**Public Policy, MPP**

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 as reflective practitioners to develop, implement, manage, analyze, evaluate, and effect innovative change in both the public and private sectors through a course of study emphasizing the fundamentals of policy development; role of technology, analytic assessment, and modeling for policy evaluation; and 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 both 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 official transcripts of all university work completed.
- TOEFL scores (for international applicants), with a minimum score of 575 (paper-based) or 230 (computer-based). 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, GMAT, or MAT scores is optional.

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, 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:

**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

**Required Public Policy Courses** .......................... 18

- PUBP 700 Theory and Practice in Public Policy ........ 3
- PUBP 704 Statistical Methods in Policy Analysis ........................................ 3
- PUBP 720 Managerial Economics and Policy Analysis ........................................ 3
- PUBP 730 U.S. National Policy Systems ................ 3
- PUBP 741 Financial Policy Processes and Procedures ........................................ 3
- And one of the following:
  - PUBP 705 Advanced Statistical Methods for Policy Research ........................................ 3
  - PUBP 711 Rational Choice and Uncertainty: Systems Dynamics Policymaking ........ 3
  - PUBP 712 Policy Analysis and Management Science ........................................ 3
  - PUBP 713 Policy and Program Evaluation ........ 3
  - PUBP 731 Macro Economic Policy Assessment ........................................ 3

**Substantive Policy Concentrations** ..................... 9

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
- Organizational Informatics in the Policy Enterprise
- 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** .............. 0–3

Certification that the student has experience in the public policy process outside the classroom and is ready to take leadership responsibilities must be exhibited by one of three ways: previous professional experience, approved by program director; an internship lasting a minimum of three months; or service as a project team leader with an external client for a minimum of six months half-time employment.

**Total 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. 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; organizational informatics in the policy enterprise; 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 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.

International Commerce and Policy, MA
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 international economic issues such 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 supplemented 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 planning, and research activities with private- and public-sector employers, and by sponsoring a variety of study abroad experiences.

Admission Requirements
Students from all academic backgrounds are welcome to apply, though some knowledge of economics, through preferably at least two undergraduate economics courses, is encouraged. While many 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 non-business occupations to careers in the global economy.

Complete applications for both 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 resume
- Two official transcripts of all university work completed.
- International students are also required to submit a translation of all international transcripts into English, if applicable.
- TOEFL scores (for international applicants) with a minimum score of 575 (paper-based) or 230 (computer-based). 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, GMAT, or MAT scores is optional. 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, 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 including 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 ........................................ 12
PUBP 501 Policy and Organizational Analysis .... 4
PUBP 502 Governance and Policy Processes ...... 4
PUBP 503 Culture, Organization, and Technology ........................................ 4

ICP Core Courses ............................................ 18
ITRN 500 Approaches to International Commerce and Policy ......................... 4
ITRN 503 Investment and Macroeconomics for International Commerce ............ 4
ITRN 504 Trade and Microeconomics for International Commerce .................. 4
ITRN 603 International Trade Relations .......... 3
ITRN 602 International Financial Institutions and Globalization .................... 3

Electives ..................................................... 12

Total Credits ................................................ 42

Certificate Programs
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. Graduate certificates will be awarded to nondegree 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 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.

**New Professional Studies: Organizational Development and Knowledge Management, MS**

703-993-1142

The Program on Organizational Development and Knowledge Management (ODKM) is an integrated, 21-month program designed for professionals with 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 both the 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 resume
- Two official transcripts of all university work completed. International students are also required to submit a translation of all international transcripts into English, if applicable.
- TOEFL scores (for international applicants), with a minimum score of 575 (paper-based) or 230 (computer-based). 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, GMAT, or MAT scores is optional. Can be waived for students with appropriate work experience, with the approval of the program director or dean.

**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: Knowledge Management, MA**

703-993-1142

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 either the Chief Information Officer (CIO) Program or Advanced Management Program (AMP) offered by the NDU IRMC or its equivalent. These applicants will generally be eligible to transfer in 15 hours of graduate credit 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 resume
• Two official transcripts of all university work completed. International students are also required to submit a translation of all international transcripts into English, if applicable.
• TOEFL scores (for international applicants), with a minimum score of 575 (paper-based) or 230 (computer-based). 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, GMAT, or MAT scores is optional.

Degree Requirements
The 21 credits offered by Mason are as follows:

Core Courses ........................................................ 12
MNPS 700 The New Professionalism: Theory and Practice* .................. 3
MNPS 702 The New Professional as Reflective Practitioner* .................. 3
MNPS 703 Technology and Learning in the New Professions* .................. 3
LRNG 762 Strategic Knowledge Management .... 3

Electives .................................................................. 6
This may include:
ITRN 701 International Issues in Knowledge Management .................. 3
ITRN 773 International Strategic Management ................................... 3
PUBP 736 E-Commerce and the Digital Divide ................................. 3
PUBP 775 Economics of Electronic Commerce ................................. 3
PUBP 777 Critical Information Technology ................................. 3
Infrastructures ................................................................ 3

Experiential Component ........................................ 3
This may include relevant work experience or a supervised internship, subject to the approval of program director.

Mason Total .......................................................... 21
* Only those sections of MNPS 700, 702, and 703 that are designated for the ODKM program will satisfy degree requirements.

Transportation Policy, Operations, and Logistics, MA
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 to communicate their analyses clearly and effectively, both 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 resume
• Two official transcripts of all university work completed. International students are also required to submit a translation of all international transcripts into English, if applicable.
• TOEFL scores (for international applicants), with a minimum score of 575 (paper-based) or 230 (computer-based). 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, GMAT, or MAT scores is optional.

Degree Requirements
The degree requires completion of 36 credits; time required to complete the degree varies. 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; 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 approval of the program director.

Total Credits ......................................................... 36
New Professional Studies: Peace Operations, MS
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 to communicate their analyses clearly and effectively, through both written and oral presentations.

Admission Requirements
Complete applications for both 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 resume
- Two official transcripts of all university work completed. International students are also required to submit a translation of all international transcripts into English, if applicable.
- TOEFL scores (for international applicants), with a minimum score of 575 (paper-based) or 230 (computer-based). 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, GMAT, or MAT scores is optional.

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 with their advisor. Students are also required to complete a project or thesis on an approved topic under guidance of the director.

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
<th>Description</th>
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<tbody>
<tr>
<td>12</td>
<td>PUBP 501 Policy and Organizational Analysis</td>
<td>4</td>
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<td></td>
<td>PUBP 502 Governance and Policy Processes</td>
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<td></td>
<td>PUBP 503 Culture, Organization, and Technology</td>
<td>4</td>
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<tr>
<td>12</td>
<td>MNPS 700 The New Professionalism: Theory of Peace Operations</td>
<td>3</td>
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<tr>
<td></td>
<td>MNPS 702 The New Professional as Reflective Practitioner: Practice of Peace Operations</td>
<td>3</td>
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<td></td>
<td>MNPS 703 Technology and Learning in the New Professions: Experiential Applications in Conflict and Post-Conflict Environments</td>
<td>3</td>
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<tr>
<td></td>
<td>CONF 501 Introduction to Conflict Analysis and Resolution (or equivalent)</td>
<td>3</td>
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</tbody>
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Electives .......................................................... 9–12
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.

Final Project or Thesis ...................................... 3–6
Students are also required to complete a project or thesis on an approved topic under guidance of the director.

Total Credits ..................................................... 39
* Only those sections of MNPS 700, 702, and 703 designated for the Peace Operations program will satisfy degree requirements.

Research Centers
Center for Regional Analysis (CRA)
Director: Steve Fuller, PhD
Focusing on economic development in technologically intensive regions, the 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 (PAC)
Director: Thomas Gulledge, PhD
PAC is a clearinghouse for research on topics such 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 (ICASIT)
Director: Stephen Ruth, PhD
ICASIT is a consulting group dedicated to delivering the power of the Internet to businesses, underserved markets, and developing countries. The center has contracts in more than 20 countries.

Mason Enterprise Center (MEC)
Director: Roger Stough, PhD
Dedicated to creating and developing businesses in the Washington, D.C., area, MEC is the synthesis of seven programs designed to meet the needs of growing businesses. It focuses the energy, skills, and intellectual capital of the university on enterprise creation, expansion, and restructuring. MEC is highly focused on providing its clients with services that add value to their organizations. It specializes in business development, entrepreneurship, government contracting, international business, technology ventures, and telework, making MEC a business development center unlike any other. In addition, the center conducts seminars and conferences related to its areas of expertise.
Center for Global Policy  
Director: Jack Goldstone, PhD  
The 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 crossnational databases for global policy.

Center for Science and Technology Policy  
Director: Philip Auerswald, PhD  
This center helps facilitate the exchange of information and ideas among the worldwide science, foreign affairs, trade, and technology communities. Areas of emphasis include international trade and science and technology.

Office of International Medical Policy (OIMP)  
Director: Arnauld Nicogossian, MD  
OIMP 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 (CEPP)  
Director: Roger Stough, PhD  
Economic development policy has been shifting dramatically from a business and industry attraction strategy to a more entrepreneurship approach, and CEPP focuses on entrepreneurship policy research and program delivery. The center offers programs in research, collaboration, and analysis.

Center for Aerospace Policy  
Director: Ken Button, PhD  
The mission of the center is to develop the U.S. aerospace sector by providing educational and research resources. The center assists 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, it specializes in providing rapid analytic support to help policymakers anticipate and manage crises that threaten global, national, and regional stability.
College of Visual and Performing Arts

Performing Arts Building, A407
Phone: 703-993-4551
Web: gmu.edu/cvpa

Departments
• Art and Visual Technology
• Dance
• Music
• Theater

Program
• Master of Arts Management

Degrees
• Art and Visual Technology BA, BFA, MA, MAT and MFA
• Arts Management MA
• Dance BA, BFA, and MFA
• Music BA, BM, and MM
• Theater BA

Minors
• Art and Visual Technology
• Arts Administration
• Dance
• Jazz Studies
• Multimedia
• Music
• Theater
• World Music

Certificates
• Artist certificate in instrumental performance
• Artist certificate in piano performance
• Artist certificate in vocal performance
• Professional development certificate in piano pedagogy

“George Mason is deeply committed to the arts and to 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 may be 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 co-curricular 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, 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 of Technology, Research and Advancement

**Academic Programs**

CVPA houses the four academic departments of Art and Visual Technology, Dance, Music, and Theater; and the Arts Management program.

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 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**

Students earning undergraduate degrees in CVPA may apply up to 3 credits of activity courses offered by the Health, Fitness, and Recreation Resources Department to their general electives requirement.

**Academic Course Load**

Undergraduate students earning degrees in CVAP 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 17-credit, university full-time academic load. Graduate students earning degrees in 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.

**Advising**

Students are assigned advisors and are encouraged to meet with them on a regular basis. Undeclared CVPA students and undergraduate students in academic difficulty (GPA under 2.00 for a semester) are required to see an advisor prior to registration for the semester following registration restriction.

**Minors**

University policy states that students must earn 8 distinct credits not used for their major toward their minor. Some departments have more specific criteria for credits applied to a minor.

Students are strongly advised to consult the “Academic Policies” and “General Education” chapters of this catalog for information concerning university-wide requirements for undergraduate degrees.

**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 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.

**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
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, but also require specific knowledge and skills in administration and management. The minor in arts administration consists of 18 credits, including CVPA 305 (3 credits) and CVPA 489 (3–6 credits). All other credits are to be selected in consultation with a program advisor from relevant courses in CVPA, the Non-Profit 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 history majors. All other students must complete 9 credits of arts-related course work to be eligible for this minor. See the program coordinator for more information.

Art and Visual Technology

College Hall, C200
Phone: 703-993-8898
Web: avt.gmu.edu

Faculty
Scott Martin, chair

Professors: Kravit, Mandes, Carbonneau
Associate Professors: Ashcraft (associate chair), Frederick, Martin (chair), Olgyay, White
Assistant Professors: Crawford, Feerick, Frenn, Rothstein
Term Assistant Professors: Constantine (associate chair), Karametou, Malone (gallery director), Winant

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
The Department of Art and Visual Technology (AVT) offers two undergraduate degrees: a BA and a BFA. These two programs prepare students for graduate study, research, and professional work in studio and digital art. These programs do not satisfy all requirements for teaching in the public schools.

A distinguishing characteristic of the AVT program is its focus on fostering student understanding of and work in interdisciplinary arts (InterArts). InterArts is based on the understanding that art today combines disciplines and approaches to create new art forms. Although only a small number of AVT majors elect to take an undergraduate InterArts concentration, all AVT undergraduates take course work in InterArts through such required courses as Aesthetics, Writing for Artists, and Critical Theory in the Visual Arts. In addition, faculty in the division of InterArts teach elective courses that complement the studio-based concentrations, focusing on performance, new media, writing, publishing, and installation in their social, critical and cultural contexts.

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.

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.

This new way of handling the requirement will take effect for incoming freshmen and transfer students in the 2005–06 catalog year. Students who entered before fall 2005 are not affected by the change.

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 increase their odds of getting a ticket for 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.

Art and Visual Technology, BA
This program offers a broad course 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 information design, painting, drawing, photography, printmaking, sculpture, or interdisciplinary arts (InterArts).

Effective in the spring of 2006, all students are admitted to 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 104–105–222 with a 3.50 or better average, and applying for admission
• Completing the sequence of AVT 104–105–222 and either 323/324 or one 200-level course with a 3.00 or better average, and applying for admission

Students may change from BA to BFA status by presenting a substantive college-level portfolio and other requested credentials at a designated time, usually the sixth week of the semester.
### Degree Requirements

#### General Education

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History, Critical Analysis,</td>
<td></td>
</tr>
<tr>
<td>Contemporary Practice</td>
<td></td>
</tr>
<tr>
<td>ARTH 200, Survey of Western Art I</td>
<td></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></td>
</tr>
<tr>
<td>ARTH 374 Art Now or ARTH 308</td>
<td></td>
</tr>
<tr>
<td>Mixing It: Art for a New Century</td>
<td></td>
</tr>
<tr>
<td>AVT 307 Aesthetics</td>
<td></td>
</tr>
<tr>
<td>AVT 395 Writing for Artists</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral sciences</td>
<td>3</td>
</tr>
<tr>
<td>Natural science (including at least 1 laboratory science)</td>
<td>7</td>
</tr>
<tr>
<td>Western civilization</td>
<td>3</td>
</tr>
<tr>
<td>Global understanding</td>
<td>3</td>
</tr>
<tr>
<td>Note: AVT majors may not double-count ARTH courses toward both AVT major and the general education fine arts requirement.</td>
<td></td>
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<tr>
<td>Total</td>
<td>40</td>
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#### Foundation Requirements

<table>
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<tr>
<td>Written communication: ENGL 101 and 302</td>
<td>6</td>
</tr>
<tr>
<td>Non-native speakers of English with limited proficiency in the language may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302 to fulfill degree requirements. Oral communication</td>
<td>3</td>
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<tr>
<td>Quantitative reasoning</td>
<td>3</td>
</tr>
<tr>
<td>Information technology</td>
<td>3</td>
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<td>Total</td>
<td>12</td>
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#### AVT Major Requirements

<table>
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<tr>
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<tr>
<td>Studio Foundation</td>
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</tr>
<tr>
<td>AVT 104 and 105 Studio Fundamentals I and II</td>
<td>8</td>
</tr>
<tr>
<td>AVT 222 and 323 or 324 Drawing I and II, or Figure Drawing</td>
<td>8</td>
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<tr>
<td>Art History, Critical Analysis,</td>
<td></td>
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<tr>
<td>Contemporary Practice</td>
<td>15</td>
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<tr>
<td>ARTH 200, Survey of Western Art I</td>
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</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></td>
</tr>
<tr>
<td>ARTH 374 Art Now or ARTH 308</td>
<td></td>
</tr>
<tr>
<td>Mixing It: Art for a New Century</td>
<td></td>
</tr>
<tr>
<td>AVT 307 Aesthetics</td>
<td></td>
</tr>
<tr>
<td>AVT 395 Writing for Artists</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral sciences</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
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</tbody>
</table>

#### Concentration

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Arts: AVT 382 and 8 credits from AVT 383, 390, 482, 483, 487</td>
<td></td>
</tr>
<tr>
<td>Drawing: AVT 422, 423; 4 credits from AVT 324, 326, 333, 336, 337, 432, 433</td>
<td></td>
</tr>
<tr>
<td>Note: All AVT majors concentrating in drawing must complete AVT 232 (Painting I) under Breadth and Experience. Graphic Information Design: AVT 311, 313, 414 InterArts: AVT 373, 473; 4 credits from 372, 374, 375, 376, 377, 378, 397, 491</td>
<td></td>
</tr>
<tr>
<td>Note: All AVT majors concentrating in painting must complete AVT 231 (Painting II) under Breadth and Experience. Graphic Information Design: AVT 311, 313, 414 InterArts: AVT 373, 473; 4 credits from 372, 374, 375, 376, 377, 378, 491</td>
<td></td>
</tr>
<tr>
<td>Note: All AVT majors concentrating in sculpture must complete AVT 233 (Sculpture I) under Breadth and Experience. Graphic Information Design: AVT 311, 313, 414 InterArts: AVT 373, 473; 4 credits from 372, 374, 375, 376, 377, 491</td>
<td></td>
</tr>
<tr>
<td>Careful planning of classes to meet this requirement, and they may not double-count ARTH courses toward both the AVT major and the general education fine arts requirement.</td>
<td></td>
</tr>
<tr>
<td>Art History, Critical Analysis,</td>
<td></td>
</tr>
<tr>
<td>Contemporary Practice</td>
<td>15</td>
</tr>
<tr>
<td>ARTH 200, Survey of Western Art I</td>
<td></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></td>
</tr>
<tr>
<td>ARTH 374 Art Now or ARTH 308</td>
<td></td>
</tr>
<tr>
<td>Mixing It: Art for a New Century</td>
<td></td>
</tr>
<tr>
<td>AVT 307 Aesthetics</td>
<td></td>
</tr>
<tr>
<td>AVT 395 Writing for Artists</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral sciences</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

#### Breadth and Experience

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

## Art and Visual Technology, BFA

This is an intensive, 120-credit studio production program with an emphasis in 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 information design, painting, drawing, photography, printmaking, sculpture, or interdisciplinary arts (InterArts).

Senior BFA students are required to participate in the visiting critics program as part of the course requirements for AVT 472 Critical Theory in the Visual Arts, and the AVT synthesis courses.

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 division coordinator of their AVT concentration in the semester prior to their application to discuss the portfolio.

Admission to the 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
• Three-page, double-spaced essay
• Transcripts of all college-level study

Students interested in applying should contact the Department of Art and Visual Technology for specific application information.

Degree Requirements

General Education ................................................ 40

Foundation Requirements

Written communication: ENGL 101 and 302 ............................... 6
Non-native speakers of English with limited proficiency may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Oral communication ........................................ 3
Quantitative reasoning ........................................ 3
Information technology ...................................... 3

Core Requirements

Literature .......................................................... 3
Fine Arts .......................................................... 3
Note: 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 general education fine arts requirement.

U.S. history ..................................................... 3
Western civilization .......................................... 3
Global understanding ....................................... 3
Note: AVT majors may not double-count ARTH courses toward both AVT major requirements and the general education global understanding requirement.

Social and behavioral sciences ...................... 3

AVT Major Requirements ................................. 73

Studio Foundation .......................................... 16
AVT 104 and 105 Studio Fundamentals I and II ............................ 8
AVT 222 and 323 or 324 Drawing I and II
or Figure Drawing ........................................... 8

Art History, Critical Analysis, Contemorary Practice ..................... 21
ARTH 200, Survey of Western Art I
or ARTH 203, Survey of Asian Art ............... 3
ARTH 201 Survey of Western Art II ................. 3
1 course from: ARTH (300 or 400 level)
or ARTH 305, 309, 371, 372, 377 ..................... 3
ARTH 374 Art Now, or AVT 308 Mixing It:
Art for a New Century .................................. 3
ARTH 307 Aesthetics ........................................ 3
AVT 395 Writing for Artists ............................. 3
AVT 472 Critical Theory in the Visual Arts . 3

Breadth and Experience ..................................... 16
Any three of the following classes .................. 12
AVT 215 Graphic Information Design I
AVT 252 Photography I
AVT 262 Sculpture I
AVT 272 Interdisciplinary Arts
AVT 232 Painting I
AVT 243 Printmaking I
AVT 280 Two-Dimensional Digital Art
AVT 399 Special Topics in Art and Visual Technology
AVT 497 Senior Project
or AVT 498 Senior Design Project .......... 4

Concentration ................................................. 20

20 credits in one of the following areas:

Digital Arts: AVT 382; 8 credits from AVT 383, 390, 482, 483, 487; and 8 credits from AVT 300–499

Drawing: AVT 422 and 423; 4 credits from AVT 324, 326, 333, 336, 337, 432, 433; and 8 credits from AVT 300–499. **NOTE:** All AVT majors concentrating in drawing must complete AVT 323 (Painting I) under Breadth and Experience.

Graphic Information Design: AVT 311, 313, 414; and 8 credits from 323, 345, 346, 353, 354, 382, 393, 422, 423, 489, 491, or 492

InterArts: AVT 373, 473; and 12 credits from 372, 374, 375, 376, 377, 378, 379, 491, or 492

Painting: AVT 333, 432, 433, and 8 credits from 300–499

Photography: AVT 353 and AVT 459; 8 credits from AVT 452, 453, 454, 455, 456, 457, 458; and 4 credits from AVT 300–499

Printmaking: AVT 343; and 8 credits from 345, 346, 442, 443; and 8 credits from 300–499

Sculpture: AVT 363, 462, 463; and 8 credits from 300–499

General Electives ............................................. 7
These general electives may be taken inside or outside of the department. Note: AVT 393 Field Experience in the Arts and AVT 489 Internship are not required courses but are recommended as electives for BFA students.

Total .......................................................... 120

Additional academic requirements for BA and BFA degree programs:

• Students are required to take a minimum of 45 credits of upper-division courses at the 300–499 level.

• Students must earn a minimum 2.00 cumulative GPA in their major.

Requirements for Honors Students

Honors students must take at least 4 credits of AVT 394 Honors Seminar. Students interested in the Honors Program in Art and Visual Technology should contact the chair of the department.

◆ 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 information design, InterArts, painting, photography, printmaking, or sculpture. The requirements are as follows:
AVT 104 and 105 Studio Fundamentals I and II .......................... 8
AVT 222 Drawing I ........................................ 4
AVT 200–299 .............................................. 4
AVT 300–399 .............................................. 4

◆ Interdisciplinary Minor in Multimedia

Faculty
Forche, Higgins, Lont, Martin, Smith, Weinberger, White

In the multimedia minor, students learn how to create original work and communicate with others through the fusion of images, text, sound, and video. Students analyze and incorporate into their productions contemporary design principles and current software applications. As part of this process, students are encouraged to focus on how multimedia technologies, which offer new tools for investigating and disseminating ideas, can enhance undergraduate research and writing. These skills, now important in most academic disciplines, are also increasingly valuable not only in the specialized information technology industries, but also in business, education, and politics.

This minor is not available to students majoring in AVT with a concentration in digital arts.

Requirements
Students must complete 18 to 20 credits distributed as follows:

Core ........................................................................ 8–9
- AVT 104 Studio Fundamentals I .................. 4
- COMM 157 Video Workshop
  or ENGL 209 Enhanced Digital Text .......... 1
And one of the following courses:
- AVT 180 or CAS 101 (Computers in the Creative Arts) or ......................... 3
- NCLC 249 Internet Literacy ........................................ 4

Electives ...................................................................... 9–12
Note: No more than 6 elective credits may be taken in any one college or department.
- AVT 280 Digital Arts I ................................. 4
- AVT 382 Digital Arts II ............................... 4
- COMM 355 Video I ...................................... 3
- NCLC 345 Introduction to Multimedia ...... 5
- NCLC 445 Multimedia Design .................. 5
- ENGL 497 Special Topics in Creative Writing: Hypertext Poetry and Web Publishing .......................... 3

GRADUATE PROGRAMS

Art and Visual Technology, MA and MFA
The MA in digital arts features courses that integrate visual information design, 2D imaging, 3D modeling, animation, video production, sound editing, multimedia authoring, and web publishing within a program that is grounded in both theory and application.

The MA degree requires 45 credits and is a professional program aimed at preparing students for employment in high-tech industries and businesses. These include 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 to 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 the following:
- Portfolio
- Statement of intent and professional goals
- Three letters of reference

Diversity among students accepted for study is another consideration. Applicants with degrees in areas other than art are welcome, although they may be required to complete undergraduate core courses.

Portfolio Guidelines
The applicant’s portfolio is a major selection criterion for graduate admission, and should represent the applicant’s most accomplished work. Portfolio requirements are different for each graduate area of emphasis.

All portfolios must include a written image or slide information sheet with the corresponding number, title, date, medium, and size of each work. If included, slides must be labeled with slide number, applicant’s name, title of work, and date. Incomplete portfolios will not be considered.

Applicants’ portfolio items are considered part of the application for admission and thus, cannot be returned. Please do not send original materials. The portfolio and all other application materials should be submitted to the Office of Graduate Admissions. For more information, contact the AVT department at 703-993-8898. Portfolio requirements by area of emphasis:
- Digital Arts: 20 images on a Mac (Apple Macintosh platform) compatible CD. All images must be numbered according to the printed list. Videos (no more than four minutes for each selection) must be playable from a Mac compatible CD or DVD. Only the relevant parts of the video should be marked for viewing, with the applicant’s role clearly stated. Digital arts applicants should not submit slides.
- Photography and Printmaking: 20 images on a Mac-compatible CD, or slides. All images must be numbered...
according to the printed list. Printmaking also requires a print portfolio of 12 prints.

- **Sculpture and Painting**: 20 slides only. All slides must be numbered and labeled according to the printed list.
- **InterArts**: Total of 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 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 included, 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 2D imaging, 3D 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 and Art and Visual Technology</td>
<td>10</td>
</tr>
<tr>
<td>Course Work</td>
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</tr>
<tr>
<td>AVT 599 Special Topics in Art and Visual Technology</td>
<td>4</td>
</tr>
<tr>
<td>AVT 600 AVT Research Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>AVT 610 Graduate Seminar (1 credit repeated for 4 credits)</td>
<td>4</td>
</tr>
<tr>
<td>AVT 620 Theory and Criticism in the Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>AVT 693 Apprenticeship</td>
<td>6</td>
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</tbody>
</table>

**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 684 Two-Dimensional Digital Art
- AVT 686 Three-Dimensional Digital Art
- AVT 688 Digital Animation

**Total credits required** | 45

**MFA Degree Requirements**

<table>
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<tr>
<th>Core Requirements</th>
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</thead>
<tbody>
<tr>
<td>AVT 500 and Art and Visual Technology</td>
<td>10</td>
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<tr>
<td>AVT 599 Special Topics in Art and Visual Technology</td>
<td>4</td>
</tr>
<tr>
<td>AVT 600 Research Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>AVT 610 Graduate Seminar (1 credit repeated for 4 credits)</td>
<td>4</td>
</tr>
<tr>
<td>AVT 620 Theory and Criticism in the Visual Arts</td>
<td>3</td>
</tr>
<tr>
<td>AVT 670 Teaching Practicum</td>
<td>6</td>
</tr>
</tbody>
</table>

**Studio Emphasis** | 15

MFA students must complete 15 credits in one of the following areas:

**Digital Arts: Any three of the following courses:**

- AVT 616 Internet Multimedia Art
- AVT 676 Sound and Music for Video and Animation
- 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

**Photography: All three of the following courses:**

- AVT 652 Graduate Photography I
- AVT 653 Graduate Photography II
- AVT 654 Advanced Graduate Photography

**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

**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 PK–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 independent 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 take 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 fall and spring semesters. The deadlines for receipt of application materials are February 15 for the fall semester, and October 15 for the spring semester. 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.

Degree Requirements

<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 500 and Studio elective</td>
<td>4</td>
</tr>
<tr>
<td>AVT 668 3-D Artmaking Across Cultures</td>
<td>4</td>
</tr>
<tr>
<td>EDRD 501 Literacy and Curriculum Integration for Specialist Teachers</td>
<td>3</td>
</tr>
<tr>
<td>AVT 691 Elementary Art Education</td>
<td>3</td>
</tr>
<tr>
<td>(with practicum)</td>
<td></td>
</tr>
<tr>
<td>AVT 692 Secondary Art Education</td>
<td>3</td>
</tr>
<tr>
<td>(with practicum)</td>
<td></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>
</tbody>
</table>

Total credits required: 30

Note on core requirements: MAT matriculants who earned a BFA at an institution other than Mason may be required to take additional undergraduate credits as post-baccalaureate core requirements before acceptance into the program. Without equivalent courses, they will be required to take a "post-bac" set of five BFA foundational courses in art education and education: AVT 396, 493, and 494; and EDUC 301 and 302. In addition, applicants who did not take equivalent undergraduate courses must also take AVT 472 Critical Theory in the Visual Arts, and AVT 180 Computers in the Creative Arts, plus any additional studio or art history course work to meet Virginia licensure requirements.

Teaching Portfolio and Qualifications Review

The “Art of Teaching Art” Showcase culminates in a final portfolio review in which MAT candidates exhibit works of PK–12 student art completed during the internship along with exemplars of the student’s own artwork. All process folios, lesson plans, explanations of projects, and other relevant materials may be 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 include a final 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.

Master of Arts Management

Mason Hall, D 21
Phone: 703-993-8381
Web: www.artsmanagement.gmu.edu

Faculty

Meg Brindle, program director
Professors: Reeder, R. Davis
Associate Professors: Brindle (program director), Marcus, S. Martin
Adjuncts: Carlborg, Celantano, Hill, Kamenitzer, Richard, J. Ward

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 administrators with skills in financial and budgetary man-
management, strategic management and entrepreneurship, and public relations—including marketing and advertising—has arguably never been more acute. The need for arts administrators 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 37-credit program of study that provides a core curriculum in the fundamentals of arts management. Students complete a 19-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 will be evaluated on a case-by-case basis. 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 that they 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 that they wish to unite these skills with prior experiences in the arts.

In addition to meeting the general requirements for university admission for graduate study, candidates must hold an undergraduate degree. They also must have an interview with at least one member of the program faculty or admissions committee.

Applicants must submit the following items:

- Undergraduate transcripts
- Three letters of recommendation from faculty members or individuals who have firsthand knowledge of the applicant’s academic or professional capabilities
- A two-page (maximum) statement of intent and goals

Additionally, applicants may submit a portfolio that demonstrates work experience. Internship experience for recent graduates will also be considered.

Degree Requirements

Core Requirements .............................................. 19

- MAM 501 Development and Fundraising in Arts .................................................. 3
- MAM 602 Seminar in Arts Management .............................................................. 3
- MAM 603 Arts in Society ................................................................. 3
- MAM 604 Strategic Marketing and Public Relations for Arts Managers ............... 3
- MAM 704 Finance and Budgeting for Arts Administrators ................................. 4
- MAM 710 Arts Policy ................................................................. 3

Internships .............................................................. 9

- MAM 740 Internal Internship ................................................................. 3
- MAM 790 External Internship ................................................................. 6

Clusters of Electives ................................. 9–10

Select a cluster of electives:

- Entrepreneurship in the Arts and Management
- AVT 610 Entrepreneurship in the Arts .................................................. 4
- MAM 712 Grant Writing in the Arts ........................................................ 3
- One of the following courses: .......................................................... 3
  - PUAD 622 Program Planning and Implementation
  - PUAD 629 Special Topics in Public Management
  - PUAD 670 Human Resources Management in the Public Sector
  - PUAD 720 Performance Measurement
  - PUAD 732 Managing Technology Transfer

Finance and Budgeting for the Arts

- MAM 712 Grant Writing in the Arts .................................................. 3
- PUAD 661 Public Budgeting Systems .................................................. 3
- PUAD 769 Issues in Public Financial Management ........................................ 3

Marketing and Public Relations

- Select three of the following courses:
  - COMM 601 Communication in Professional Relationships ...................... 3
  - MBA 623 Marketing Management ................................................... 3
  - PUAD 654 The Community, Marketing and Public Relations ............... 3
  - Electives from COMM, AVT, or other

Arts Specific cluster

Either general or specific to an arts discipline such as music, theater, art and visual technology, or dance

Total credits required .............................................. 37–38

Dance

Performing Arts Building, A300
Phone: 703-993-1114
Web: dance.gmu.edu

Faculty
Elizabeth Price, chair
Professor: Miller
Associate Professors: Carbonneau, Lepore, Shields, Studd
Assistant Professors: Joyce, Price (chair), Thompson
Adjunts: Bush, Clancy, Koucheryavy, Lees, McLaughlin, 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 contacting 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 the requirements for a BA or BFA in dance. Additionally, students must meet the following requirements:

• Be formally accepted into the program by the Dance Education Committee. Before requesting an interview with the committee, students must complete 45 to 60 credits with a GPA of 2.80 or higher, and submit passing scores for the Praxis I tests (Reading Writing, Mathematics). It is strongly recommended that students take the Praxis I tests as soon as they have completed ENGL 302, a course in literature, and a course in mathematics.

• Earn no grade lower than a C in dance (see major curriculum) and in professional education courses (EDUC 300, 302; EDRD 300; DANC 453, 454).

• Maintain an overall GPA of 2.80 or higher in all dance course work at Mason, and at all other institutions of higher learning combined.

• As dance elective options, complete DANC 118 World Dance, DANC 453 Teaching Creative Movement, and DANC 131 or 231 Jazz.

• With committee approval, register for and complete EDUC 300 and 302, and EDRG 300.

• After completing all required course work and with committee approval, 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 to 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

General Education .................................................. 46

Foundation Requirements
Written communication
ENGL 101 and ENGL 302 ................................. 6
Non-native speakers of English with limited proficiency in the language may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.

Oral communication (see DANC 454) .................. 3
Quantitative reasoning ........................................... 3
Information technology ........................................... 3

Core Requirements
Literature ............................................................ 3
Arts .................................................................. 9
MUSI 101 ........................................................... 3
AVT/ARTH ........................................................ 3
THR 210 ............................................................ 3

Natural science
(must include one laboratory science) ............... 7
U.S. history ......................................................... 3
Western civilization ............................................. 3
Global understanding .......................................... 3
Social science ....................................................... 3

Synthesis Requirement (DANC 490) .................... 3

Dance Major Core .................................................. 77
DANC 114 Rhythmic Analysis and
Music Resources for Dance .............................. 3
DANC 150 Dance Improvisation ......................... 3
DANC 170 Introduction to Dance Production ....... 1
DANC 210 Dynamic Alignment .......................... 3
DANC 251 Dance Composition I ........................ 3
DANC 252 Dance Composition II ........................ 3
DANC 270 Dance Production Lab ........................ 1
DANC 325/425 Int./Adv. Modern Dance ........... 18
DANC 345/445 Int./Adv. Ballet ....................... 9
DANC 360 Choreography .................................. 3
DANC 362 Directed Choreography .................... 1
DANC 370 Dance Performance .......................... 4
DANC 372 Advanced Dance Production ............ 1
DANC 390 Dance History: Pre-20th Century ...... 3
DANC 391 Dance History: 20th Century ............. 3
DANC 454 Teaching Principles of
Modern Dance .................................................. 3
DANC 480 Introduction To Laban Movement
Analysis .......................................................... 3

Dance Electives ................................................... 12
Chosen from:
DANC 118 World Dance
DANC 119 Dance in Popular Culture:
  Afro-Latino Dance
DANC 120 Special Topics in Dance
DANC 131, 231 Beginning/Intermediate Jazz
  Technique
DANC 161 Beginning Tap Dance
DANC 225 Beginning Intermediate Modern Dance
DANC 245 Beginning Intermediate Ballet
DANC 314 Music Accompaniment for Dance
**Department of Dance**

- **DANC 318 Global Perspectives: World Dance Forms**
- **DANC 325 Intermediate Modern Dance**
- **DANC 326 Dance Performance Practicum**
- **DANC 330 Dance/Movement Therapy I**
- **DANC 345 Intermediate Ballet**
- **DANC 350 Advanced Dance Improvisation**
- **DANC 362 Directed Choreography**
- **DANC 370 Dance Performance**
- **DANC 371 Residency Workshop**
- **DANC 399 Independent Study**
- **DANC 418 Global Dance Intensive**
- **DANC 420 Special Topics in Dance**
- **DANC 430 Dance/Movement Therapy II**
- **DANC 445 Advanced Ballet**
- **DANC 453 Teaching Creative Movement**
- **DANC 455 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**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>General Education</td>
</tr>
<tr>
<td>44</td>
<td>Dance Major Core</td>
</tr>
<tr>
<td>12</td>
<td>Dance Electives</td>
</tr>
<tr>
<td>120</td>
<td>Total</td>
</tr>
</tbody>
</table>

**General Education**

**Foundation Requirements**

- Written communication
  - ENGL 101 and 302 ............................................ 6
- Non-native speakers of English with limited proficiency in the language may substitute ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.
- Oral communication .......................................... 3
- Quantitative reasoning ....................................... 3
- Information technology ..................................... 3

**Core Requirements**

- Literature ......................................................... 6
- Arts ...................................................................... 6
  - (3 credits from university general education “Arts” courses plus any MUSI, THR, AVT, or ARTH)
- Natural science
  - (must include a laboratory science) ................. 7
- U.S. history ....................................................... 3
- Western civilization ......................................... 3
- Global understanding ....................................... 3
- Social science ................................................... 3
- Philosophy or religion ..................................... 3

**Synthesis Requirement (DANC 490)** ..................... 3

**Other**

- Foreign language ................................................. 0–12
  - Elementary .................................................... (6)
  - Intermediate .................................................. (6)

A student must demonstrate intermediate-level proficiency in one foreign language. This requirement is fulfilled by completion of one foreign language course at the 202 level or higher, or by a satisfactory score on an approved proficiency test. International students should consult with CVPA about a possible waiver of this requirement.

**Dance Major Core** ................................................. 44

- **DANC 114 Rhythmic 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 Int./Adv. Modern Dance** .......... 6
- **DANC 345/445 Int./Adv. Ballet** ....................... 3
- **DANC 350 Advanced Dance Improvisation** ....... 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** .................................................. 4

- Chosen from:
  - **DANC 118 World Dance**
  - **DANC 119 Dance in Popular Culture:**
    - Afro-Latino Dance
  - **DANC 120 Special Topics in Dance**
  - **DANC 131, 231 Beginning, Intermediate Jazz**
  - **DANC 161 Beginning Tap**
  - **DANC 225 Beginning Modern Dance**
  - **DANC 245 Beginning Ballet**
  - **DANC 314 Music Accompaniment for Dance**
  - **DANC 318 Global Perspectives: World Dance Forms**
  - **DANC 325 Intermediate Modern Dance**
  - **DANC 326 Dance Performance Practicum**
  - **DANC 330 Dance/Movement Therapy I**
  - **DANC 345 Intermediate Ballet**
  - **DANC 350 Advanced Dance Improvisation**
  - **DANC 362 Directed Choreography**
  - **DANC 370 Dance Performance**
  - **DANC 371 Residency Workshop**
  - **DANC 399 Independent Study**
  - **DANC 418 Global Dance Intensive**
  - **DANC 420 Special Topics in Dance**
  - **DANC 425 Advanced Modern Dance**
  - **DANC 430 Dance/Movement Therapy II**
  - **DANC 445 Advanced Ballet**
  - **DANC 453 Teaching Creative Movement**
  - **DANC 455 Teaching Practicum**

**Electives** ................................................................. 12

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

**Minor in Dance Appreciation**

The minor (total 21 credits) offers students an opportunity to study a variety of movement styles, and understand dance in its historical and cultural context. All minors must demonstrate a basic level of training in modern dance and ballet.
Required Courses
DANC 101 Dance Appreciation .............................. 3
DANC 118 World Dance ....................................... 3
Select three of the following courses:
DANC 125 Beginning Modern Dance ................. 3
DANC 225 Beginning Intermediate Modern Dance ................................................. 3
DANC 145 Beginning Ballet ................................ 3
DANC 245 Beginning Intermediate Ballet ............. 3
Select 6 credits from the following:
DANC 118 World Dance ....................................... 3
DANC 119 Dance in Popular Culture ................. 3
DANC 131 Beginning Jazz ................................... 3
DANC 231 Intermediate Jazz ............................... 3
DANC 161 Beginning Tap ..................................... 3
DANC 120 Special Topics ................................. 1–3
DANC 318 Global Perspectives ......................... 3
DANC 420 Special Topics .................................. 1–3
Substitutions may be proposed to department faculty for approval.

GRADUATE PROGRAM

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 resume and a 10-minute VHS video that illustrates the applicant’s choreography. All candidates must also demonstrate advanced technical proficiency through an audition. Contact the Dance Department at 703-993-1114 for dates and times.

All candidates must satisfy the following prerequisites: advanced dance technique; improvisation; two semesters of dance composition; two semesters of dance history; rhythmic analysis or music for dance; anatomy/kinesiology; and dance production. Prerequisite courses may be completed before or concurrent with graduate coursework 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>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANC 501 Graduate Dance Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

A total of 18 credits of advanced dance technique:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANC 525 Advanced Modern Dance</td>
<td>9–12</td>
</tr>
<tr>
<td>DANC 545 Advanced Ballet</td>
<td>6–9</td>
</tr>
<tr>
<td>DANC 560 Advanced Choreography</td>
<td>6</td>
</tr>
<tr>
<td>DANC 570/571 Advanced Performance/Residency Workshop</td>
<td>3</td>
</tr>
<tr>
<td>DANC 580 Laban Movement Analysis</td>
<td>3</td>
</tr>
<tr>
<td>DANC 598 Philosophy and Aesthetics of Dance</td>
<td>3</td>
</tr>
<tr>
<td>DANC 615 Contemporary Trends</td>
<td>3</td>
</tr>
<tr>
<td>DANC 627 Advanced Teaching Seminar</td>
<td>3</td>
</tr>
<tr>
<td>DANC 680 Dance Management</td>
<td>3</td>
</tr>
<tr>
<td>DANC 790 Internship</td>
<td>3</td>
</tr>
<tr>
<td>DANC 799 Thesis</td>
<td>6</td>
</tr>
</tbody>
</table>

Electives ................................................. 6

Total Credits ........................................... 60

Mason does not guarantee the availability of these courses every semester; some are offered in alternating years.

Music

Performing Arts Building, A417
Phone: 703-993-1380
Web: gmu.edu/departments/music

Faculty

Professors: Burton (Heritage Chair in Music), Engebretson, J. Gardner (chair), Maiello, Miller, Smith
Term Professor: Sternbach
Associate Professors: Billingham, Carroll, Monson (associate chair)
Term Associate Professors: Casagrande, Rendler
Assistant Professors: Bergman, Bullard, T. Owens

Applied Music Faculty

Bassoon: Douglas Kehlbrink, 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, The 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, The 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, The 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, The Catholic University of America; former member, U.S. Air Force Band of Washington, D.C.; instructor of clarinet, The Levine School of Music.

Composition: Steve Antosca, Adjunct Assistant Professor. BA, Tulane University; MM Peabody Conservatory of Music of The Johns Hopkins University; Artist-in-Residence, Duke Ellington School of the Arts; Co-Chair, Composition Department at Levine School of Music.

Stephen Burton, Professor. MM, Peabody Conservatory.
Glenn Smith, Professor. BA, MA, California State University, Hayward; DMA, Indiana University.

Conducting: Stanley Engebretson, Professor. BA, MA, University of North Dakota; DMA, Stanford University; Director of Choral Studies, George Mason University; artistic director, Masterworks Chorus and Orchestra; music director, New York Avenue Presbyterian Church; former associate conductor, Minnesota Chorale.

Anthony Maiello, Professor. BS, M.S, Ithaca College; Director of Instrumental Music Studies, George Mason University; former chairman of performance, Potsdam College of the State University of New York; former associate conductor, McLean (Va.) Orchestra.

Euphonium: Roger Behrend, Adjunct Professor. BME, Arizona State University; MM, Manhattan School of Music; conductor, 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); international concert tours; former principal flutist, U.S. Army Band.

Guitar (Jazz): Richard Whitehead, Adjunct Assistant Professor.

Harp: Jeanne Chalifoux, Adjunct Assistant Professor. Artist Diploma, Curtis Institute of Music; former harpist, National Gallery Orchestra and National Symphony Orchestra.

Horn: Eric Moore, Adjunct Assistant Professor.

Edwin Thayer, Adjunct Associate Professor. BM, MM, University of Illinois; hornist, National Symphony Orchestra.

David Whaley, Adjunct Associate Professor. BM, University of Alabama; hornist, National Symphony Orchestra.

Koto: Kyoko Okamoto, Adjunct Assistant Professor. Bachelor in Languages, Kyoto University of Foreign Studies; Toho Kinshu Kai (Koto School).

Oboe: Lorrie Berkshire-Brown, Adjunct Assistant Professor. BM, Arizona State University; MM, Manhattan School of Music; substitute oboist, U.S. Army Band of Washington, D.C.; former freelance music producer, National Public Radio.

Organ: William Neil, Adjunct Professor. BA, Pennsylvania State University; MM, Syracuse University; University of Michigan; The Juilliard School; organist and keyboardist, National Symphony Orchestra, Chamber Soloists of Washington, Handel Festival Orchestra, New York Trumpet Ensemble.

Percussion: Guy Gauthreaux, Adjunct Associate Professor. BMEd., Northeast Louisiana University; MM, Northwestern University; DMA, Louisiana State University; timpanist, U.S. Navy Band.

Kenneth Harbison, Adjunct Associate Professor. BM, Eastman School; MM, The Catholic University of America; assistant principal percussionist, National Symphony Orchestra.

Percussion (Jazz): Harold Sunnem, Adjunct Assistant Professor.

Piano: Anna Balakerskaia, Adjunct Artist Professor. MM, DMA, St. Petersburg State Conservatory, Russia; piano soloist and chamber musician throughout the U.S., Europe, South America, and Russia. Former faculty member, Moscow and St. Petersburg State Conservatories.

Joanne Haroutounian, Adjunct Associate Professor. BA, Trenton State College; MA, The American University; PhD, University of Virginia; pedagogy author, lecturer, and clinician.

Linda Apple Monson, Associate Professor. BME, MM, D.MA, Peabody Conservatory of Music of the Johns Hopkins University; solo/piano performance, Santiago de Compostela, Spain; soloist, accompanist, and chamber musician in the U.S. and Europe; music director, Springfield United Methodist Church. Former faculty member of Peabody Institute, College of Notre Dame of Maryland, and Northern Virginia Community College.

Piano (Jazz): Wade Beach, Adjunct Assistant Professor.

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. B.S.M.Ed., Penn 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, The Catholic University of America; trumpeter, U.S. Army Band of Washington, D.C.; and National Gallery Orchestra.

Tuba: Roger Behrend (see listing under Euphonium).

Viola: Edwin Johonnott, Adjunct Professor. Former violinist, National Symphony Orchestra. Studied at Indiana University and Illinois University.

Ramon Scavelli, Adjunct Associate Professor. Philadelphia Musical Academy; violist, National Symphony Orchestra.

Violin: James E. Gardner, Professor. 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, Adjunct Professor. Former violinist, National Symphony Orchestra. Studied at Indiana University and Illinois University.
Voice: Carla Rae Cook, Adjunct Associate Professor. BM, University of Utah; MM, Boston University; Postgraduate Studies, Manhattan School of Music; winner of national and international singing competitions; performing dramatic mezzo-soprano.

Stanley Engberetson (see listing under Conducting).

Kathryn Hearden-Botelho, Adjunct Professor. BM, St. Norbert College; MM, Performers Certificate, DMA, Eastman School of Music; nationally known soloist and concert artist with opera companies and orchestras.

Laura Mann, Adjunct Professor. BM, MM, Eastman School of Music; DMA, University of Maryland; international opera, concert, and recording artist with European and North American opera companies and orchestras.

Debby Wenner, Adjunct Assistant Professor. BS, Frostburg State College; MM, George Washington University; Graduate Work, West Virginia University, The Catholic University of America; former member, Metropolitan Opera Apprentice Program; performing mezzo-soprano.

Kerry Wilkerson, Adjunct Assistant Professor. BM, University of North Carolina, Greensboro; MM, George Mason University; member, U.S. Army Chorus.

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 the 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 the 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 in November, January, and March through August, usually on the first Monday of each month except for January and August, when dates are scheduled during the university registration period.

A fundamentals of music test is given during the first week of classes to all students enrolled in MUSI 115 (Theory I). This test consists of standard musical notation in treble and bass clefs; key signatures; all intervals up to a perfect octave; and all major, natural minor, harmonic minor, and melodic minor scales, ascending and descending.

Competency placement tests are required of all transfer students who desire to present transfer credit in any of the following areas: sight singing, ear training, and keyboard skills, including keyboard harmony.

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 331, 332, 431, or 432. Students who transfer all of these courses into Mason may be required to repeat one of them or to 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 either 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 are required.

Degree Requirements

<table>
<thead>
<tr>
<th>General Education</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Foundation Requirements</td>
<td>28–49</td>
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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>Written Communication</td>
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<tr>
<td>ENGL 101 and ENGL 302</td>
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<tr>
<td>Non-native speakers of English with limited proficiency may substitution ENGL 100 for ENGL 101. Students must attain a minimum grade of C in ENGL 100 or 101, as well as in 302, to fulfill degree requirements.</td>
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<tr>
<td>Quantitative Reasoning (Mathematics)*</td>
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<tr>
<th>Core Requirements</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Literature*</td>
<td>3</td>
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<tr>
<td>Natural Science* (2 classes; 1 must contain a lab)</td>
<td>3</td>
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<tr>
<td>U.S. History</td>
<td>7</td>
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</tbody>
</table>
Western Civilization .............................................................. 3
Social or Behavioral Science* .............................................. 3
* Also have significant elective choices as per general education listing.

Remaining general education requirements are fulfilled with major course work.

Other
Intermediate-level language proficiency or an academic minor .................................. 0–21

Music Major ........................................................................... 57

Musicianship ......................................................................... 28
MUSI 115, 116, 215 Music Theory I, II, III .............................. 9
MUSI 216 Form and Analysis .............................................. 3
MUSI 113, 114 Sight Singing/Ear Training I, II ..................... 4
MUSI 171, 172, 273 Keyboard Skills I, II, III (Pianists substitute MUSI 371 and 372 for MUSI 171 and 172) .......... 3
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 .............................. 4
MUSI 431 Music History III [Meets General Education Global Understanding requirement] ............................................. 3

Performance and Music Electives ............................................... 29
Applied Music (Private Music Instruction) (Major Instrument or Voice) ...................... 8
Large Ensemble (transfer students must earn at least 2 credits at Mason) .............................................. 4
Additional Ensembles (Large or Small; meets general education arts requirement) ............. 3
MUSI 415 Music in Computer Technology (Meets general education information technology requirement) ............................................. 3
MUSI 251 Art of Teaching Music (Meets general education communications requirement) .............................................. 3
MUSI 351, 352, or 353 Pedagogy .................................................. 3
MUSI 395 Teaching Internship .................................................. 2
MUSI 490 Synthesis (Meets general education synthesis requirement) .............................. 3
MUSI 300 Recital Attendance, 5 semesters ......................... 0

Electives ........................................................................... 14–35
Can include additional music courses

Music, BM
A total of 120 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 ................................................................................ Credits
Foundation Requirements
Written Communication ................................................................. 6
ENGL 101 and ENGL 302
Non-native speakers of English with limited proficiency may substitution 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
U.S. History ................................................................................... 3
Western Civilization ....................................................................... 3
Social or Behavioral Science* ...................................................... 3
* Also have significant elective choices as per general education listing.

Remaining general education requirements are fulfilled with major course work.

Performance Basic Musicianship Requirements ................................................. 61
Applied Music (Private Music Instruction) (Major Instrument or Voice) ...................... 20
MUSI 324 Junior Recital .............................................................. 1
MUSI 424 Senior Recital .............................................................. 1
MUSI 491 Performance Synthesis (meets general education synthesis requirement) .......... 1
MUSI 113, 114 Sight Singing/Ear Training I, II ..................... 4
MUSI 115, 116, and 215 Music Theory I, II, and III .................... 9
MUSI 273 Keyboard Skills III ....................................................... 1
MUSI 216 Form and Analysis ....................................................... 3
MUSI 251 Art of Teaching Music (Meets general education oral communication requirement) .............................................. 3
MUSI 319 Class Composition and Arranging ......................................... 3
MUSI 415 Music in Computer Technology (meets general education information technology requirement) .............................................. 3
MUSI 331, 332, and 432 Music History in Society I, II, and IV .............................................. 9
MUSI 431 Music History in Society III (meets general education global understanding requirement) .............................................. 3
MUSI 300 Recital Attendance (5 semesters) .......................... 0

Keyboard Concentration ..................................................................... 25
Ensemble .................................................................................. 5
Ensemble (Meets general education fine arts requirement) .............................................. 3
MUSI 325 Performance Seminar for Singers and Accompanists ......................................... 2
MUSI 351 Keyboard Pedagogy ....................................................... 3
MUSI 371 and 372 Techniques of Accompanying I and II .............................................. 2
MUSI 379 Improvisation .............................................................. 1
MUSI 391 Conducting I .............................................................. 2
MUSI 395 Teaching Internships (2 semesters) .......................... 4
MUSI 492H Keyboard Literature .................................................. 3
General Electives ........................................................................... 10

Voice Concentration ..................................................................... 27
Ensemble .................................................................................. 5
Ensemble (Meets general education fine arts requirement) .............................................. 3
MUSI 171 and 172 Keyboard Skills I and II ..................................... 2
MUSI 325 and 326 Performance Seminar for Singers and Accompanists I and II ............. 4
MUSI 341 and 342 Diction for Singers I and II ... 4
MUSI 352 Vocal Pedagogy and Lab .......................... 3
MUSI 388 Fundamental Techniques of
Stagecraft ................................................................ 2
MUSI 391 and 396 Choral Conducting I and II ... 4
General Electives ....................................................... 8

Winds, Strings, Percussion Concentration ....... 25
Ensemble ................................................................ 5
Ensemble (Meets general education fine arts
requirement) ........................................................... 3
MUSI 171 and 172 Keyboard Skills I and II ........ 2
MUSI 353 Instrumental Pedagogy and Literature 3
MUSI 379 Improvisation ....................................... 1
MUSI 391 and 396 Instrumental Conducting I
and II ................................................................ 4
MUSI 395 Teaching Internships (2 semesters) .... 4
MUSI 419 Orchestration ....................................... 3
General Electives ....................................................... 10

Jazz Concentration ................................................. 30
Ensemble ................................................................ 5
Ensemble (Meets general education fine arts
requirement) ........................................................... 3
Jazz Chamber Ensemble ....................................... 4
MUSI 107 The Development of Jazz ..................... 3
MUSI 171 and 172 Keyboard Skills I and II (Key
board students substitute MUSI 371 and
MUSI 372 Techniques of Accompanying I
and II) .................................................................. 2
MUSI 311 Jazz Studies (Jazz Theory, Styles,
and Analysis) .......................................................... 3
MUSI 379 Intro to Jazz Improvisation ................. 1
MUSI 450, 452 Jazz Improvisation I & II
(2 credits each) .................................................... 4
MUSI 454 Jazz Arranging ....................................... 3
MUSI 492 Jazz Topics in Jazz Studies .................. 2
General Electives ....................................................... 5

Concentration in Music Education

Certification to Teach
The music education concentration is approved by the
Virginia State Department of Education and administrated
through the College of Education and Human Development,
which is accredited by the National Council for the Accredi-
tation 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 educa-
tion concentration by the department’s Music Teacher Edu-
cation Committee. They must have earned 45 to 60 credits,
and have completed Sight Singing and Ear Training II, Key-
board Skills III, and Theory III with a grade of C or better.
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 com-
pleted at Mason, and in course work at all institutions of
higher learning combined.
• Earn no grade lower than a C in music and in professional
education courses needed for graduation.
• Successfully pass sight singing, ear training, keyboard, and
conducting proficiency exams during the first music meth-
ods course (MUSI 461, 463, 464, or 466). 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 com-
plete 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 Educa-
tion at the beginning of the previous semester. Additionally,
students must pass the Praxis II (Music: Content Knowl-
dge) test during the internship semester.

Concentration in Music Education

Degree Requirements

General Education .................................................. 24

Foundation Requirements
Written Communication ....................................... 6
ENGL 101 and ENGL 302
Non-native speakers of English with limited
proficiency may substitute ENGL 100 for ENGL 101.
Students must attain a minimum grade of C in ENGL 100 or 101,
as well as in 302, to fulfill degree require-
ments.
Quantitative Reasoning (Mathematics)* .............. 3

Core Requirements
Literature* ......................................................... 3
Natural Science (nonlab)* ................................. 3
U.S. History .......................................................... 3
Western Civilization ........................................... 3
Social or Behavioral Science* ......................... 3
*Also have significant elective choices as per general
education listing.

Remaining general education requirements are fulfilled
with major course work.

Music Education Basic Musicianship
Requirements ...................................................... 65
Applied Music (Private Music Instruction; major
instrument or voice) .................. 12
MUSI 323 Music Education Recital ..................... 0
Large Ensemble ................................................... 4
Additional Ensembles (Meets general
education fine arts requirement) ...................... 3
MUSI 113, 114 Sight Singing/Ear Training
I, II ................................................................ 4
MUSI 115, 116, and 215 Music Theory I, II,
and III ............................................................... 9
MUSI 171, 172, and 273 Keyboard Skills I,
II, and III (Piano majors substitute MUSI
371 and 372 for MUSI 171 and 172) .............. 3
MUSI 216 Form and Analysis ............................. 3
MUSI 251 Art of Teaching Music
(Meets general education oral communication
requirement) .................................................... 3
MUSI 319 Class Composition and Arranging ................................. 3
MUSI 415 Music in Computer Technology
(meets general education information
technology requirement) ............................... 3
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
(meets general education synthesis
requirement) .......................................................... 6

Choral Emphasis in Music Education .................... 15
MUSI 361 Class Strings ......................................... 1
MUSI 363 or 364 or 365
or 369 Class Woodwinds or Class Brass .......... 1
MUSI 366 Class Percussion .................................. 1
One of the following:
Singers take: MUSI 367 Class Guitar and
PMI Piano (2 credits) ........................................... 3
Guitar students take: PMI Voice (2 credits)
and PMI Piano (1 credit) .................................. 3
Keyboard students take: MUSI 367 Class
Guitar and PMI Voice (2 credits) .................. 3
MUSI 352 Vocal Pedagogy and Lab .................... 3
MUSI 461 Teaching General Music in
Elementary and Middle School ....................... 3
MUSI 463 Teaching Vocal Music in
Secondary School ........................................... 3

Or
Instrumental Emphasis in Music Education ...... 14
MUSI 361 Class Strings ......................................... 1
MUSI 363 and 364 Class Woodwinds ................. 2
MUSI 365 and 369 Class Brass ............................ 2
MUSI 366 Class Percussion .................................. 1
MUSI 367 Class Guitar ........................................ 1
MUSI 368 Class Voice ......................................... 1
MUSI 464 Instrumental Methods I (Marching
Band and Jazz Ensemble)
or MUSI 467 Instrumental Music Methods I
(orchestra) ......................................................... 3
MUSI 466 Instrumental Methods II .................... 3

Elective ................................................................. 1–2

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.” Students who have
earned a baccalaureate degree and who 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 and Ear Training I ........ 2
MUSI 115, 116 Theory I and II ......................... 6
MUSI 171 Keyboard Skills I ............................... 1
MUSI 221, 421 Undergraduate private music
instruction (major instrument or voice) .......... 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-
mentalists 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 and Ear Training I ........ 2
MUSI 115, 116 Theory I and II ......................... 6
MUSI 171 Keyboard Skills I ............................... 1
MUSI 221 Undergraduate Private Music
Instruction (major instrument or voice) .......... 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), Lepore, Owens, Carroll

Course Work
This program is designed for those who wish to widen their
scope of knowledge about music while deepening their un-
derstanding of the world’s peoples. For the minor in world
music, students will learn—in the classroom as well as ex-
perimentally in the form of applied studies and exercises in
field work—how music making functions within cultural
contexts, conveying varied meanings worldwide, in bodily
action and musical sound. Students gain skills that will serve
them in many fields of endeavor: from developing specific
musical expertise to acquiring proficiency with technologi-
cal 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
departments at Mason.
Prerequisite: Students must first demonstrate to the coordinator a basic level of knowledge and training in some area of Western or non-Western music, or earn a grade of B or higher in MUSI 103 or 431. Prerequisites for specific courses are indicated below.

Credits

Total Required ......................................................... 16–18

Core ....................................................................... 10

ANTH 114 Introduction to Cultural Anthropology ................................................. 3
MUSI 497 Independent Study: Experiential Learning in World Music ..................... 3
One of the following two courses: ........................................... 1
MUSI 221 Undergraduate Private Music Instruction or MUSI 485 Ensembles*
MUSI 303, World Music event attendance (5 each semester for 3 semesters) .................. 0

*Selection of private music instruction or ensemble must be approved by minor coordinator.

Electives .............................................................. 6–8

Choose from

MUSI 221 Undergraduate Private Music Instruction .................................................. 1
MUSI 485 Ensembles .............................................................................. 1
One of the following three courses: ................................................. 1–3
MUSI 102 Popular Music in America or MUSI 107 The Development of Jazz or MUSI 379 Jazz Improvisation
One of the following 2 courses in Dance: ........................................... 3
DANC 118 World Dance or DANC 119 Afro-Latino Dance
One of the following two courses in communications: .............................................. 1–3
COMM 157 Video Workshop or COMM 305 Foundations of Intercultural Communication
One course, selected from the following five categories of area studies: ......................... 3
Folklore: ENGL 333 Folklore of the Americas
African American Studies: One of the following three courses:
AFAM 200 Introduction to African American Studies
or AFAM 390 Special Topics in African American Studies,
or AVT 378 The African American Experience in the Performing Arts
Latin America: ANTH 302 Peoples and Cultures of Latin America
Island Asia: ANTH 306 Peoples and Cultures of Island Asia
South Asia: ANTH 309 Peoples and Cultures of India

Additional electives may include summer travel courses, as appropriate, and must be approved by the minor coordinator.

Professional Development Certificate in Piano Pedagogy

This certificate provides specialized training designed to meet the needs of those seeking to expand their piano teaching skills. This is a nondegree program of Continuing Education sponsored by the Department of Music. The professional development certificate can be earned through the completion of 16 hours of pedagogy-related course work.

The curriculum includes concentrated course work in keyboard pedagogy including business aspects of teaching, techniques of teaching repertoire and technical skills at different levels of student development, and a comprehensive study of teaching strategies appropriate for private and group settings. Students will have the opportunity to research current topics in the field of pedagogy. Course work includes observation of teaching, a teaching internship, and a final pedagogy project.

Certification requires a certain level of performance proficiency, and basic knowledge of music theory, sight-singing and ear training, and keyboard skills. Entry to the certificate program will include testing in theory, sight-singing and ear-training, and keyboard skills; and a performance audition to determine proficiency or placement in appropriate levels of private music instruction or course work to achieve required proficiency for certification.

Entrance Requirements

Students must demonstrate musical proficiency comparable to the following minimum levels of coursework:

Private Music Instruction: 4 semesters
Theory II (MUSI 116)
Sight-singing/Ear-Training I (MUSI 113)
Keyboard Skills III (MUSI 273) (functional keyboard skills, including transposition, harmonization, and score-reading)

If entrance exams indicate that a student is deficient in any area, the student may enroll in the appropriate level class at Mason. However, remediation classes will not count toward the 16 hours necessary to earn the certificate.

Credits

Required Courses ......................................................... 16

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

GMU piano pedagogy workshops (1 credit each)
Private Music Instruction in piano at upper-level undergraduate level (1–4 credits)
MUSI 371 Techniques of Accompanying I (vocal) (1 credit)
MUSI 372 Techniques of Accompanying II (instrumental) (1 credit)
MUSI 382 Piano Ensemble (1 credit)
MUSI 485 Piano Chamber Music (1 credit)
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 impact 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 the admission requirements for graduate study, applicants are expected to hold a baccalaureate degree in music or in 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 to have presented a full solo recital or equivalent. All music teaching experience should be summarized.

Diagnostic Entrance Exam

All new graduate students are required to take an entrance exam to demonstrate competence in music history, music theory, and general musicianship. 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. All sections of the exam must be passed prior to graduation.

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 prove diction competency. Students who do not pass the Italian or English diction test are required to take MUSI 525 Performance Seminar for Singers and Accompanists I. Students who do not pass the French or German diction test are required to take MUSI 526 Performance Seminar for Singers and Accompanists 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, upon 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 30 credits in graduate music courses. With the approval of the department, 3 non-music graduate credits may be taken.

The student must satisfy the following requirements:

**General Requirements** ............................. 11

- MUSI 511 Analytical Techniques .................. 3
- MUSI 531 Advanced Topics in Music History and Literature .......................... 3
- MUSI 662 Introduction to Research in Music .... 3
- Ensemble .................................................. 2

**Additional Requirements for the Concentration in Performance: Single Instrument** ........................ 19

- MUSI 512 Advanced Orchestration .............. 3
- MUSI 531 Advanced Topics in Music History and Literature .......................... 3
- MUSI 621 Graduate Private Music Instruction: Instrumental/Vocal .................... 9
- MUSI 724 Graduate Recital ........................... 1
- Electives .................................................. 3

**Additional Requirements for the Concentration in Performance: Multiple Instruments** ............ 19

- MUSI 621 Graduate Private Music Instruction: Major Instrument .................................. 4
- MUSI 622 Graduate Private Music Instruction: Secondary Instrument #1 .................. 4
- MUSI 623 Graduate Private Music Instruction: Secondary Instrument #2 .................. 4
- MUSI 553 Instrumental Pedagogy and Literature ................................................. 3
- MUSI 724 Graduate Recital: Multiple Instruments ................................................. 1
- Electives .................................................. 3

**Additional Requirements for the Concentration in Music Education** ................................. 19

- MUSI 562 Psychology of Music Teaching and Learning ........................................ 3
- MUSI 663 Aesthetics of Music Education ........ 3
- MUSI 799 Thesis ......................................... 6
- Or MUSI 363, 564, & 565 Orff Schulwerk certification .................................... 9
- Electives .................................................. 4–7

**Additional Requirements for the Concentration in Composition** ........................................ 19

- MUSI 621 Graduate Private Music Instruction: Composition ..................................... 9
- MUSI 512 Advanced Orchestration .............. 3
- MUSI 531 Advanced Topics in Music History and Literature .......................... 3
- MUSI 724 Graduate Recital ........................... 1
- Electives .................................................. 3

**Additional Requirements for the Concentration in Conducting** ........................................ 19

- MUSI 621 Graduate Private Music Instruction: Conducting .................................... 6
- MUSI 597 Advanced Topics in Conducting .... 3
- MUSI 512 Advanced Orchestration .............. 3
- MUSI 724 Graduate Recital ........................... 1
- Electives .................................................. 6
Additional Requirements for Pedagogy and Performance ........................................ 16

Pedagogy I: Take one of the following courses ........................................ 3
  MUSI 551 Keyboard Pedagogy
  or MUSI 552 Vocal Pedagogy and Lab
  or MUSI 553 Instrumental Pedagogy and Literature

Pedagogy II: MUSI 561 Advanced Topics in Music Education .......... 3
  MUSI 595 Teaching Internship ........................................ 2
  MUSI 684 Graduate Lecture-Recital Pedagogy Research ..................... 1
  MUSI 724 Graduate Recital ........................................ 1
  Electives .................................................................... 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 assistant conductor of a university ensemble.

◆ Artist Certificates

The Artist Certificate is a specialized, graduate-level program for advanced musicians who desire to further develop and refine their performance art. This program is designed for aspiring and professional artists who seek continued artistic growth and career advancement through extensive educational training and performance experience. The program is intended for a very limited number of the most gifted performers who demonstrate strong potential for successful careers in musical performance.

The certificate program is a two-year course of study requiring at least two consecutive semesters of residence. A total of 32 semester hours is required. Advisor’s approval is required for each semester’s enrollment.

Admission Requirements
  • An Artist Certificate application and current resume
  • A bachelor’s degree in music or equivalent (as evaluated by the Music Department admissions committee)
  • Transcripts from previous educational institutions
  • A one-page written statement of the student’s goals and interest in the program
  • Two letters of recommendation
  • A CD (preferred), audio cassette, or videotape of a live performance of solo works from the standard repertory

Those applicants recommended for a full audition 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. This final step in the admission process is a 30-minute audition, and a 15-minute interview with the panel.

◆ Artist Certificate in Piano Performance or Instrumental Performance

Credits

Studies in Performance .................................................. 17
  MUSI 621 Graduate Private Music Instruction (3 credits for four semesters) .......... 12
  MUSI 592 Advanced Topics in Music .................................. 2
  MUSI 724 Graduate Recital (solo) .................................... 1
  MUSI 724 Graduate Recital (solo) .................................... 1
  MUSI 724 Graduate Recital (chamber) ................................ 1

Support Studies in Literature, Pedagogy, and Electives ................................ 9
  MUSI 531 Advanced Topics in Music History and Literature ............. 3
  MUSI 551 Keyboard Pedagogy (Piano Performance)
  or MUSI 553 Instrumental Pedagogy and Literature (Instrumental Performance) .......... 3
  MUSI 595 Teaching Internship; may be repeated for a total of three semesters at 2 credits each semester ........................................ 2–6

Electives (may include additional ensembles or course work) .................. 0–4

Artist Certificate in Piano Performance

Studies in Accompaniment and Ensemble Performance .......................... 6
  MUSI 571 Techniques of Accompanying I (vocal accompanying) ............ 1
  MUSI 572 Techniques of Accompanying II (instrumental accompanying) .......... 1
  MUSI 585 Chamber Ensembles (to include piano ensemble, piano trio, etc.) ............ 1

Students may choose from additional 1-credit ensembles and performance classes ........ 3

Or

Artist Certificate in Instrumental Performance

Studies in Ensemble Performance ........................................ 6

Students may choose from a variety of 1-credit ensembles, including:
  MUSI 587 Symphony Orchestra
  MUSI 580 Wind Ensemble
  MUSI 583 Symphonic Band
  MUSI 585 Chamber Ensembles
  MUSI 589 Jazz Ensemble

◆ Artist Certificate in Vocal Performance

Credits

Studies in Vocal Performance ........................................ 20
  MUSI 621 Applied Voice (private music instruction, 3 credits, upper level) .......... 12
  MUSI 592 Advanced Topics in Music: Solo Vocal Repertoire Coaching .............. 4
  MUSI 526 Performance Seminar and Solo Vocal Repertoire I ...................... 2
  MUSI 544 Diction for Singers I (Italian/English) (German/French) .................. 2

Vocal Performance Ensemble ........................................ 9
  MUSI 688 Advanced Opera and Musical Theater Techniques .................... 6–9*
  MUSI 485 Chamber Ensembles—(Solo Vocal/Chamber Ensemble) ................. 3

*option for 3 of the 9 required performance ensemble credits, with faculty advisor’s written permission and supervision
Solo Performance Emphasis ............................ 2
MUSI 684 Graduate Lecture Recital .................. 1
MUSI 724 Graduate (certificate) Recital ............ 1

Elective ................................................................ 1
(Support studies in literature, history, pedagogy,
foreign languages, Alexander technique, and acting
may be selected for a broader course of study and
determined with the faculty advisor or director of
the program).

Note: With written permission of the faculty
advisor and approval of the program director, a student may receive up to 3 performance ensemble credits or
1 chamber recital credit for an off-campus profes-
sional performance project once during the two-year
course of study, not to exceed three weeks during a
given semester. With written permission of the
faculty advisor, a student may receive 1 elective or
up to 3 performance credits for participation in an
Intensive Language Immersion or Summer Opera,
Internship or Opera Apprenticeship Program, not to
exceed six weeks during the school year.

Semester Evaluations
At the end of every semester—except the final semester,
when students are expected to give an hour-long, adjudicated,
graduate or certificate recital—all students must give a
20-minute (upper level, 3-credit) jury of repertoire learned
during the semester with the voice teacher and vocal coach
in preparation of the chamber and lecture recital, or the
final certificate recital. The chamber or lecture recital may
be given at any time during the course of the program.
Certificate students are expected to excel in the area of
performance, and to maintain a 3.50 average in all core
courses. Students falling below this requirement in any given
semester will be given one semester probation before expulsion from the program.

Performance Expectations
Students are expected to take advantage of the many excel-
 lent performance opportunities available in the department.
They are expected to perform at least twice a year in a staged
opera or musical theater or scene production on campus with
GMU Opera Theater; to sing in at least one vocal concert
each year; and to give two recitals during the course of the program.
Students are also encouraged to apply and audition for summer programs, apprenticeships, and vocal com-
 petitions.

Theater

Performing Arts Building, A407
Phone: 703-993-1120
Web: gmu.edu/departments/theater

Faculty
Clayton Austin, Chair
Professors: D’Andrea (Robinson professor), Davis
Associate professors: Austin, Gero, Johnsen-Neshati
Assistant professors: Elston, Kurtz
Term associate professor: McDonald
Term assistant professors: Chew, Raybuck
Adjuncts: Clark, 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 educa-
tion in the belief that such study, combined with serious
practical training and experience, offers the best prepara-
tion 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 rigor-
ous, concentrated, and individualized training. However,
students are encouraged to maintain wide-ranging interests
both inside 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

General Education .............................................. 43

Foundation Requirements
Written communication: ENGL 101 and 302 ....... 6
Non-native speakers of English with limited
proficiency may substitution 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 quanti-
tative skills and one of MATH 108, 110, 111,
113, 115, 125; or IT 250; or STAT 250
or lower placement score requiring MATH 106
Information technology ............................. 3

Core Requirements
Literature ....................................................... 3
Arts (outside the major) ................................. 3
Natural science (including one laboratory science) ........................................ 7
U.S. history ........................................................................ 3
Western civilization ............................................................. 3
Global understanding .......................................................... 3
Social and behavioral sciences ............................................. 3
Synthesis Requirement .......................................................... 3

Major ............................................................................. 53–66

Foreign Language ............................................................. 0–12
Students must demonstrate proficiency at the intermediate level, either by exam or course work, in one foreign language offered by Mason.

Theater Core Requirements ........................................... 32–33

Additional literature .......................................................... 3
Additional arts (outside the major) ................................. 3–4
THR 150, 151 Drama, Stage, and Society
I and II ........................................................................... 6
THR 200 Play Production Practicum
(1 each, repeated for a total of 4) ....................................... 4
THR 210 Acting I .............................................................. 3
THR 230 Introduction to Technical Theater I ................. 3
THR 329 Directing I ......................................................... 4
THR 350 Script Analysis ................................................... 3
One upper-level dramatic literature course
(THR 351, 352, 355, 359, 395, or 424) ......................... 3
One from the following group of 1-credit mini-courses: ... 1
THR 201 Stage Management, THR 202
Literary Management, or
THR 203 Production/Company Management

Upper-Level Units ............................................................. 21
Twenty-one credits of 300- and 400-level courses, chosen from at least two of the following areas: performance, design and technical theater, and theater studies.

Performance
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.

THR 300 Voice and Speech Fundamentals .............. 3
THR 301 Voice and Speech for the Performer ....... 3
THR 303 Movement for Actors I ......................... .................. 3
THR 304 Movement for Actors II ......................... 3
THR 310 Acting II ......................................................... 3
THR 320 Beginning Modern Acting .............. .................. 3
THR 321 Acting Shakespeare ...................... .................. 3
THR 322 Alexander Technique/Stage Combat .... 3
THR 345 Puppetry: History and Technique ...... 4
THR 365 Characterization .......................................... 3
THR 420 Advanced Modern Acting ............. .................. 3
THR 421 One-Person Show .................. .................. 3
THR 423 Audition Techniques: Stage and Camera3
THR 425 Verse Speaking ............................................. 3

Design and Technical Theater
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.

THR 304 Digital Lighting Design .................. .................. 3
THR 311 Beginning Design ........................................... 3
THR 312 Designing for the Stage ............. .................. 3
THR 313 Advanced Design .................. .................. 3
THR 315 Lighting Design I .................. .................. 3
THR 326 Advanced Lighting Design ........... .................. 3
THR 330 Seminar in Technical Theater ............. 3
THR 331 Seminar in Costume History ......... .................. 3
THR 332 Studio in Stage Management ............. 3
THR 333 Stage Design ............................................. 3
THR 334 Lighting Design ......................................... 3
THR 335 Costume Design .......................................... 3
THR 336 Advanced Theater Technology ............. 3
THR 343 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 395 Theater as the Life of the Mind ......... .................. 3
THR 424 Contemporary Women Playwrights .... 3
THR 440 Advanced Studies in Directing/ Dramaturgy ............................................. 3
THR 480 Advanced Playwriting ......................... 3
THR 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.

 Practicum .............................................................. 1
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)

Electives .............................................................. 11–24

Minor in Theater
The theater minor consists of 18 credits in theater, selected in consultation with a faculty adviser 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 mainstage, studio, or Theater of the First Amendment (TFA) productions.

TFA, a professional theater in residence within CVPA, offers students the chance to work closely with professional artists. TFA productions regularly employ student assistants in stage management, directing, dramaturgy, technical crews, and production and company management. Students are eligible to audition for roles or understudy assignments in TFA productions, and may participate in the membership candidate program through Actor’s Equity Association.
Course Descriptions

Glossary
This section lists undergraduate and graduate courses offered by George Mason University and available for credit. Courses are listed in alphabetical order. The subject code for courses and the programs offering the courses are listed below:

- Accounting: ACCT
- Administration of Justice: ADJ
- Adult Education: EDAL
- African American Studies: AFAM
- Alternative Education: EDAE
- Anthropology: ANTH
- Arab: ARAB
- Art History: ARTH
- Art and Visual Technology: AVT
- Arts Management: MAM
- Astronomy: ASTR
- Bachelor of Arts in Interdisciplinary Studies: BAIS
- Bachelor of Individualized Study: BIS
- 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 Arts and Sciences: CAS
- College Teaching: CTCH
- College of Visual and Performing Arts: CVPA
- Communication: COMM
- Comparative Literature: CL
- 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
- Decision Sciences: DESC
- Early Childhood Education: EDUT
- Earth Observing and Systems: EOS
- E-commerce: EC
- Economics: ECON
- Education: EDUC
- Education Leadership: EDLE
- Education Research: EDRS
- Educational Psychology: EDEP
- Electrical and Computer Engineering: ECE
- Elementary/Secondary Education: EDCI
- Engineering: ENGR
<table>
<thead>
<tr>
<th>Course Title</th>
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<td>English</td>
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<td>Enterprise Engineering Policy</td>
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<td>Environmental Science and Public Policy</td>
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<td>Executive Master of Business</td>
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<td>Global Affairs</td>
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<td>Government and International Politics</td>
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<td>Honors Program in General Education</td>
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<td>Initiatives in Educational Transformation—Teaching</td>
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**Semester Notation**

At the end of some course descriptions, a semester notation informs of the semester in which the course is usually taught. Fall (f) means the course is usually only taught in the fall semester; fall, summer (f,sum) means the course is taught fall and summer only. A fall, spring, summer designation (f,s,sum) means the course is usually available every semester. A course offered only in alternate fall or spring semesters would be designated with af or as. A course offered only alternate years would be designated with ay. If the course is offered on an irregular basis at the discretion of the department or school, irregular (ir) follows the description. Although circumstances may cause a unit to deviate occasionally from these notations, students should use this information to plan their programs of study.

**Course Numbering**

**General Information**

Course titles are followed by numbers in parentheses (0:0:0), separated by colons. The numbers have the following significance:

- **First number:** credits for the course
- **Second number:** hours of lecture or seminar per week for the course
- **Third number:** hours of laboratory or studio per week for the course

For independent study, readings, topics, or similar courses, individual instructors set hours.

**Undergraduate**

Courses numbered 499 and below are undergraduate courses. Course numbers in the 100 series are customarily taken by freshmen, the 200 series by sophomores, the 300 series by juniors, and the 400 series by seniors. The number designations of the course descriptions in this chapter have the following significance:

- **A single number (HIST 301):** indicates the course is complete within a single semester, and that the semester course may be taken separately with credit toward a degree.
- **A double number separated by a comma:** indicates the subject matter or content of the course extends through two semesters, but that either semester may be taken by itself. Unless otherwise specified, the first semester is not prerequisite to the second semester.
Graduate
Graduate courses are divided into the following categories:
- **500-699** Open only to graduate students admitted to master’s or doctoral programs; other bachelor’s degree holders; and approved, advanced undergraduate students. Advanced undergraduate students who have secured the permission of the department offering the course may select from these courses to accumulate the hours necessary for completion of 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 hours from these courses may be applied to a graduate degree.
- **700** Master’s research
- **700** 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**

If a student takes noncore, upper-level business courses before admission 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 the School of Management.

**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.

**301 Financial Accounting and Managerial Decision Making (3:3:0)** Prerequisite: grade of C or higher in ACCT 203 and sophomore standing. Examines financial accounting from the viewpoint of both users and preparers of financial statements, with an emphasis on using 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 management decisions. Designed for students in all areas of management, especially those whose careers 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.

**321 Financial Reporting and Analysis (3:3:0)** Prerequisites: degree status, and grade of C or higher in ACCT 301. Serves as the intermediate course for students who wish to obtain substantial training in financial accounting. Also helps students who desire additional understanding of financial statements beyond the introductory level. Course discusses the role of financial information in valuation, cash-flow analysis, credit risk assessment, and contracting. Covers receivables, inventories, long-lived assets, financial instruments, leases, pension and post-retirement benefits, intercorporate equity investments, and international reporting.

**351 Taxation and Managerial Decision Making (3:3:0)** Prerequisites: degree status, and 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 that enables students to learn the fundamental tax concepts and apply them to a variety of business, investment, employment, and personal transactions. Students learn to weigh tax and non-tax 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, and 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 a platform for developing and manipulating accounting information within a computerized transaction-processing and electronic data environment.

**372 Business Analysis and Valuation (3:3:0)** Prerequisites: degree status, and grade of C or higher in ACCT 301. Expands on students’ ability to use financial statement information for such important business valuation and financial analysis transactions as 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, and 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 work-outs.

411 Advanced Managerial Accounting (3:3:0) Prerequisites: degree status, and grade of C or higher in ACCT 311. Managerial uses of accounting information in planning, controlling, motivating and decision making. Emphasis on the quantitative and behavioral aspects of managerial accounting.

421 Advanced Financial Accounting Topics (3:3:0) Prerequisites: degree status, and grade of C or higher in ACCT 321. Intended for students who seek expertise in preparing financial statements for complex business organizations. Topics include preparing segmental and consolidated financial statements, especially for multinational firms with complicated corporate structures. Also covers especially intricate accounting issues such as business combinations, segmental disclosures, and foreign currency translation.

451 Advanced Federal Taxation (3:3:0) Prerequisites: degree status, and grade of C or higher in ACCT 351. Federal taxation of corporations, partnerships, fiduciaries, and gratuitous transfers.

461 Assurance and Audit Services (3:3:0) Prerequisites: degree status, and grade of C or higher in ACCT 321 and ACCT 361. Focuses on the process and techniques of providing various assurance services. Also provides students with the necessary information to successfully complete the auditing portion of the CPA exam.

472 Government and Not-for-Profit Accounting (3:3:0) Prerequisites: degree status, and 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 (1-3:0:0) Prerequisites: 9 credits in upper-level accounting courses and degree status. Research and analysis of selected problems or topics in accounting. Must be arranged with an instructor, and students must receive written approval from the associate dean for undergraduate programs before registration. Written report required. May be repeated for a maximum of 6 credits if topics vary.

### Administration of Justice (ADJ)

#### Public and International Affairs

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. Emphasis is on asking clear, researchable questions, and using appropriate evidence to answer them. Students are introduced to and learn to use a broad range of evidence, including quantitative and qualitative information. Design and analysis of surveys, government archives, case studies, and interpretations of events in journals are studied. Ethical implications of information technologies are examined.

301 Public Law and the Judicial Process (3:3:0) Prerequisite: ADJ 100, GOVT 103. 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, SOCI 101 or permission of instructor. Theories of juvenile delinquency and societal reactions to delinquency. Presents gender differences in rates and types, historical overview emphasizing origins, and development of juvenile justice system. 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.

306 Criminal Justice Ethics (3:3:0) Prerequisite: 60 credits or permission of instructor. Analysis of the ethical principles relevant for those working in criminal justice.

377 Public Safety Officers and the Law (3:3:0) Prerequisite: ENGL 302. Law applicable to fire and police protection, firefighters, and police officers, and their relationship to the public, employers, courts, and other societal institutions. Rights and obligations of the uniformed services in tort and criminal law, historical development of each, Virginia law, and other local topics are discussed. Writing-intensive course.

400 Applied Criminal Psychology (3:3:0) Uses an overview of psychological and crimino logical theories to apply behavioral science theory to practical application in forensic settings. Focuses on analysis of various crimes 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 credits of sociology including ADJ 100, SOCI 101; or permission of instructor. Theories explaining 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.

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. Nature and impact of victim’s rights advocates also considered.

405 Law and Justice around the World (3:3:0)
Prerequisite: ADJ 100. Comparative inquiry into the models of legal and justice systems around the world. Considers how social and legal norms are created, and how different societies exercise powers of social control. Evaluates justice models in action, including law and courts, policing, corrections, and juvenile justice.

406 Family Law and the Justice System (3:3:0)
Prerequisite: ADJ 100. Introduction to the elements of family law, and exploration of its influence on American social life and contemporary notions of justice. Topics include marriage and parenting, divorce, custody and support, nontraditional families, and domestic violence.

407 Law and Society (3:3:0)
Prerequisite: ADJ 100 or GOVT 301. Explores relationship between law and society, including concept of law; origin, development, and role of law in society, and relationship between law and social change. Different approaches to the study of law and society considered, and different methodologies assessed.

408 Criminal Courts (3:3:0)
Prerequisite: ADJ 100 or GOVT 301. Study of the workings, advantages, and frailties of criminal courts: how criminal courts are set up, what they do, how they vary, why they are structured as they are, and whether the system works effectively and efficiently.

409 Community Policing (3:3:0)
Prerequisite: ADJ 100. Study of community policing, focusing especially on the United States. Covers history and development of community policing, community relations, problem solving, and issues of organizational change.

Prerequisite: GOVT 103. Study of the First Amendment freedoms of speech, press, assembly, association, and religion; the right to privacy; and Fourteenth Amendment right to equal protection.

424 Constitutional Law: Criminal Process and Rights (3:3:0)
Prerequisite: GOVT 103. Study of constitutional law pertaining to the rights of the criminally accused from the stages of investigations 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. Emphasis on 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 doing surveillance, how they calculate and manage risks, and legal constraints on surveillance activities.

471/SOCI 471 Prevention and Deterrence of Crime (3:3:0)
Theoretical and practical strategies for crime prevention and deterrence. Discusses social, environmental, and mechanical developments, police courts, and correctional elements of law enforcement in terms of current effectiveness and future potential for crime prevention.

475 Theory and Politics of Terrorism (3:3:0)
Explores origins of terrorism, and traces its development from early states to a modern mode of conflict. National, regional, and global perspectives are presented.

479 Preparation for Internship (3:3:0)
Prerequisites: ADJ 100, ADJ/GOVT 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; 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 is 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 (1-3:3:0)
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.
577 Legal Issues for the Law Enforcement Manager (3:3:0) Examines civil liability of individual officers, managers, and agencies. Covers constitutional right of public employees, employee rights, and constitutional issues.

590 Special Topics in Administration of Justice (1-3: 1-3:0) Recent developments in the field. Content varies. Recent topics have covered violence in the workplace and international terrorism. May be repeated for credit.

Adult Education (EDAL) Graduate School of Education

541 Understanding Adult Learners (6:6:0) Examines a variety of adult learning issues, including theory, 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. Emphasizes program development processes, and teaching and learning strategies for adults. Other topics covered include 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, including a 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 the current and changing status of such issues as diversity and multiculturalism from national and global perspectives.

390 Special Topics in African American Studies (3:3:0) Study of selected topics related to the field of 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.

Alternative Education (EDAE) Graduate School of Education

600 Alternative Education for At-Risk Youth (1:1:0) Provides an overview of the nature of at-risk students, why alternative education programs exist, and the types of alternative programs available locally, statewide, and nationally.

601 Curriculum and Methods in Alternative Education (3:3:0) Identifies and develops expertise in various instructional strategies, adaptations, and modifications used with at-risk students in the context of alternative education environments. Puts special emphasis on motivation, scheduling, standards of learning, and technology.


603 Communication and Management Strategies for Alternative Education (3:3:0) Focuses on techniques to manage crisis management, resolve conflicts, implement peer mediation, and develop positive peer and adult relationships. Emphasizes strategies for working successfully with families, diverse populations, substance abusers, and dually diagnosed students.

604 Multidisciplinary and Interagency Collaboration (3:3:0) Examines the Comprehensive Services Act of Virginia and other legislation about at-risk youth. Emphasizes agency functions, case management, collaboration, identifying resources, and networking.

Anthropology (ANTH) Sociology and Anthropology

114 Introduction to Cultural Anthropology (3:3:0) For non-Western credit. Overview of major ideas and approaches in the study of cultures around the world. Survey of 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. Development and use of contemporary theory and field and lab methods.

135 Human Evolution, Biology, and Culture (3:3:0) Exploration of human origins and nature, primate social groups and behavior, fossil evidence for human evolution, and the evolution of culture and human society.

299 Independent Study (1-3:0:0) Prerequisite: ANTH 114 or permission of instructor. Individual study in anthropology on topic organized in advance by student and instructor.

300 Civilizations (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Cross-cultural and transtemporal examination of complex societies and civilizations. Exploration of 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. Emphasis on 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. Historical development of Latin American cultures, focusing on specific areas of the region. Examination of shifts in political and economic systems and configurations.
tor. For non-Western credit. Examination of 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. Examination of cultures of a specific region such as Middle East, Amazonia.

304 Peoples and Cultures of the Pacific (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Survey of 20th century Melanesian, Polynesian, and Micronesian cultures. Case studies of interplay between cultural systems and island ecology.

305 Foraging Societies (3:3:0) Prerequisite: 60 credits, 6 credits of anthropology including ANTH 120, or permission of instructor. For non-Western credit. Examination of early human societies with emphasis on environmental, technological, and cultural aspects of hunting and gathering as a successful prehistoric and contemporary means of adaptation.

306 Peoples and Cultures of Island Asia (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. For non-Western credit. Examination of cultures of the Island Asia culture region; focus 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. Examination of South Asia, with emphasis on India. Includes general overview of prehistory and history; impact of colonialism; contemporary Indian culture, including the changing relations of caste and class, family organization, and the roles of women, religion, and ideology; and current trends in economic development and socioeconomic differences in different parts of the country.

310 Social Organization and Kinship (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examination of social organization, kinship, descent, and kinship terminologies in mainly non-Western cultures, emphasizing both the meaning of specific cultural systems and crosscultural 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. Focus on Thailand and Malaysia.

312 Political Anthropology Systems (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examination of cultural and ecological contexts of political structures and competition for power in selected societies; a crosscultural and comparative approach 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. Examination of religion as a cultural system. Topics include mythology, ritual, symbolism, and dogma. Crosscultural and predominantly non-Western material emphasized.

314 Socialization Processes: Family, Childhood, Personality in Cross-Cultural Perspective (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examination of selected 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. Examination of 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 the instructor. Examination of the origin and nature of conflict in human society with an emphasis on the ancient past. Major topics reviewed include the possible role of violence in human evolution, crosscultural studies of conflict in indigenous society, warfare in early states, and sacrifice as a ritual practice.

325 Field Techniques in Archaeology (3-6:0:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Intensive study of archaeological field techniques by directed group projects in site survey, site testing, recording techniques, and stratigraphy through discussions, demonstrations, and hands-on experience. May be repeated for maximum 6 credits.

330 Peoples and Cultures of Selected Regions: Non-Western (3:3:0) Examination of cultures of a specific region such as Africa and the Middle East. Course focuses primarily on non-Western cultures.

331 Refugees (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Introduction to causes and consequences of forced dislocation as a global issue. Course covers formally recognized refugees, as well as those people (such as internally displaced persons and asylum seekers) who are in refugee-like circumstances. Attention is directed to understanding the personal experiences of refugees, and examining the efforts on their behalf at the 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. Examination of 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. Examination of humanitarian action, drawing on anthropology’s holistic and comparative perspective developed to ground understanding of humanitarian action within larger cultural contexts. Attention to cultural, biological, environmental, and political sources of humanitarian crises, and the 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, primate 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. Examination of bio-
logical dimensions of human variation, and the beginnings of race as a concept. Discusses evolution of human biodiversity in culturally distinct human groups related to environment, physiology, genetics, nutrition, and disease. Explores use of scientific analyses of human biodiversity.

370 Environment and Culture (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines relationships among environment, culture, and human behavior with an emphasis on cultural ecological explanations in mainly non-Western contexts.

371 Psychological Anthropology (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Surveys topics: ANTH 114, 60 credits, or permission of instructor. Examines bases for gender differences and raised by contemporary information technology. Anthropology. Required for anthropology majors.

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. Survey of the discipline of medical anthropology with focus 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 drawn 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. Interrelationships among constructions of gender, class, and ethnicity are examined.

390 Theories, Methods, and Issues I (3:3:0) Prerequisites: ANTH 114 and 60 credits, or permission of instructor. First part of a two-course sequence that reviews the major theoretical traditions and schools of thought in anthropology. Required for anthropology majors.

395 Work, Technology, and Society: An IT Perspective (3:3:0) Prerequisites: ANTH 114, 60 credits or permission of instructor. Introduction to the anthropology of work, technology, and society, with emphasis on information technology. Covers general conceptual issues of information technology and also involves specific practical exercises with computers, their operating systems, the logic of automated production, databases, and web-based communication. Attention also directed to social and ethical issues raised by contemporary information technology.

396 Issues in Anthropology: Social Sciences (3:3:0) Prerequisites: ANTH 114, 60 credits or permission of instructor. Topic of contemporary interest in anthropology, focusing on social science topics of interest.

399 Issues in Anthropology (3:3:0) Prerequisite: ANTH 114 and 60 credits, or permission of instructor. Topic of contemporary interest in anthropology, changing from semester to semester, and focusing on topics such as sex roles, anthropology and ethics, and primate social organization. May be repeated for credit.

400 Engaging the World: Anthropological Perspectives (3:3:0) Prerequisites: ANTH 114, 60 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 are generally drawn from issues of global economic processes, civic rights and responsibilities, the environment, and migration. Student papers and oral presentations receive formal review by multiple faculty members, to which the students must then respond. Satisfies general education synthesis requirement.

410 Research and Inquiry in Biological Anthropology and Archaeology (3:3:0) Prerequisites: 60 credits and 6 credits of anthropology, including ANTH 120 or 135; or permission of instructor. Research design in bioanthropology and archaeology. Topics include critique of case studies, framing problems, field strategies, measuring variables, sampling, analysis, and interpretation of results.

420 Interpretation in Archaeology (3:3:0) Prerequisite: 6 credits of anthropology including ANTH 120, or permission of instructor. Explores theoretical and methodological issues encountered in archaeology. Patterns and contexts of archaeological remains, analytic problems, and interpretation of material culture are considered.

425 Public Archaeology (3:3:0) Prerequisite: 6 credits of anthropology including ANTH 120, or permission of instructor. Considers public significance of archaeology and anthropological contributions to public concerns such as antiquities legislation and cultural resource management.

427 Historic Cemetery Survey (4:4:0) Prerequisite: ANTH 120 or permission of instructor. Explores demographic, stylistic, and religious aspects of historic cemeteries. Students learn to survey, record, and analyze gravestone data through field projects.

428 Patterns in Prehistory (3:3:0) Prerequisite: 60 credits or permission of instructor. Explores diversity of prehistoric cultures in light of major cultural development (hunting-gathering, agriculture, pastoralism, complex societies).

430 Research Methods in Archaeology (3:3:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Archaeological research process studied through discussions of current archaeological methodologies and student participation in designing and critiquing research projects.

435, 436 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 are completed under instructor’s guidance.
440 Public Anthropology: Seeking Solutions in the Public and Private Sectors (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Focus on anthropologists’ contributions to major policy issues in development agencies in the United States and abroad. Attention to techniques that lead to prevention or management of social and cultural conflict.

450 Qualitative Methods: Non-Statistical Approaches in Culture and Social Research (3:3:0) Prerequisites: 60 credits and 6 credits of anthropology including ANTH 114, or permission of instructor. Explores some of the most useful nonquantitative research techniques in social sciences, and offers practice in their application.

488 Gender, Sexuality, and Culture (3:3:0) Prerequisite: ANTH 114, 60 credits, or permission of instructor. Examines how gender, sexuality, race, and class come together as analytically distinct, yet practically intertwined, systems of meaning and practice. Examples highlight questions of political economy and history while focusing on specific ethnographic or historical readings.

490 Theories, Methods, and Issues II (3:3:0) Prerequisites: 60 credits and 9 credits of anthropology, or permission of instructor. Second part of a two-course sequence that reviews major theoretical traditions and schools of thought in anthropology. Required for anthropology majors, and usually taken as a senior seminar.

492 Contemporary Controversies in Anthropology (3:3:0) Prerequisites: 60 credits and 9 credits of anthropology including ANTH 390, or permission of instructor. Examines recent important works, issues, and controversies in anthropology.

495 Internship (3-6:0:0) Prerequisite: ANTH 120, 60 credits, or permission of instructor. Supervised project in applying anthropology (public archaeology, development anthropology, museums). May be repeated for a maximum of 6 credits.

496 On Evolution (4:2:2) Prerequisites: 60 credits and 9 credits of anthropology, or permission of instructor. Considers evolution as a biological as well as cultural concept. Parallels and contrasts among conceptual approaches allow a critique of the potential of evolution as a unifying biosocial theory.

499 Independent Research (1-3:0:0) Prerequisite: 60 credits, 9 credits of anthropology, or permission of instructor. Individual research on a topic to be organized in advance by student and instructor. May be repeated for credit.

535 Anthropology and the Human Condition: Seminar I (3:3:0) Prerequisite: graduate standing or permission of instructor. Examines some of the major theorists of 19th and early 20th century cultural theory. Marx, Freud, Durkheim, and Weber are surveyed as foundational thinkers for reading the works of such 20th century theorists as Boas, Malinowski, Benedict, and Sapir.

536 Anthropology and the Human Condition: Seminar II (3:3:0) Prerequisite: ANTH 535. Examines contemporary theorists of anthropology, covering ongoing debates over epistemology and the multiple strands that inform anthropological theory and practice.

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. Current interpretations and debates are discussed.

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 epistemological shift that has 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 students to 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 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. The domains of religion and politics are conjoined by the questions of power—its deployment, distribution, and the 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 between 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 political ethnographies, to arrive at a better understanding of the nature of culture. Course material drawn from many ways the study of language has enhanced understanding on the relationship between language and culture, and the ways anthropological knowledge is transmitted in written form through ethnography. 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.

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 the actual and potential responses to them.

631 Refugees in the Contemporary World (3:3:0) Prerequisite: graduate standing. Seminar on the major refugee flows since the middle of the 20th century, with emphasis on mechanisms for providing assistance, asylum, and resettlement.

632 International Migration in Comparative Perspective (3:3:0) Prerequisite: graduate standing or permission of instructor. Seminar on international migration in the contemporary world. Comparative course with attention to the full range of economic, political, and social reasons for migration, and the effects of different national policies on that process.

635 Regional Ethnography (3:3:0) Prerequisite: graduate standing or permission of instructor. In-depth study of peoples and cultures of a specific world region (Latin America, East Asia, the Pacific, United States). Content may include cultures defined by diaspora, migration, and other global forces and processes. May be repeated for credit when content differs.

640 Applied Anthropology (3:3:0) Prerequisite: graduate standing or permission of instructor. Explores the application of contemporary anthropological ideas, theories, and methods to definition of and the search for solutions to practical problems as defined by various organizations and institutions including business, government, non-governmental 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. 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 ethnology.

687 Culture and Curing (3:3:0) Prerequisite: graduate standing or permission of instructor. Explores the wide variety of cultural interpretations of health, illness, and curing. Examines a number of different curing systems, both traditional and modern, and compares them with cosmopolitan biomedicine. Several book-length case studies cover a wide variety of cultural groups, health topics, and theoretical orientations.

690 Internship (1-6:0:0) Prerequisite: graduate standing in anthropology with 3 credits of methods and 12 credits in program, or with permission of primary advisor. All internships must be approved by faculty advisor to ensure suitability to the student’s course of study. An introduction to applied anthropology through approved work and study at a museum, institute, agency, or other approved site. May be repeated for up to 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 intertwine systems of meaning and practice.

797 Anthropology Colloquium (1:1:0) Prerequisite: graduate standing in anthropology or permission of graduate coordinator. Public forum for the presentation and discussion of contemporary anthropological research.

Arabic (ARAB)

Modern and Classical Languages

101 Introduction to the Arabic Language (3:3:1) Prerequisite: ARAB 101 or permission of instructor. Introduction to developing reading skills in the formal settings. Emphasizes modern standard Arabic in oral communication. Beginning grammar level focuses on verbal sentences, present tenses, WH-questions, and compound nouns.

201 Intermediate Arabic I (3:3:1) Prerequisite: ARAB 102 or equivalent. Further development of skills acquired in prerequisites Arabic 101 and 102: listening, speaking, reading, and writing. 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. Continuation of Arabic 201 with 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.

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.

150 Freshman Seminar (3:3:0) Prerequisite: freshman standing. Focus 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. Provides an introduction to the 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. Monuments
and artifacts in a variety of media are discussed in 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. Important examples of painting, sculpture, and architecture discussed 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. Study of the traditions of art and architecture within a single selected country or historical region. Topic varies. May be repeated for credit with different course content.

311 Design of Cities (3:3:0) Prerequisite: 24 credits. Problems in urban design in a particular geographical region or historical period. Approach varies with instructor and may involve archaeological or theoretical approaches appropriate to the specific context. May be repeated when course content is different.

315 Modern Architecture (3:3:0) Prerequisite: 24 credits. Studies in modern architecture from the Beaux Arts movement to the present; an investigation of stylistic, structural, or theoretical innovations.

319 Art and Archaeology of the Ancient Near East (3:3:0) Prerequisite: 24 credits. For non-Western credit. Aspects of the art, archaeology, and culture of ancient Near East and Bronze Age Mediterranean. Approach varies; emphasis may be on Mesopotamia, Iran, Egypt, Anatolia, the Levant, or the Aegean, depending on instructor.

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 Hellenistic age within the context of history and culture of the period. Many aspects of the Hellenistic world are explored: 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 the 17th century through the 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. Study of 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. Art of sub-Saharan Africa in terms of styles and aesthetics, materials and techniques, and contexts (geographical, social, cultural, and religious). 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 the earliest civilizations along the Indus River to the onset of Western colonialism. Emphasis on the role that material evidence has provided in the creation of the South Asian history and the ways political, social, and religious developments affected the arts. Monuments and artifacts in a variety of media are discussed in relation to their 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 the onset of Western 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 in which political changes, religious movements, and social developments influenced and shaped those creations. Monuments and artifacts in a variety of media are discussed in relation to social and historical contexts.

392 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. Emphasis on issues central to museums in Washington, D.C., or museums in other locations; focus varies with instructor.

399 Special Topics in the History of Art (3:3:0) Topics vary. At least one 400- or 500-level course is offered each semester; each topic area is generally offered every two years.

400 Historiography and Methods of Research in Art History (3:3:0) Prerequisites: ENGL 302, and 6 credits in art history at the 300 level; or permission of instructor. Historical investigation of theories, methods, and critiques involved in the discipline of art history. Approach or focus may vary with instructor. May be repeated for credit.

420 Advanced Studies in Ancient Art (3:3:0) Prerequisite: ENGL 302 and 300-level course in ancient art, or permission of instructor. Study in a particular area of ancient art of the Mediterranean, Near East, or Middle East. Topics may be art form or medium, geographical area, theme, function, or context. May be repeated for credit.

430 Advanced Studies in Medieval or Islamic Art (3:3:0) Prerequisite: ENGL 302 and a 300-level course in medieval or Islamic art, or permission of instructor. Study of 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. Study in 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 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 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. Study in a particular area of American art, focusing on a form (landscape or genre painting), theme (nationalism, regionalism, iconography of the family), or movement (American modernism) May be repeated for credit.

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, region, or region, as well as theoretical issues or works in a particular medium. Content varies; course may be repeated for credit.

490, 491 Independent Study in Art History (3:0:0), (3:0:0) Prerequisites: 60 credits, ENGL 302, permission of instructor and chair, plus 9 credits in art history beyond ARTH 200, 201. Intensive study of a particular artist, period, or theoretical problem to be conducted by an individual student in consultation with instructor. Study proposal submitted before registration.

492, 493 Honors Directed Readings, Honors Directed Research (3:3:0), (3:3:0) Prerequisites: admission to art history honors program, ENGL 302, and permission of instructor. Linked individualized courses, usually given by same instructor. ARTH 492 involves directed readings, and ARTH 493 culminates in research paper related to subject of readings. Students must have completed at least one course in the field (or with the professor) chosen for these
honors courses. The 3 credits of readings should be taken before the 3 credits of research; however, they may be taken concurrently.

593 Art History Internships (3-6:0:6) 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. Emphasis on 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.

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

103 Introduction to the Artist’s Studio (3:3:0) For non-majors only. Through projects, readings, class critiques, videos, CD-ROMs, slides, and field trips, students explore materials, techniques, concepts, and processes essential to understanding the language of visual arts and role of the artist. Also develops imaginative thinking and sensitivity to visual environment.

104 Studio Fundamentals I (4:2:4) First half of a two-semester course that introduces common concepts, principles, and practices in two-dimensional and color media. Blend of studio projects, study and practice, discussions, and presentations. Review of historical and contemporary achievements in the arts, visual communication, and the environment develops fundamental knowledge and basic skills in visual arts.

105 Studio Fundamentals II (4:2:4) Prerequisite: AVT 104 or permission of instructor. Second half of a two-semester course that introduces common concepts, principles, and practices in three-dimensional and time-based media. Blend of studio projects, study and practice, discussions, and presentations. Review of historical and contemporary achievements in the arts, visual communication, and the environment develops fundamental knowledge and basic skills in visual arts.

180 Computers in the Creative Arts (3:1:2) Introduces computing from artist’s perspective. Emphasis on employing computers for artistic creation and research. Overview of hardware, software, operating systems, peripherals, 2D graphics, and web design.

204 Visual Thinking (3:3:0) Introduction to visual thinking. Topics include information from visual perception, memory, classical and modern art, performance, and dance. Opportunities for students to assess themselves as visual thinkers.

206 Color (4:2:4) Prerequisite: AVT 104, or permission of instructor. Examines color in both light and pigment, behaviors of colors in relation to one another, physical and archival properties of pigment, dyes and color reproduction processes, psychology of color, basic digital processes and light projections, and practical applications in visual communication, environment, and arts.

207 Writing Out Loud (3:3:0) Explores relationship between writing and the voice, looking at texts that were written to be performed aloud. Students write and present their own work and develop personal and collaborative projects. Emphasizes composition for oral presentations, and delivery, poise, persuasiveness, clarity, and comprehensibility in public delivery.

215 Graphic Information Design I (4:2:4) Prerequisites: AVT 104, 105, and 222 or equivalent, or permission of instructor. Introduces elements of basic typographical composition, including historical development of letter forms; recognition, use and specification of existing typefaces; and alphabet design.

222 Drawing I (4:2:4) Introduces fundamentals of drawing with emphasis on observational study and formal composition. Develops perceptual and rendering skills through exposure to a range of materials, methods, and formal concepts, including effective and expressive use of lines, mass, value, perspective, and composition.

232 Painting I (4:2:4) Introduces basic techniques and principles of oil and water-based painting through projects combining observational study, technique development, fundamentals of formal composition, color interaction, and articulation of form. Offers basic knowledge and experience in preparing various supports, mixing of color, and techniques of paint application.

243 Printmaking I (4:2:4) Introduces basics of hand printing with emphasis on translation and transferal of images, tools, equipment, and technical skills to make a well-defined print. Explores various print media with reference to historical and contemporary models. Discussion, presentation, and field trips focus on practical and conceptual concerns of making multiple images.

252 Photography I (4:2:4) Introduces basic principles and aesthetics of photography. 35mm camera operation, and darkroom practices including film processing and print development.

262 Sculpture I (4:2:4) Introductory course offers foundation in basic technical and formal processes of sculpture, and introduces diverse methods and concepts underlying the work of historic and contemporary sculptors. Emphasis on exploring various materials, technical execution, conceptualization, and creative problem solving to enable students to visually manifest their individual ideas.
272 Interdisciplinary Arts (4:4:2) Prerequisite: AVT 104 or permission of instructor. Introduces interdisciplinary art practice and equally important practice of writing about own work and work of others. Complements Studio Fundamentals, and focuses on studio practice in its cultural context, with practical projects in performance, writing, and installation. Students also look at artists’ writings and draft, write, and edit their own art writing. Helps students prepare for the writing-intensive class (Writing for Artists) and AVT Honors, and provides opportunity to deepen understanding of non-traditional media practices.

280 Two-Dimensional Digital Arts (4:2:4) Prerequisite: AVT 104 and 180, or permission of instructor. Teaches vector and raster graphics software programs. Emphasis on concept development, visual aesthetics and technique. Students produce a series of art works in digital, printed, and HTML format.

300 Artbus Attendance (0:0:0) Students travel to New York or other destinations once during the semester aboard the AVT Department’s Artbus to attend faculty-selected gallery and museum exhibitions. Graded S/NC (satisfactory/no credit).

305 Creative Processes (3:3:0) Study of the creative process in general, with particular emphasis on the inspiration, working methods, and final creations of various artists. Students are encouraged to explore their own creative processes through regular journal keeping, collaborative exercises, and two major projects.

307 Aesthetics (3:3:0) Goal is creation of heightened aesthetic perception and understanding. Emphasis on examining a broad range of contemporary art and culture to engage an expansive conception of aesthetic experience.

308 Mixing It: Art for a New Century (3:3:0) Prerequisites: AVT 307 or permission of instructor. Interdisciplinary course exploring art making and ideas from the last two decades, with special emphasis on artists working and shaping (or responding to) the culture with which we are immediately involved. Investigates what art making is in contemporary society, what informs the current artistic condition, and how it differs from its predecessors. Considers broad spectrum of influential factors, including technology, politics, the role of the artist’s intent, and the influence of the market and educational systems on art making.

309 Art as Social Action (4:4:2) Interdisciplinary course exploring the work of citizen-artists who make their art with the express purpose of becoming agents of social commentary, social protest, community improvement, individual and world betterment, and even radical change. Examines practices by which these artists take the content of their lives and turn it into art. Through lectures, films, videos, and projects, students explore the lesser-known history of socially engaged art-making, and investigate the ways art stimulates connections and conversations between viewer and object and artist and viewer, and among viewers.

311 Graphic Information Design II (4:2:4) Prerequisite: AVT 215, portfolio review or equivalent, or permission of instructor. Introduction to graphic communication design concepts, processes, and production. Students create a portfolio of graphic products that solve typical problems in communication design.

313 Graphic Information Design III (4:2:4) Prerequisite: AVT 311, or permission of instructor. Intermediate graphic design course emphasizing publication and information design. Students develop a series of professional graphic communication products.

323 Drawing II (4:2:4) Prerequisite: AVT 222 or permission of instructor. Builds on skills and concepts covered in Drawing I. Students continue to develop rendering and observational skills, while utilizing formal concepts and a knowledge of materials and expressive techniques.

324 Figure Drawing (4:2:4) Prerequisite: AVT 222 or permission of the instructor. Focuses on drawing through study of human body. Composition, action, and design emphasized through a variety of media such as graphite, charcoal, color pencil, oil stick, watercolor, gouache, and mixed techniques.

326 Nontraditional Approaches to Drawing (4:2:4) Prerequisites: AVT 222, or permission of instructor. Investigates contemporary trends challenging mainstream notions and traditional roles of drawing. Students are first guided in creating innovative works by learning to combine familiar drawing techniques with new approaches, and conventional drawing media with unusual formats and surfaces. Students then progress to investigating and experimenting with nontraditional materials and methodologies to develop personal thematic and conceptual drawing aesthetic.

333 Painting II (4:2:4) Prerequisite: AVT 212 or permission of instructor. Building on concepts, knowledge of materials, and techniques covered in Painting I, course further develops student’s formal and technical skills while enhancing perceptual awareness. As students continue to practice and develop traditional techniques of observational painting, development enriched by the introduction of concepts, methodologies, and approaches relevant to contemporary painting.

336 Experimental Painting (4:2:4) Prerequisite: AVT 232, or permission of instructor. Using late 20th century and contemporary painting as starting place, students explore recent experimental and conceptual approaches to painting. Through structured and free problems, students encouraged to investigate non-traditional materials, scale, formats, surfaces, and methods of paint application, as well as content and concept-driven approaches. In the context of expanding and defining their own practices, students engaged with questions. Includes one field trip, slide lectures, and video screenings.

337 Figurative Painting (4:2:4) Prerequisite: AVT 232, or permission of instructor. Explores human form as main subject for broad array of visual, conceptual and expressive inquiries. By using a human model for all class projects and self-portraiture for several home assignments, students are challenged to hone observational skills and investigate formal pictorial issues. By directing attention to the expressive properties of color, scale, space and process within the context of observational practice, students learn conceptual and visual thinking that makes art purposeful and engaging.

343 Printmaking II (4:2:4) Prerequisite: AVT 243 or permission of instructor. Introduces relief printing, including the study of historical antecedents and relevancy to contemporary printmaking. Teaches reductive and additive
345 Digital Bookmaking (4:2:4) Prerequisite: AVT 180 or 280 or permission of the instructor. Intermediate course in hand printing of digitally processed images in book format. Projects focus on developing visual ideas in electronic imagery, and digital printing on specialized papers for hand binding. Elements of time and space explored in movable and sculptural structures. Personal content will evolve in making booklets of sequential or narrative digital images.

346 Digital Printmaking (4:2:4) Prerequisite: AVT 180 or 280 or permission of the instructor. Beginning course in hand printing of digitally processed images. Projects focus on electronic means of creating and manipulating imagery for application within various processes in printmaking. By exploring personal content, with an emphasis on images of self and languages of the body, students achieve skills in the 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, and 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. Computer-intensive class using Photoshop, in which students create digital images from the viewpoint of a photographic artist. Offers an opportunity for developing technical proficiency in using digital tools from image capture to digital manipulation, and creating digital negatives for use in the analog darkroom. Ongoing discussions and critiques of projects develop insights and of digital technology’s impact on traditional photography.

355 Color Photography I (4:2:4) Prerequisite: AVT 353, or permission of instructor. Introduces basic concepts, theories, modern materials, and processes of color photography with focus on creative photographic expression and technique. Combines lecture and darkroom time to expand student’s photographic repertoire through work with color negative, print and transparency materials.

356 Studio Lighting I (4:2:4) Prerequisite: AVT 353, or permission of instructor. Introduces theory, concepts and applications of photographic studio lighting with emphasis on ability to control and manipulate light. Students investigate artificial and natural light sources and produce a series of photographs based on combination of technical understanding and creative problem solving.

363 Sculpture II (4:2:4) Prerequisite: AVT 262, or permission of instructor. Intermediate-level studio course offers opportunity to investigate a wider variety of materials, techniques, and conceptual issues. Emphasis on individual creative work, and increasing familiarity with historical and contemporary aesthetics.

370 Entrepreneurship in the Arts (4:2:4) Combined lecture and studio course in developing entrepreneurial skills in arts. Special focus to developing communication skills, planning strategies, and nurturing skills that enable students to creatively solve problems and think about opportunities. Students will conceive, develop and present a for-profit or not-for-profit business strategy, followed by a full business and marketing plan for the final project.

371 Visual Perception and the Arts (3:3:0) Prerequisite: 3 credits of AVT or 3 credits of ARTH or junior standing, or permission of instructor. Review of the major approaches to the study of visual perception. Topics include an 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, and also explore gains, conflicts, and contradictions. Along with surveying and assessing the varieties of artistic expression emerging from hip hop, course takes comprehensive look at the multilayered social, political, and aesthetic aspects of hip hop, historical causes and precedents, and contemporary derivatives and implications.

373 Performance Art 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 the 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. Combined course focusing on selection, editing, processing, and integration of sound and music (post-production) into video and animation. Studies time, frequency, and amplitude domain techniques, as well SMPTE synchronization formats and MIDI control. Students post-produce sound and music for five-minute video/animation due at semester end.

375 Writing and Performance (4:2:4) Prerequisite: 3 credits of AVT, 3 credits of ARTH or junior standing, or permission of instructor. Explores relationship of word, sound, and image in performance and visual art, performance poetry, theatre and web-based performance. Conducted as a series of practical, critical workshops. Students produce written papers and performance documentation for assessment.

376 Live Movies (4:2:4) Prerequisite: AVT 272, or permission of instructor. Advanced performance studio with emphasis on 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) Prerequisite: 3 credits of AVT, 3 credits of ARTH or junior standing, or permission of instructor. Traces how cinema, music, fiction, cultural theory, visual art, television, theater, and performance have embraced and been shaped by Cyberpunk and cyber-culture. Includes readings, writings, discussion, screenings, guest speakers, and research projects.

378 The African American Experience in the Performing Arts (3:3:0) Through lectures, slides, audio recordings, videos, and films, students examine African-American contributions to cultural fabric of American forms and institutions. Artistic contributions examined in aesthetic, political, historical, and social contexts.
Practical writing seminar en-
395 Writing for Artists (3:3:0)
invited to work toward achieving credit to graduate with hon-
events, and public art presentations. Selected students in-
Washington, D.C., area galleries, artist studios, gallery talks, art
research, and creative assignments that may include Wash-
ties with the New York Artsbus program, by field trips,
art world professionals and experiences, aligning activi-
ties. Special focus on video, visual digital, and Internet artists, their relationship to technology, and sociopolitical implications of their work. Form and content, medium, and process of art works stud-
ed, analyzed, and discussed.
390 Digital Media and Video Art (4:2:4) Prerequisite:
AVT 280 or permission of instructor. Integrates study of
contemporary theory, philosophy, and artistic practices with
application of new media and technology. Focus special focus on
methodologies and techniques relevant to their expression.
393 Field Experience in the Arts (1-6:0:0) Prerequisite:
junior standing and permission of instructor and academic
advisor. Paid or unpaid placement with an organization or
individual in the arts, or as a teaching assistant, providing
introductory working and learning experience in the field.
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 maximum exposure to
art world professionals and experiences, aligning activi-
ties with the New York Artsbus program, by field trips,
research, and creative assignments that may include Wash-
ington, D.C., area galleries, artist studios, gallery talks, art
events, and public art presentations. Selected students in-
vited to work toward achieving credit to graduate with honors
in AVT. Repeatable for up to 8 credits. Graded S/NC.
395 Writing for Artists (3:3:0) Prerequisite: ENGL 302,
or permission of instructor. Practical writing seminar en-
couraging students to think of text and writing practice in
its broadest terms, including the ways in which artists have
used writing, books and language. Students are encour-
gaged to discover the creative value and pleasure of using
writing inventively.
396 Introduction to Art Teaching and Learning (3:3:0)
Prerequisite: junior standing, completion of ENGL 302 and
completion of at least 20 credits of AVT course work (in-
cluding AVT 307), or permission of the art education advi-
sor. Explores art-teaching profession through readings,
discussion, hands-on activities, and visits to diverse area
public schools. Students discover a variety of ways that art is
taught and evaluated to meet the multiple educational
needs of today’s PK-12 students.
399 Special Topics in Art and Visual Technology (1-6:
1-6:0-6) Explores topical studies in AVT including theo-
retical and critical aspects of art or studio production. Top-
ics and credit vary with instructor. May be repeated when
taken under different topics.
414 Graphic Information Design IV (4:2:4) Prerequi-
site: AVT 252 and 313, or permission of instructor. Ad-
vanced graphic-design course emphasizing corporate 2D,
3D, and web graphic information design systems. Students
develop professional corporate design products, and be-
come knowledgeable about profession’s resources and range of
products.
422, 423 Drawing III, IV (4:2:4), (4:2:4) Prerequisite:
AVT 323, or permission of instructor for 422; AVT 422, or
permission of instructor for 423. Intermediate to advanced
drawing skills and techniques with emphasis on individual
exploration and expressive techniques. Along with rigor-
os observation, students work from a variety of sources to
develop a broad understanding of visual re-
sponses and solutions within contemporary art practice.
432, 433 Painting III, IV (4:2:4), (4:2:4) Prerequisite:
AVT 333, or permission of instructor for 432; AVT 432, or
permission of instructor for 433. Students are expected to
have strong foundations in principles and techniques of
the medium, as well as some familiarity with issues and
practices of contemporary painting. Emphasis on further
development of content and personal vision, and formal
methods and techniques relevant to their expression.
434, 435 Painting V, VI (4:2:4), (4:2:4) Prerequisite: AVT
433, or permission of instructor for 434; AVT 434, or
permission of instructor for 435. Painting on advanced level.
Students work rigorously and independently, gaining ins-
sights into personal process and direction through dialogue
with faculty and formal group critiques. Emphasis on indi-
vidual decision-making and personal initiative.
442 Printmaking III (4:2:4) Prerequisite: AVT 343, or
permission of instructor. Advanced print-media course in
intaglio printmaking. Students explore traditional metal
engraving and etching, as well as new related printmaking
techniques in toray and sintra plate printing. Hand-drawn,
digital and photo-based imagery developed in a series of
related prints. Course includes the study of historical ante-
cedents and their relevance to contemporary printmaking.
443 Printmaking IV (4:2:4) Prerequisite: AVT 442, or
permission of instructor. Advanced print-media course in-
corporating three-dimensional applications of hand print-
ing. Students develop concepts in digital printmaking,
bookmaking, sculptural prints, and installation works fo-
cused on specific individualized themes. Issues in contem-
porary printmaking explored through critical discussions,
reading and writing assignments.
452 Advanced Photographic Printing I (4:2:4) Prereq-
site: 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, contem-
porary photographic approaches, and critical discussions.
453 Advanced Photographic Printing II (4:2:4) Prereq-
site: AVT 452, or permission of instructor. An 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, image transfer. Exploration and discussion of photography's influences, application, and use in other mediums.

455 Advanced Digital Photo (4:2:4) Prerequisites: AVT 354 or permission of instructor. Advanced digital-imaging course involving further exploration of digital photography techniques and personal expression. Emphasis on developing technical proficiency using Photoshop as well as furthering one's personal aesthetics. The semester will be spent creating digital negatives based on the use of color. Students create large-scale photographic digital images.

456 Large Format Photography (4:2:4) Prerequisite: AVT 353 or permission of instructor. An introduction to basic concepts, controls, and exposure theories of large format photography. Students work with 4"x5" view cameras in the studio and field. Darkroom techniques emphasize tray processing of negatives and printing in large format. Classroom critiques, introduction to contemporary photographers and styles, and discussions further aesthetic knowledge of view camera's applications.

457 Documentary Photography (4:2:4) Prerequisite: 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 people's lives and situations.

458 Advanced Studio Lighting (4:2:4) Prerequisites: AVT 356 or permission of instructor. Advanced study of photographic studio lighting concepts using electronic strobes and power packs. Students learn about constructing studio equipment, metering techniques, staging complex sets, different types of transparency films, and working with medium-format cameras. Also introduces on-location photography. Students examine principles of photographic seeing and visual perception through discussions, readings, and exercises to facilitate greater understanding of visual communication in a studio environment.

459 About Photography: Practice and Research (4:2:4) Prerequisites: one course from AVT 452-458, or permission of instructor. Combined studio and lecture course investigating photography's history, critical theory, philosophy, and practice. Lectures, discussions, readings, and projects focus on ubiquity of the photograph, multiplicity of uses, and complexity as a medium that has enormously influenced art and culture.

462, 463 Sculpture III, IV (4:2:4), (4:2:4) Prerequisite: AVT 363, or permission of instructor for 462; AVT 462, or permission of instructor for 463. Intensive studio course for advanced students to further individual, conceptual, and critical development. Students produce a body of work through self-expression, based on technical exploration, critical discussion, reading, and writing components.

464, 465 Sculpture V, VI (4:2:4), (4:2:4) Prerequisite: AVT 463, or permission of instructor for 464; AVT 464, or permission of instructor for 465. Sculpture on advanced level. Students work rigorously and independently, gaining insights into personal process and direction through one-on-one critical dialogue with faculty and formal group critiques. Emphasis on individual decision-making and personal initiative.

472 Critical Theory in the Visual Arts (3:2:1) Prerequisite: ARTH 374, or permission of instructor. In-depth examination of theory and criticism that have formed theoretical and philosophical underpinnings of contemporary practice and critical analysis in visual arts. Emphasis on modernist and postmodernist practices as influenced by science, philosophy, politics, and literary theory, particularly structuralist and poststructuralist theories.

473 Advanced Performance Art Studio (4:2:4) Prerequisite: AVT 373, 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 audio-visual performance. Students participate in collaborative production.

482 Advanced Two-Dimensional Digital Art (4:2:4) Prerequisites: AVT 280, or permission of instructor. In-depth look at advanced vector and raster graphics imaging techniques. Emphasis on idea generation, concept development, visual aesthetics, and technique. Students 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 Multimedia Art (4:2:4) Prerequisite: AVT 382 or permission of instructor. Investigates and presents current Internet developments with a special attention and focus on artistic applications. Intermediate and advanced principles of form, content design, site mapping, aesthetic languages explored through HTML editing, layout, and web animation applications.

487 Advanced Digital Media (4:2:4) Prerequisite: AVT 382, or permission of instructor. In-depth look at digital media techniques including layer compositing, digital video editing, rotoscoping, and hand-drawn animation. Introduces techniques in publishing and authoring final projects to CD-ROM, digital video tape, DVD, and Internet. Focuses on creating individual and group projects. Emphasizes integration of traditional techniques with recent software applications.

489 Internship in Art and Visual Technology (1-6:0:0) Prerequisite: senior standing, completion of 12 concentration credits, or permission of instructor and academic advisor. Unpaid professional level work experience related to the student's concentration and career plans, providing opportunity to be apprenticed in a professional organization or with an individual artist. Placement documentation to include 45 hours of work per credit. May be repeated for credit for maximum 12 credits.

491, 492 Independent Study in Art and Visual Technology (1-6:0:0), (1-6:0:0) Prerequisite: senior standing, completion of 12 concentration credits, or permission of instructor. Study proposal submitted prior to registration. Opportunity for development of advanced skills and concepts in drawing, painting, sculpture, and other media. Project documentation to include 45 hours of work per credit. May be repeated for credit for maximum 12 credits.

493 Teaching Visual Thinking Through Media, PK–12 (3:3:0) Prerequisite: AVT 396, or permission of art educa-
494 Teaching Critical Response to Art, PK–12 (3:3:0)
Prerequisite: AVT 396, or permission of the 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 and enrich children’s art and artifacts. Includes intensive writing, readings, discussions, museum work, research and Internet skills, and studio work.

495 Portfolio Preparation (4:2:4) Combination lecture and studio production course addressing nature of professional portfolio in terms of career development and self-marketing including visual presentation of a body of work, preparing professional written materials, and the public and verbal presentation of one’s work.

497 Senior Project (4:2:4) Prerequisite: senior AVT major, completion of 12 concentration credits, or permission of instructor. Students participate in all aspects of development and presentation of cohesive and mature body of work. Students required to develop and present written materials and documentation related to the development and presentation of their works, as well as participate in formal oral critiques with critics or AVT faculty.

498 Senior Design Project (4:2:4) Prerequisite: senior AVT major with a graphic information design concentration, completion of 12 concentration hours, or permission of instructor. Students participate in all aspects of development and presentation of cohesive and mature body of work. Students required to develop and present written materials and documentation related to development and presentation of their works, as well as participate in formal oral critiques with critics or AVT faculty.

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. Emphasis on 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 direction of department faculty member. Written reports required. May be repeated for credit.

599 Special Topics in Art and Visual Technology (1-6: 1-3:0-6) Prerequisite: admission to AVT graduate program, or permission of instructor. Exploration of topical studies in AVT, including theoretical and critical aspects of art or studio production. Topics and credit vary with instructor. May be repeated when taken under different topics.

600 Research Methodologies (3:3:0) Prerequisite: admission to AVT graduate program, or permission of instructor. Graduate seminar focusing on development of independent research project in student’s area of emphasis. Explores principal methods of researching and documenting art and arts practice. In addition to traditional methods of library research, special emphasis on 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 AVT graduate 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 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 AVT graduate program, and permission of instructor. Addresses uses 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 Internet Multimedia Art (5:2:6) Prerequisite: admission to AVT graduate program or permission of instructor. Combined lecture and studio course in HTML layout and animation. Perceptual problems in designing the presentation of visual and textual information for electronic display. Explores how design considerations are affected by changes in media and society.

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. Looks at 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. Exploration and growth in the 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. Emphasis on 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 we inhabit, and issues involved in one's own work as it progresses. Weekly classes share equal time with critical theory and hands-on studio work. Readings, visiting artists and lecturers, and field trips provide a variety of viewpoints as well as encourage discourse.

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 we inhabit, and issues involved in one's own work as it progresses. Weekly classes share equal time with critical theory and hands-on studio work. Readings, visiting artists and lecturers, and field trips provide a variety of viewpoints as well as encourage discourse.

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. Emphasis on self-evaluation, critical discussion, reading, and writing components.

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. Emphasis on self-evaluation, critical discussion, reading, and writing components.

664 Advanced Graduate Sculpture (5:2:6) Prerequisite: AVT 663, or permission of instructor. Emphasizes individual creative production and development, with periodic exposure of the student's work and ideas to the critical attention of the AVT teaching faculty and other graduate students. Writing and reading components.

668 Three-Dimensional Artmaking Across Cultures (4:2:4) Prerequisite: admission to AVT graduate 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 3D artmaking techniques, including ceramics and fibers, and learn to design 3D 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 undergraduate program at Mason or community college program. May be repeated for a total of 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 the artist as performer. Students study the work of performance practitioners, make short performance pieces, document and exhibit their work as well as take part in a program of gallery and performance visits locally and in New York. Students required to complete substantial research project.

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. Detailed analysis of the 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. Repeatable up to 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. Time, frequency, and amplitude domain and processing are studied. 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. Special focus to exportation of traditional visual and aural artistic aesthetic to the computer environment within a multimedia context. Assigned class readings augmented and supported by presentations of various digital interfaces and CD-ROM examples. Commercial, entertainment, and educational titles, as well as CD-ROM experimental art works, studied and discussed. Studio time divided between the AVT labs and area multimedia facilities. Students conceive, design, and develop a two-CD-ROM and/or Kiosk Interfaces due at midterm, and complete a dual platform CD-ROM project due at semester end.

684 Two-Dimensional Digital Art (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Overview of 2D computer imaging applications in the arts, including painting, printmaking, mixed media, illustration, video, animation, and others. Lectures combine technical and aesthetic material, including image processing for artists and color reproduction. Emphasis on developing an advanced studio portfolio.

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. Emphasis on idea generation, concept development, visual aesthetics, and technical abilities. Students required to render a portfolio of high-resolution images.

688 Digital Animation (5:2:6) Prerequisite: admission to AVT graduate program, or permission of instructor. Students study digital 2D and 3D animation practices. Lighting, camera movement, object motion, timing, and texture mapping introduced as students plan and produce a short animation. Emphasis on idea generation, concept development, visual aesthetics, and technical abilities.

691 Elementary Art Education (3:3:1) Prerequisite: admission to AVT graduate 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 the AVT graduate program, or permission of instructor. AVT students apprentice at a local business conforming to their interest in visual information technologies. May be repeated for a total of 6 credits.

695 Internship in Art Education (Student Teaching) (6:0:0) Prerequisite: completion of all other program requirements. Corequisite: AVT 696. Full-time internship in which students teach in elementary and secondary schools with guidance from cooperating mentor teachers. College supervisors make periodic site visits to observe, assess, and evaluate progress.

696 Seminar for Student Teachers (1:2:0) Corequisite: AVT 695. Weekly professional seminar focused on needs and concerns of student teachers. Covers issues as they emerge in practice and concludes with an “Art of Teaching Art” exhibit of work by students of preservice teachers.

796, 798, 799 Directed Project, Directed Reading, Thesis (1-9:0:0), (3:0:0), (1-3:0:0) Prerequisite: admission to AVT graduate program, or permission of instructor. Three courses comprising the MFA comprehensive experience for AVT students. Involves a study of historical basis for studio project, independent creative production suitable for public viewing, and written thesis documenting evolution of the creative problem and exploring the intention, purpose, and relative success of the finished production.

Arts Management (MAM)

College of Visual and Performing Arts

501 Fundraising and Development in the Arts (3:3:0) Introduces art and practice of fundraising in the arts. Serves as an overview for students seeking general knowledge, as well as introductory course for those who will complete the fundraising concentration. Students learn role of fundraising as management function and part of overall strategic intention of arts organizations. They study fundraising as a multifaceted, team-based process. Tools and techniques for effective fundraising analyzed.

599 Special Topics in Arts Management (1-6:1-6:0) Prerequisite: admission to the MAM graduate program or permission of instructor. Provides opportunity to explore special and timely topics in the field of arts management including theoretical and applied areas. Topics and credit vary; may be repeated for up to 12 credits taken under different topics.

602 Seminar in Arts Management (3:3:0) Prerequisite: admission to graduate program in CVPA, or permission of instructor. Develops tools and techniques necessary for successful pursuit of a management career in visual and performing arts. Introduces wide range of arts organizations, working arts administrators, and institutional models through guest lectures, readings, field trips, and analysis of institutional data. Students gain understanding of organizational structures and functions of arts organizations as well as a theoretical model for general management and practical tools.

603 Arts in Society (3:3:0) Prerequisite: admission to a master’s program in CVPA or permission of instructor. Examines role of visual and performing arts as social and cultural institutions, with emphasis on historic traditions and trends that have most directly influenced contemporary American practice. Consideration is given to the essential functions of art in society in an effort to address questions: Why do we require art at all? What constitutes “good” or “bad” art? What is the value of art? What encouragements or impediments does our society offer to the creative artist or arts institution? How do the various forms differ in their traditions, philosophical underpinnings, and
current manifestations? How can arts managers participate in the cultural conversation to the benefit of art forms, artists, and the institutions they serve?

604 Public Relations and Marketing Strategies for the Arts (3:3:0) Prerequisite: admission to a CVP A graduate program 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—existing and potential; and are introduced to fundamentals of applied marketing media and advertising fundamentals. Designed as fundamentals course for elective concentration in marketing and public relations.

704 Budgeting and Finance for Arts Organizations (4:4:0) Prerequisites: admission to a CVP A graduate program or by special written approval of program director. Introduces budget and finance as fundamentals of the budget process, specifically tailored to the needs of arts organizations. Provides overview of accounting as a tool toward managing and controlling arts organizations. Involves laboratory component for teaching software application, frequently encountered in the fiscal operation of arts organizations.

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 (3:3:0) Opportunity to engage in a more intensive study or project in arts management in a more specific, individualized manner than is available in general arts management curriculum. 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 Grantwriting in the Arts (3:3:0) Prerequisite: admission to the master of arts management program or permission of instructor. Places the components of the grant writing process within broader context of nonprofit management. Introduces perspectives of grant seeker and grant maker including program officers and selection panels. Students engage in all aspects of the grant writing process, from research and proposal writing to developing the specific aspects of the grant as well as terminology, oral and written presentation techniques. Explores grant- seeking resources and teaches compelling writing skills for proposal writing and letters of intent.

740 Internal Internship-Laboratory Rotation (3:0:0) Prerequisite: admission to master's in arts management program; 12 credits taken in the master's program; or permission of program director. Required for developing practical application for the master's in arts management. Builds on apprenticeship as a core means of teaching students applied concepts of arts management. Augments use of the Center of the Arts and the active arts environment, both performing and visual, as a learning laboratory for students. Builds on practical learning and provides internal training as preparation for external internship.

790 External Internship (3-6:0:6-12) Prerequisite: admission to master's in arts management program; 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 the internal internship.

Astronomy (ASTR)

Physics and Astronomy

103 Astronomy (3:3:0) Not for physics majors. Introduction to origin of life, Earth, planets and sun, stars, galaxies, quasars, nature of space radiation, and general theory of relativity.

111 Introduction to Modern Astronomy I (3:3:0) ASTR 111, 112, 112, 114 can be used to fulfill the eight-hour lab science requirement; not for physics majors. Topics include history of astronomy from prehistory to present, evolution of solar system, properties of planets, scientific method, critical thinking, nature of light, and principles of telescope design.

112 Introduction to Modern Astronomy Lab I (1:0:3) Corequisite: ASTR 111. Laboratory portion of two-semester introductory astronomy sequence.

113 Introduction to Modern Astronomy II (3:3:0) Topics include electromagnetic radiation, stellar evolution, interstellar medium, galaxies, cosmology, scientific method, and critical thinking.

114 Introduction to Modern Astronomy Lab II (1:0:3) Corequisite: ASTR 113. Laboratory portion of two-semester introductory astronomy sequence.

301 Astrobiology (3:3:0) Prerequisites: MATH 113 and PHYS 160. Physical science perspective on the origin and evolution of life on Earth and how life, in turn, has significantly influenced the evolution of Earth. Topics include origin of Earth, mechanisms and sites for origin of life, co-evolution 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 stellar 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 used 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. Emphasis on hands-on projects.

403 Planetary Sciences (3:3:0) Prerequisites: MATH 213 and PHYS 260. Introduction to the physics and chemistry of planets and their natural satellites, asteroids, and comets. Topics include history of the solar system; origin and evolution of planets, their internal structure and atmospheres; and analytical techniques used in remote and in situ study.

404 Galactic Astronomy (3:3:0) Prerequisites: 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) Prerequisite: 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 what knowledge from previous astronomy courses with selected readings from current scientific papers and an opportunity to effectively present that synthesis. Emphasis on student participation and student-led class discussions. Required of all astronomy majors.

530/CSI 661 Astrophysics (3:3:0) Prerequisites: PHYS 303, 305, 308, MATH 214. Survey of contemporary astrophysics. Topics include physical concepts, stellar spectra, Hertzsprung-Russell diagram, stellar atmospheres, stellar structure, interstellar matter, stellar evolution, high-energy phenomena, hydrodynamical processes in astrophysics, accretion disk formation, and shock formation.

535/CSI 660 Space Instrumentation and Exploration (3:3:0) Prerequisites: PHYS 262 and MATH 213. Survey of the instruments, devices, and methods used for space and planetary exploration. Remote sensing of Earth and other solar system bodies. 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.

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 in solving 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. 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, 513, 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) Formerly PHYS 531. 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.
Astronomy (ASTR) • Bachelor of Individualized Study (BIS)

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.

Athletic Training (ATEP)

School of Recreation, Health, and Tourism

228 Introduction to Athletic Training (3:3:0) Introduces profession of athletic training. Study areas include the role of the athletic trainer 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. Topics include athletic training room organization and procedures; protective sports equipment; construction of protective devices; application of protective taping, braces, wrapping, and protective pads. Assignments include the application of skills with athletic teams.

310 Athletic Injury Recognition of the Lower Extremity and Thorax (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 315; current CPR certification; 2.50 major GPA. An analysis of injury mechanisms of specific injuries to the lower extremity and thorax.

315 Clinical Evaluation Skills for Lower Extremity and Thorax (3:3:0) Corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 310; current CPR certification; 2.50 major GPA. An analysis of injury evaluation and muscle isolation techniques of specific injuries to the lower extremity and thorax. Assignments include the application of skills with athletic teams.

320 Athletic Injury Recognition of the Upper Extremity, Head and Neck (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 325; current CPR certification; 2.50 major GPA. An analysis of injury mechanisms of specific injuries to the upper extremity, head and spine.

325 Clinical Evaluation Skills for the Upper Extremity, Head and Neck (3:3:0) Corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 320; current CPR certification; 2.50 major GPA. An analysis of injury evaluation and muscle isolation techniques of specific injuries to the upper extremity, head and spine. Assignments include the application of skills with athletic teams.

350 Therapeutic Modalities (3:3:0) Prerequisites or corequisites: BIOL 124, 125; HEAL 110, 205; ATEP 310, 315, 320, 325, 354, 357. Study of the physical principals, physiological effects, indications, and contraindications of therapeutic modalities used in athletic training. Also covers indications, contraindications, physiological effects, special programs, and resistance methods used in the prevention and rehabilitation of athletic injuries.

354 Rehabilitation of Athletic Injuries (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; ATEP 228, 229, 310, 315, 320, 325, 350, 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; 2.50 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 the collegiate, clinical, professional, and secondary school levels.

441 Practicum in Athletic Training (3:3:0) Prerequisites: BIOL 124, 125; HEAL 110, 205; PHED 200; ATEP 228, 229, 310, 315, 320, 325, 350, 357; PRLS 405, 410; current CPR certification; 2.50 major GPA. Techniques and procedures in the care and prevention of athletic injuries in a selected environment under certified athletic trainer supervision. Involves at least 300 hours of participation.

Bachelor of Individualized Study (BIS)

300 Understanding Multidisciplinary Studies (3:3:0) Prerequisite: 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) Prerequisite: BIS 300, ENGL 302. Open only to pre-BIS students and BIS majors. Focuses on skills needed to develop a research topic, find and organize relevant information, examine and critique
evidence, establish criteria, and create plan to complete senior project.

489 Directed Readings and Research (1-3:0:0) Prerequisite: 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.

Biodefense (BIOD)

Molecular and Microbiology

601 Foundations of Biodefense Science and Technology I (3:3:0) Basic biology of living systems including cell structure and function, metabolism, genetics, and biodiversity. Areas covered are important to comprehending the technology and systems involved in biodefense. May not be used for credit toward a graduate degree in biodefense.

602 Foundations of Biodefense Science and Technology II (3:3:0) Required course that covers basic chemical and physical science topics behind biodefense. Areas covered are important to comprehending technology and systems involved. May not be used for credit toward the master’s degree in biodefense.

603 Introduction to Biodefense: Fundamentals of Microbiology (3:3:1) Prerequisite: BIOD 601 and 602, or equivalents. Lecture and laboratory course that emphasizes basic principles of microbiology, including virology and mycology. Structure, metabolism, genetics, and virulence properties of infectious microorganisms are stressed as well as the immune response to microorganisms. Laboratory covers basic techniques of isolation, propagation, and identification of microbes. Not available to students who have had a course in microbiology. May not be used for credit toward the master’s degree in biodefense.

604 Introduction to Biodefense/Threat Analysis I: Bacterial Agents (3:3:0) Prerequisites: BIOD 601, 602, and 603, unless waived. Required course that covers the pathology, metabolism, and threat of bacterial agents that can be utilized as biological weapons. Subjects include Bacillus anthracis, Yersinia pestis, and others chosen by instructor.

605 Introduction to Biodefense/Threat Analysis II: Viral Agents (3:3:0) Prerequisites: BIOD 601, 602, and 603, or permission of instructor. Required course that covers pathology, metabolism, and threat of viral agents that can be utilized as biological weapons. Subjects include Variola (smallpox), hemorrhagic fevers (Marburg, Ebola, Dengue) and others chosen by instructor.

606 Introduction to Biodefense/Threat Analysis III: Agricultural Biodefense (3:3:0) Prerequisites: BIOD 601, 602, and 603, or permission of instructor. Covers agents that can be utilized for the disruption of agriculture and livestock. Fungal, bacterial, and viral agents are discussed as well as local and global economic and social impact of disruption of food supplies.

607 Introduction to Biodefense/Threat Analysis IV: Toxins (3:3:0) Prerequisites: BIOD 601, 602, and 603, unless waived. Required course discussing 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: permission of instructor. Different topics in different years, depending on instructor’s specialty. Topics include legal, ethical, scientific, and political aspects of biodefense, emphasizing current problems and research. May be repeated.

702 Special Topics in Biodefense Seminar (1:1:0) Prerequisite: BIOD 601, 602, 603, 604, and 605; or permission of instructor. In-depth examination of advanced topics in defense against biological agents. Topic depends on instructor’s specialty. May be repeated for credit with advisor’s permission.

703 Special Topics in Biodefense Seminar (Presenting) (1:1:0) Prerequisite: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Student research and presentations on approved topic. May be repeated for credit with advisor’s permission.

704 Principles of Toxicology (3:3:0) Prerequisite: courses in physiology and biochemistry, or permission of instructor. Introduction to scientific principles and biological underpinnings of toxicology. Surveys the processes of absorption, distribution, metabolic transformation, and elimination of foreign substances in the body, as well as mechanisms of toxicity. Students gain understanding of genetic toxicology, cancer formation, developmental and reproductive toxicology, and target organ toxicology (including effects on blood, liver, and skin; and urinary, cardiovascular, respiratory, nervous, and immune systems). Concludes with overview of several types of toxic agents and their interactions with biological systems.

705 Detecting Production of Biological Agents (2:2:0) Prerequisite: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Involves the study of detection techniques for biological weapon-production facilities. Major goal is to show students the difference in detecting a large-scale, state-run facility and detecting a home laboratory. In addition, students learn the differences between illicit biological agents versus biological agents used for pharmaceutical research.

706 History of Biological Agent Use and Treaties (3:3:0) Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Lecture course on historical uses of biological weapons as well as treaties signed by various countries and powers concerning their use.
707 Detection Techniques in a Bioterror Attack (3:3:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Involves the study of detection techniques for a biological weapon that has been released in various forms. Students gain understanding of how different detectors work, and how to interpret data these detection devices collect.

708 Epidemiology of a Bioterror Attack (3:3:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Teaches basics of epidemiology as well as unique issues in epidemiology that biological agents used as weapons present. Includes how disease would spread naturally, how to prevent it from spreading, and differences in natural and unnatural outbreaks.

709 Nonproliferation in Biodefense (3:3:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Involves current issues in nonproliferation of biological agents as a weapon of mass destruction. Students study various theories in nonproliferation, and look at nonproliferation in practice in recent history.

710 Approaches to Bioweapon Medical Treatment and Response (3:3:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Involves research, treatment, and preparedness strategies against biological agents. Focuses on various strategies including immunological, pharmaceutical, and medical treatment methodologies and designs.

711 Techniques in Immunology Lecture (3:3:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Introduces theory of immunological techniques and their application.

712 Techniques in Immunology Laboratory (1:0:3)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Prerequisite or corequisite: BIOD 711. Laboratory techniques discussed in BIOD 711 including enzyme-linked immunosorbant assay, protein electrophoresis, FLOW cytometry, and vaccine preparation. Not available to students who have had an undergraduate laboratory course in immunology.

721 Coordinated Response to a Bioterror Attack (2:2:0)
Prerequisite: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Provides information for defending against biological attacks. Includes on-scene procedures following the initial discovery of such agents, site boundaries for biological agents, gross decontamination procedures, site set-up procedures, agent removal, and case studies or hypothetical inceptions. Students learn critical response requirements of biological attack.

722 Examining Terrorist Groups (3:3:0)
Prerequisites: BIOD 601, 602, 603, 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 601, 602, 603, 604, and 605; or permission of instructor. Analysis of legal issues associated with counterterrorism surveillance, interrogation, search, detainment, and decontamination in the context of civil rights and rule of law.

724 Incident Response Information Technology (2:2:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Effective information-sharing on bioterrorist incidents among federal, state, and local law enforcement agencies through databases and computer software.

742 Modern Geographic Techniques in Detection as Tracking (3:3:0)
Prerequisites: GEOG 300 and 311, or permission of instructor. Elective course on the utilization of GIS, remote sensing/satellite imagery, and spatial analysis techniques that can be used to monitor biological events and plan and coordinate response.

761 Dispersal Patterns of Biological Agents (3:3:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Introduction to military and terrorist methods of dispersal patterns. Course covers physics of aerosols, engineering and mechanics of building ventilation systems, and mechanical dissemination including handheld, automatic, vehicle, and truck-mounted systems. Also covers viability of specific agents involved.

762 Into the Hot Zone: Working in a High Threat Environment (2:2:0)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Covers history of genetic manipulation of bioweapons. Special attention to advent of molecular techniques, as well as the general microbiology techniques in making strains of both pathogenic and nonpathogenic organisms more virulent or survivable.

764 Engineering Immunology and Immune Drug Development (2:2:0-6)
Prerequisites: BIOD 601, 602, 603, 604, and 605; or permission of instructor. Covers history of genetic manipulation of bioweapons. Special attention to advent of molecular techniques, as well as the general microbiology techniques in making strains of both pathogenic and nonpathogenic organisms more virulent or survivable.

765 Drug Discovery and Development (2:2:0-6)
Prerequisite: two of the following: BIOD 604, 605, 606 or 607. Elective course covers traditional and novel methods employed in engineering immunology, as well as methods and equipment for immunomodulating drug development. Emphasis on various methods and techniques to develop protection against BW infections and naturally occurring infections using substances to modulate the host immune response.

766 Bioengineering and Bioprocessing (2:2:0-6)
Prerequisite: two of the following: BIOD 604, 605, 606 or 607. Elective course covers methods, means and processes necessary 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 that could be used for both medical biodefense and civilian medicine purposes.

780 Masters Supervised Internship (1-8:0:0)
Prerequisite: permission of program director or advisor. An internship for master’s students dealing with application of principles presented in courses within a concentration, under
the supervision of qualified professional in the field of biodefense at a government agency, consulting firm, industrial firm, or other acceptable agency.

783 Laboratory Rotation (1:0:4) Prerequisite: permission of instructor. Intensive introduction to research laboratory in the biosciences. Students read background material pertinent to the problem under study, learn and practice research methods of the laboratory, and formulate a short final project, which may be a proposal or an actual project, demonstrating some mastery of techniques and approaches employed.

793 Directed Studies in Biodefense (1-8:0:0) Prerequisite: permission of instructor, department chair, and student’s graduate committee. Study of specialized topics not otherwise available in graduate program. May involve any combination of reading assignments, tutorials, lectures, papers, presentations, or lab or field study, determined in consultation with instructor. Specific arrangements for designing the scope and area of study to be determined in consultation with instructor. May be repeated for credit with permission of instructor or graduate program director.

798 Master’s Research Project in Biodefense (1-3:0:0) Prerequisites: 8 graduate credits in BIOD course and permission of major professor and department chair. Experimental or theoretical research project chosen and completed under guidance of graduate faculty member. Requires comprehensive report acceptable to the student’s advisory committee. Graded S/NC.

799 Master’s Thesis in Biodefense (3-6:0:0) Prerequisites: 8 credits in BIOD and permission of instructor and department chair. Master’s thesis research under direction of supervisor. Graded S/NC.

890 Doctoral Supervised Internship (1-6:0:6-18) Prerequisite: permission of program director and student’s doctoral committee. Internship dealing with the application of principles presented in courses within a concentration under the supervision of a qualified professional in the field of biodefense at a government agency, consulting firm, industrial firm, or other acceptable agency.

899 Directed Research in Biodefense (1-12:0:0) Prerequisites: permission of research advisor. Research on a pertinent topic in biodefense. Scope and subject of research determined by instructor.

996 Doctoral Reading and Research (1-9:0:0) Prerequisites: admission to doctoral program, and permission of advisor and committee. Reading and research on a specific topic in biodefense under direction of a faculty member. 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) Prerequisite: admission to doctoral candidacy, or approval of doctoral program director. Development of a research proposal, which forms the basis for doctoral dissertation under guidance of dissertation director and doctoral committee. May be repeated, but only 12 credits may be applied to the degree. Graded S/NC.

999 Doctoral Dissertation (1-12:0:0) Prerequisite: approved doctoral proposal. Doctoral dissertation research under direction of dissertation director. May be repeated for no more than a total of 24 credits of BIOD 998. BIOD 999 may be applied toward doctoral degree. Graded S/NC.

**Bioinformatics (BINF)**

**School of Computational Sciences**

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 course designed as an introduction to life sciences for physicists, chemists, engineers, and mathematicians. Combines knowledge from the core General Education areas of 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.

630 Bioinformatics Methods (3:3:0) Prerequisites: graduate standing or permission of instructor. Introduction to bioinformatics methods and tools for pairwise sequence comparison, multiple sequence alignment, phylogenetic analysis, protein structure prediction and comparison, database similarity searches, and discovery of conserved patterns in protein sequence and structures.

631 Molecular Cell Biology for Bioinformatics (3:3:0) Prerequisites: undergraduate background in biochemistry or cell biology, or permission of instructor. Intensive review of aspects of biochemistry, molecular biology, and cell biology necessary to begin research in bioinformatics. Topics include cell structure and cell cycle; DNA replication, transcription, and translation; 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 of modern biotechnology. 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 633 or permission of instructor. Theory and practice of genome analysis including the 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. Laboratory intensive introduction to theory and practice of modern forensic genomics.
DNA science, including biochemistry, chemistry, genetics, statistics, instrumentation, software, and wetware required for applications of DNA science to forensic science.

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 will develop computer programs to perform many of these tasks.

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 the instructor. Computational techniques for solving scientific problems focusing on applications in bioinformatics and computational biology. Students will develop the ability to convert a quantitative problem into computer programs to solve the problem. Emphasizes efficiency and readability of code.

701/BIOS 701 Biochemical Systematics (Biochemistry) Core for Doctoral Studies in Biosciences and Bioinformatics (3:3:0) Prerequisite: admission to PhD program in biosciences or bioinformatics. CHEM 663, or equivalent. Introduction to biochemical systems now in use 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 as necessary.

704 Seminar 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, beginning with a reflection on its purpose and a review of 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 the design, execution, and analysis of experiments and analysis of current ethical issues in research, including use of animals and humans, ethical standards in the computer community, and research fraud. Currently accepted guidelines for data ownership, manuscript preparation, and conduct of people in authority may be presented and discussed in terms of relevant ethical issues.

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. Lecture topics include genome mapping, comparative genomics, and functional genomics.

733 Gene Expression Analysis (3:3:0) Prerequisites: BINF 730 or permission of instructor. Covers development of probabilistic tools, including hidden Markov models and optimization algorithms. Development of probabilistic tools, including hidden Markov models and optimization algorithms. Survey of current software tools.

734 Advanced Bioinformatics Programming (3:3:0) Prerequisites: BINF 634 or permission of instructor. Selected topics including algorithm design, complex data structures, object oriented programming, relational databases, designing modules, and graphics and web programming. Students will 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 as needed.

796 Directed Reading and Research (3:3:0) Reading and research on a 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 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.

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 as needed.

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, but no more than 12 credits of BINF 998 may be applied to doctoral degree requirements.

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, heredity, evolution, and diversity of life and animal systems. Students who have already received 4 credits of biology are not eligible to take this course. f,s

104 Introductory Biology II (4:3:3) Prerequisite: BIOL 103. Topics include human structure, function and homeostatic mechanisms, animal systems, behavior, plants, major ecosystems, and ecological problems. Students who have already received 8 credits of biology are not eligible to take this course. s

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. Not available for biology major or minor credit. Students may not receive credit for BIOL 124 or 125. Introduction to structure and function of body's major organ systems. f,s

213 Cell Structure and Function (4:3:3) For science majors and preprofessionals in life sciences. Introduction to cell chemistry, metabolism, genetics, and evolution. f,s

225 Human Reproduction and Sexuality (3:3:0) Not available for biology major or minor credit. Examination of 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, or 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. Emphasis on control of microorganisms, host-parasite interactions including immunology, and viral and bacterial pathogens. f,s

301 Biology and Society (3:3:0) Prerequisites: BIOL 103 and 60 credits, or permission of instructor. For nonscience majors. Not available for biology major or minor 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

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

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. Host-parasite interactions are stressed. f,s

306 Biology of Microorganisms Laboratory (1:0:3) Corequisite: BIOL 246 or 305. Laboratory techniques in culturing, staining, and identifying microorganisms. f,s

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

309/GEOL 309 Introduction to Oceanography (3:3:0) Prerequisites: GEOL 101 and BIOL 103 or 213, or permission of instructor. Introduction to chemical, biological, and geological aspects of oceanic environment. 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

312 Biostatistics (4:3:2) Prerequisites: BIOL 303 and 304, or permission of instructor. Use of probability and descriptive and inferential statistical techniques in interpreting biological data. f

313 Human Genetics for the Social Sciences (3:3:0) Prerequisite: One year of biology or permission of instructor. Not available for biology credit. Emphasizes topics of interest to students in social sciences, but open to any non-biology major. Topics include human genome and its inheritance; nature versus nurture; genetic disease; genetics of sex-determination, intelligence, personality, and mental illness; genetic differences within and between populations; and evolution of human beings. s,odd

318 Conservation Biology (3:3:0) Prerequisites: BIOL 307, 311. Introduction to science used to identify species in need of conservation, and techniques employed to manage and protect organisms.

320 Comparative Chordate Anatomy (4:2:6) Prerequisite: BIOL 303, or permission of instructor. Comparison of 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.
31 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.

32 Insect Biology (4:3:3) Prerequisite: BIOL 303, or permission of instructor. Survey of insects including taxonomy, morphology, physiology, behavior, ecology, and economic importance.

33 Vertebrate Zoology (4:2:6) Prerequisite: BIOL 304, or permission of instructor. Phylogeny and systems of major vertebrate groups. Emphasis on ecological adaptation. Lab includes field studies of local fauna.

34 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.

35 Plant Communities (4:3:3) Prerequisite: BIOL 304, or permission of instructor. Plant associations and formations and their successions in North America. Three Saturday or Sunday field trips required.

36 Freshwater Ecosystems (4:3:3) Prerequisites: CHEM 211/212, and either EVPP 110/111 or BIOL 307. Study of physical, chemical, and biological processes occurring in lakes, streams, and wetlands. Students learn about physical and chemical aspects of aquatic systems and life cycles and adaptations of aquatic organisms through lectures, field trips, and lab exercises.

37 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. Emphasis on vertebrates.

38 Biotechnology and Genetic Engineering (3:3:0) Prerequisites: BIOL 311; CHEM 211, 212, MATH 110 or 113. Emphasizes theory and applications, including significance and societial implications of biotechnology applied to medicine, agriculture, and environment.

401 Microbial Diversity: An Organismal Approach (3:3:0) Prerequisites: BIOL 305, 306, or permission of instructor. Study of nonpathogenic microbial world, emphasizing detection, enumeration, and classification of microorganisms, their physiological and evolutionary relationships, and biotechnological applications.

402 Applied and Industrial Microbiology (3:3:0) Prerequisites: BIOL 213, 305, 306; CHEM 211, 212, or permission of instructor. Biology of microorganisms of ecological and industrial significance. Includes food production, spoilage and preservation, fermentation technology, waste disposal, water purification, biodeterioration, and decomposition.

403 Techniques in Applied and Industrial Microbiology (1:0:3) Prerequisites: BIOL 213, 305, 306; CHEM 211, 212. Prerequisite or corequisite: BIOL 402 or permission of instructor. Laboratory exercises illustrate basic and applied methodologies, including isolation of commercially useful strains. Production and purification of industrial products are discussed.

404 Medical Microbiology (3:3:0) Prerequisites: BIOL 305 and 306. Basic principles of infectious diseases caused by bacteria and viruses. Genetics and molecular mechanisms of pathogenicity are discussed.

405 Microbial Genetics (4:3:3) Prerequisites: BIOL 305 and 306. Study of structure and function of bacterial DNA with emphasis on 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 impact of microorganisms on ecological phenomena. Stresses evolution of environmental 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.

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 (1-4:1-4:0-6) Prerequisite: BIOL 304, or permission of instructor. Lecture or field course in botany. Topic varies with instructor’s specialty.
440 Field Biology (1-4:0-2:3-9) Prerequisites: BIOL 303, 304, and 60 credits, or permission of instructor. Directed field studies emphasizing ecology and behavior. Topics vary but include design of field manipulations, data collection and analysis, and an 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 biotemperature and adaptation to temperature, high pressure, and altitude. Emphasis on vertebrates.

449 Marine Ecology (3:3:0) Prerequisite: BIOL 307, 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 and 305, 306, 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 immunosorbent assay, immunodiffusion, protein electrophoresis, and immune fixation.

459 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 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 with emphasis on 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 lab.

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, lipids, enzymes, and metabolism and its control. Chemistry of nitrogen compounds is emphasized.

484 Eukaryotic Cell Biology (3:3:0) Prerequisites: BIOL 311, 483; MATH 110 or 113; or permission of instructor. Structure and function of cell membranes and organelles with regard to cellular transport, sorting, compartmentalization, signaling, motility, and cell division.

485 Eukaryotic Cell Biology Laboratory (1:0:1) Corequisite: BIOL 484, or permission of instructor. Laboratory experiments utilizing 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 required of all biology majors for graduation. 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 6 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 any combination of reading assignments, tutorials, lectures, papers, presentations, or field or lab 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 a written report of research. Research and paper are 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 (3:0:0) Prerequisite: undergraduate course in microbiology, or permission of instructor. In-depth study of nonpathogenic microbial world, emphasizing detection, enumeration, and classification of microorganisms and 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 315. Functional anatomy of mammal brains, 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.

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. Lab emphasizes identification of specimens, and acquaintance with taxonomic literature.

522 Animal Behavior (3:3:0) Prerequisite: permission of instructor. Ecological aspects of animal behavior.

533 Selected Topics in Plant Biology (1-4:1-3:0-6) Prerequisite: BIOL 304, or permission of instructor. Topic depends on instructor’s specialty. May be repeated only with permission of department chair.

534 Advanced Plant Taxonomy (3:1:6) Prerequisite: course in plant taxonomy, or permission of instructor. Laboratories consist of field trips, and collection and identification of specimens.

535 Ancient Plants and their Environment (3:3:0) Prerequisite: BIOL 304, a 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 systematics, evolution, physiology, ecology, and behavior of fish.

537 Ornithology (4:2:6) Prerequisite: course in ecology, or permission of instructor. Study of evolution, systematics, physiology, ecology, and behavior of birds, emphasizing field work.

538 Mammalogy (4:2:6) Prerequisite: course in ecology or permission of instructor. Study of evolution, systematics, physiology, ecology, and behavior of mammals, emphasizing field work.

539 Herpetology (4:2:6) Prerequisite: course in ecology or permission of instructor. Study of evolution, systematics, physiology, ecology, and behavior of amphibians and reptiles, emphasizing field work.

543 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 lab. 

546 Estuarine and Coastal Ecology (4:3:3) Prerequisite: course in ecology, and permission of instructor. Emphasizes marine biology of estuarine and coastal habitats of Chesapeake Bay region, and factors affecting distribution and abundance of organisms. Lab 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. sum

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 lab emphasize data collection and statistical analysis.

553 Advanced Topics in Immunology (3:3:0) Prerequisite: BIOL 452, or permission of instructor. Comprehensive study of immunologic mechanisms as they pertain to immunologic diseases and transplantation.

556 Advanced Topics in Microbial Physiology and Metabolism (3:3:0) Prerequisite: BIOL 305, 306, or permission of instructor. Comprehensive study of microorganisms including growth, nutrition, transport, autotrophic and heterotrophic metabolism, regulation, and differentiation.

559 Fungi and Ecosystems (3:3:0) Prerequisite: BIOL 304 or a course in microbiology, or permission of instructor. Considers impact of fungi on ecosystems in terms of their effects on biogeochemical cycling, primary and secondary production, and regulating community structure and populations of individual species through their activities as symbionts and parasites. Discusses role of fungi in ameliorating pollutants produced by anthropogenic activities.

561 Comparative Animal Physiology (3:3:0) Prerequisite: BIOL 326, or permission of instructor. Detailed study of selected physiological systems of invertebrates and vertebrates, emphasizing current research.

563 Virology (3:3:0) Prerequisite: BIOL 482, or permission of instructor. Fundamental concepts of nature of viruses, virus classification, cultivation, and biochemistry. Bacteriophage and animal viruses emphasized.

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
574 Population Genetics (3:3:0) Prerequisite: 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. Topics include 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 protists) 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 their contributions to global environment. Course emphasizes biogeochemical cycles of natural, disturbed, and managed ecosystems, and their integration at landscape and global level as related to current ecological problems such as transfer of nonpoint source pollutants, atmospheric deposition, stratospheric ozone depletion, and global change.

578 Mutation, DNA Repair, and Environmental Contamination (3:3:0) Prerequisites: BIOL 307 and 311. Overview of relationship between environmental contamination and genetic damage. Course 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. Lectures combined with supervised exercises on mainframe and microcomputers. Students present seminar on advanced application, and supervised exercises on mainframe and microcomputers. May be repeated for credit with permission of department chair.

582 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. Chemistry of nitrogen compounds emphasized.

584 Eukaryotic Cell Biology (3:3:0) Prerequisites: BIOL 311, 483; MATH 110 or 113; or permission of instructor. Structure and function of cell membranes and organelles with regard to cellular transport, sorting and compartmentalization, signaling, motility, and cell division.

585 Eukaryotic Cell Biology Laboratory (1:0:1) Corequisite: BIOL 584, or 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. Some training provided in system of soil classification and current methods used 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. Focus on global-level changes that influence ecology of our planet. Emphasizes links between ecological systems and changes in climate, land use, and element cycling. Topics include responses of forests and 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.

608 Topics in Biology (1-4:1-4:0-9) Prerequisite: employment or anticipated employment as a 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 used to demonstrate microbial degradation, detection of microbes, isolation, and evaluation of their 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 used in animal classification with emphasis on practical application to a lab problem dealing with a particular animal group.

640 Environmental Biology (3:3:0) Prerequisite: course in ecology, or permission of instructor. Patterns of climate and weather, tectonics, soil formation, and surface water and groundwater movements.

643 Microbial Ecology (4:3:3) Prerequisite: course in microbiology, or permission of instructor. Study of relationships between microorganisms and their natural environment, and methodology for observing their natural environment and biochemical activities in that environment.
648 Population Ecology (3:3:0) Prerequisite: course in ecology, or permission of instructor. Survey of ecological models and theory. Topics include population growth and regulation, competition, predator-prey relationships, and models of community structure.

649 Biological Resource Management (3:3:0) Prerequisite: course in ecology, or permission of instructor. Modern ecological theories and methods applied to biological resource management in developing and developed countries. 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 environmental laws such as the National Environmental Policy Act and regulatory issues such as the Clean Water and Clean Air acts. Emphasis on 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 application of probability and statistics to research in life sciences. Examples drawn from environmental, medical, physiological, genetic, and chemical biology.

690 Introduction to Graduate Studies in Biology (2:2:0) Required of all new MS students in biology. f

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 student's 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 lab 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.

745 Environmental Toxicology (3:3:0) Prerequisites: courses in ecology and physiology, or permission of instructor. Study of nature, distribution, and interaction of toxic chemicals released into the environment. Emphasizes effects on nonhuman biota, detection and fate of chemicals, and implications for government regulation.

793 Research in Biology (1-3:0:0) Prerequisites: 8 graduate credits in BIOL, and permission of instructor and chair. Library, lab, or field investigation under supervisor's guidance. May be repeated for a total of 3 credits.

798 Master's Research Project (1-3:0:0) Prerequisites: permission of instructor and department chair. Students who take BIOL 793 may not receive more than 6 credits total for both BIOL 793 and 798. Experimental or theoretical research project chosen and completed under guidance of graduate faculty member. Comprehensive report acceptable to student's advisory committee is required. Graded S/NC.

799 Thesis (1-6:0:0) Prerequisites: 8 graduate credits in BIOL, and permission of instructor and department chair. Students who take BIOL 793 may not receive more than 6 credits total for both BIOL 793 and 799. Thesis research under direction of supervisor. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study in biology. Program of study designed by student's discipline director and approved by student's doctoral committee. Students participate in research of discipline director, and produce paper reporting original contributions of student. Paper is presented in a 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 bioscience management program. Provides fundamental understanding of how microeconomics concepts are usefully applied to managerial decision making. Principles of microeconomic theory are explored fully, 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 bioscience management program. Foundation course focusing on the economics and analysis of business transactions and related financial reporting issues. Topics include an introduction to the accounting framework used in financial reporting, analysis of economic events and their impact on financial reports, analysis of the impact of accounting method choices on financial reports, and financial statement analysis.

623 Marketing Management (3:3:0) Prerequisite: admission to bioscience management program. Develops abilities to make marketing decisions in a wide variety of bioscience organizational and competitive situations. Emphasizes use of technology to aid in analysis, decision making, and communication of decisions to relevant stakeholders. Case studies, team work, and projects.
650 Legal and Ethical Aspects of Bioscience Management (3:3:0) Prerequisite: admission to bioscience management program. Emphasizes development of 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 bioscience management 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 bioscience management program, or permission of instructor. Deals with management of R&D within the corporation and with outside funding agencies. Management of an 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 tradeoffs, budgeting, cost control, and project monitoring. Special emphasis on cost-management aspects of projects in bioscience industries. Use of software and case studies.

720 Analysis of the Bioscience Industries (3:3:0) Prerequisite: admission to bioscience management program, or permission of instructor. Develops knowledge of the status of the 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 bioscience management program, or permission of instructor. Teams undertake a 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 bioscience management program, or permission of instructor. Explores best practices in product development in the life sciences (bioinformatics, bioscience, genomics, biotechnology, and pharmaceutical). Students analyze practices in terms of gaining competitive advantage in an industry where new technologies and economic models for products are constantly being developed. Life science projects and product development efforts categorized and analyzed to develop and maintain the most favorable project or product asset portfolio to successfully carry out business goals and strategies. Analyzes effect of bioscience project investments on the financial worth and performance of an organization, and bioscience industry segments and companies from a perspective of choosing appropriate partnerships.

750 Global Aspects of Bioscience Management (3:3:0) Prerequisite: admission to bioscience management 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. Feature 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, which 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 a research laboratory in biosciences. Students read background material pertinent to problem under study, learn and practice research methods of laboratory, and formulate a short final project, which may be a proposal or an actual project, demonstrating some mastery of techniques and approaches employed.

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 faculty (both internal and external) with graduate student seminars. Presentation at a seminar is a requirement for advancement to candidacy, generally given in last semester before candidacy. Includes a discussion section lead by course coordinator.

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, theory and practice of DNA microarray analysis of
gene expression. Topics may vary from year to year depending on advances in field.

741 Genomics (3:3:0) Prerequisites: at least one undergraduate course in genetics and molecular biology, or permission of instructor. Genetic structure and function at whole genome level. Includes some sequence analysis, comparative genomics, classical genetics, and developmental genetics, as well as an analysis of synteny groups, isochores, gene families, genetic complexity, C value paradox, directed discovery of gene functions, and animal models of human disease. Readings taken from recent texts and primary research literature. Students expected to give one or two oral presentations of primary research papers, as well as completing 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.

744 Molecular Genetics (3:3:0) Prerequisites: undergraduate course work including BIOL 311; CHEM 313, 314, 315, and 318; equivalents; or permission of instructor. Students expected to develop an understanding of principles of modern molecular genetics and methods of investigation of genomes of pro- and eukaryotes, including types of genetic manipulations that are carried out 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.

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 a 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, with emphasis on the 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, competition, and investor protection. 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. 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 the planning and control of organizational activities. Students who have received credit for both ACCT 203 and FNAN 301 cannot also receive credit for MSOM 300.

301 Managing People and Organizations (3:3:0) May not be taken for credit by SOM majors. Introduces key issues in management, organizational behavior, and human resource management. Special attention to best practices used by effective managers. Students cannot receive credit for both MGMT 301 and MSOM 301.

302 Managing Information in a Global Environment (3:3:0) May not be taken for credit by SOM majors. Provides overview of the 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. Students cannot receive credit for both MIS 301 and MSOM 302.

303 Marketing in a Global Economy (3:3:0) May not be taken for credit by SOM majors. 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 the firm’s offerings in a dynamic economic, social, political, and global environment. Students cannot receive credit for both MKTG 301 and MSOM 303.

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. Multi-disciplinary approach to the global economy from the viewpoint of managing international business. Introduces unique aspects of managing in the 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. 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. Students cannot receive credit for both DESC 301 and MSOM 306.

Character Education (EDCE)

Graduate School of Education

600 Philosophical and Theoretical Perspectives on Character Education (3:3:0) Prerequisite: admission to the Character Education Program. Analyzes and evaluates theories and models of character education that fit with different philosophical perspectives on education. Makes comparative analyses related to 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 learning theories to practice to help increase students’ 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 leading to examination of the components of frameworks and the application of framework components 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 a developmental framework and a 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 a 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. Students choose to focus on one of the following for the internship: instructional strategies, curriculum or program development, the use of 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) Fundamental principles of chemistry. Physical and chemical discoveries and properties of matter presented along with their application and impact on our way of life. Topics include atomic and molecular structure, nuclear chemistry, chemistry in Earth and atmosphere. No previous knowledge of chemistry assumed or required. Course not open to students majoring in chemistry. Credit will not be given for this course and CHEM 103.

102 Introduction to Organic and Biological Chemistry (3:3:0) Prerequisite: CHEM 101 or 103 or 211. Structure and properties of major classes of organic compounds with particular reference to organic molecules and their relationships to polymers, both manmade and biopolymers such as carbohydrates, lipids, proteins, and nucleic acids. Primarily intended for those interested in application of principles of organic chemistry and biochemistry to related areas of science such as genetics, microbiology, physiology, and nutrition. 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.

103, 104 Chemical Science in a Modern Society (4:3:3) Terminal course in chemistry for non-science and nursing majors. Principles and application of chemistry. Topics are those described for CHEM 101 and 102, but with lab to enhance scientific experience. Credit will not be given for both this course and for CHEM 211, 212. Not open to students majoring in chemistry.

155, 156 Introduction to Environmental Chemistry I and II (4:3:3) Prerequisite for 156: CHEM 155. Basic chemical principles of Earth’s water, air, and soil systems, presented in the context of understanding environmental issues. Course includes Saturday morning field trips to sites of past and present environmental contamination, alternating with Saturday morning laboratory activities. Credit will not be given for this course and CHEM 103, 104.

201 Introductory Chemistry I (3:3:0) 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. Does not fulfill degree requirements for laboratory science course. Credit will not be given for this course and CHEM 211 or 103.

202 Introductory Chemistry II (3:3:0) Prerequisite: CHEM 201 or CHEM 211. 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 equilibria, chemical thermodynamics, electrochemistry, and nuclear chemistry. Does not fulfill degree requirements for laboratory science course. Credit will not be given for this course and CHEM 212 or 104.

211, 212 General Chemistry (4:3:3), (4:3:3) CHEM 211 is prerequisite to 212. 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. Credit will not be given for this course and CHEM 103, 104.

251 General Chemistry for Engineers (4:3:3) Fundamental principles of chemical structure and reactivity including atomic and molecular structure, chemical bonding, structures of ionic, covalent, and metallic lattices, oxidation-reduction, electrochemistry, chemistry of metals, and introduction to organic chemistry and polymers. Enrollment restricted to students intending to major in engineering. Students who need two semesters of chemistry should enroll in CHEM 211. Credit will not be given for this course and CHEM 211.

300 Chemistry of Semiconductor Processing (3:3:0) Prerequisite: completion of 30 credits or permission of instructor. Chemical aspects of the manufacture of semiconductor devices. Topics include oxidation of silicon, photoreists, plasma etching, removal of metal contaminants by acid etching, and analysis of semiconductor thin films. Cannot be used as a chemistry elective toward BA, BS, or minor in chemistry, and does not fulfill premedical requirements. Does not satisfy the chemistry course requirements for BS in biology.


321 Elementary Quantitative Analysis (4:2:6) Principles of chemical analysis with emphasis on ionic equilibria. Lab consists of gravimetric, volumetric, and instrumental methods illustrating principal types of quantitative determinations.

322 General and Biochemical Equilibrium (2:2:0) Prerequisite: CS 103, 112, or 161. Study of general and biochemical equilibria in gas-phase, ionic, and heterogeneous systems. Topics include gas reactions, polyfunctional acids and bases, complexion 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 and MATH 113. CHEM 333 is prerequisite to CHEM 334. Corequisite or prerequisite: MATH 114. Yearlong survey of principles of physical chemistry with emphasis on their 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. Credit will not be given for both this course and CHEM 331, 332.

336 Physical Chemistry Lab I (2:1:3) Prerequisite or corequisite: CHEM 331. 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. 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, with emphasis on 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 the 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. Introduction to theories of analysis by instrumental methods. Basic electronics applied to chemical measurements. Topics include introduction to theory of spectroscopy—ultraviolet, visible, infrared, and others—and electrochemical methods of analysis; theory of Fourier transform techniques—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 the use of modern analytical instrumentation. Laboratory
463 General Biochemistry I (4:4:0) 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.

464 General Biochemistry II (3:3:0) Prerequisite: CHEM 463. Continuation of general biochemistry, focusing on secondary metabolism, cell signaling, and processes of replication, transcription, and translation. Special emphasis on 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. Techniques to monitor enzyme reactions discussed.

468 Bioorganic Chemistry (3:3:0) Prerequisites: CHEM 464 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.

500 Selected Topics in Modern Chemistry (3:3:0) Topics of interest in analytical, biological, environmental, geological, geochemical, inorganic, organic, and physical chemistry. May be repeated for credit with different topics. Credit not allowed toward major in chemistry.

505 Hazardous Materials Waste Management (1-3: 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 application of this background to new topics emphasizing applications to fused ring aromatics, heterocyclics, natural products, and biologically active compounds. Relationship of applied organic chemistry to consumer products, including drugs and agricultural chemicals, included. 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 (FT-IR, FT-NMR), convolution and correlation spectroscopy, chemical sensors, chromatography, flow injection analysis, ion transport in membrane, and interpretation of analytical signals. Analytical core course.

529 Instrumental Techniques of Analysis (2:0:6) Prerequisites: CHEM 321 and 422 or 521, or permission of department. Principles and operation of modern instrumentation with emphasis on applications to analysis of chemical, biological, and environmental samples. Methods include combined capillary column gas chromatography/mass spectrometry, high-performance liquid chromatography, optical methods, surface analysis methods, magnetic resonance spectroscopy, atomic absorption and emission spectrometry, and electroanalytical methods. Students, with approval of research committee, choose methods studied.

531 Elements of Physical Chemistry (3:3:0) Prerequisite: CHEM 211, 212 (general chemistry), CHEM 313, 314 (organic chemistry), PHYS 243, 245 (college physics), MATH 113 (calculus), 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. Emphasis on 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 313 and 314 or permission of instructor. Current topics in chemistry. Topic depends on specialty of instructor. May be repeated with different topics with approval of department.

**613 Modern Polymer Chemistry (3:3:0)** Prerequisite: CHEM 314 or permission of instructor. Synthetic and analytical chemistry of synthetic macromolecules. Topics include polymer solutions, molecular weight determination, spectroscopy, thermal analysis, x-ray crystallinity, types of polymerization, commercial polymers, 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, the 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 H, D, F, and P nuclear magnetic resonance spectroscopy, infrared spectroscopy, mass spectroscopy, ultraviolet/visible spectroscopy, 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 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 chromatography and high-performance liquid chromatography. Emphasizes theory of reverse-phase, normal-phase, ion-exchange, size-exclusion, and affinity-based separations. Instrumentation such as detectors, pumps, and columns, and data acquisition and analysis are also presented. Analytical core course.

**625 Electroanalytical Chemistry (3:3:0)** Prerequisites: CHEM 321 and 331. Review of basic electrochemistry. Applications of modern electrochemical techniques such as chronoanpamperometry, cyclic voltammetry, pulse polarography, stripping voltammetry, AC voltammetry, coulometry, electrochemical sensors, and instrumentation presented with emphasis on use in analysis and research.

**633/CSI 711 Chemical Thermodynamics and Kinetics (3:3:0)** Prerequisites: CHEM 331 and 332. Advanced study of thermodynamics and kinetics. Covers 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. Application of inorganic coordination chemistry and physical methods in understanding 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.

**663, 664 Biochemistry (3:3:0), (3:3:0)** Prerequisites: CHEM 313 and 314. CHEM 663 is prerequisite to CHEM 664. Important biological compounds, including proteins, carbohydrates, lipids, and nucleic acids, and their interrelations. Previous course in biology recommended but not required. CHEM 663 is the biochemistry core course.

**670 Teaching Practicum (1-2:0:0)** Prerequisites: enrollment in graduate program and demonstrated proficiency in the English language. Lecture and laboratory teaching chemistry in the laboratory. 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 a minimum of 70 percent of departmental seminars in semester preceding each enrollment. Selected topics from recent chemical theory and applications, designed to inform students about current developments in the chemical sciences. Seminar presentation on the student's own research or another topic acceptable to the department required in last semester. Three credits of CHEM 690 are required for MS degree; an additional 3 credits are required after admission to PhD program.

**728/CSI 712 Introduction to Solid Surfaces (3:3:0)** Prerequisite: CHEM 422 or equivalent. Introduction to 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 their surface sensitivities, instrumentation needed, 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/pyroelectric behavior, and non-linear 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 a computational point of view, review of systems with spherically symmetric potentials, electron-atom solutions to Schrödinger’s equation, electron spin in many electron systems, atomic structure calculations, algebra of many electron calculations, Hartree-Fock, self-consistent field method, molecular structure calculations, scattering theory computations, and solid-state computations.

798 Research Project (3-6:0:0) Prerequisite: permission of department. Experimental or theoretical research project chosen and completed under guidance of graduate faculty member. Comprehensive report acceptable to student’s advisory committee and final oral exam on that report are required. Six credits of either CHEM 798 or 799 are required, but credit will not be given for both. 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.

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 the 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. Development of reading proficiency, with emphasis on 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, with emphasis on 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. Introduction to terminology and structure of business Chinese. Emphasis on 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. Introduction of outlines of Chinese literature from beginning to the 19th century, presented through literary sources arranged in roughly chronological order. Readings include poetry, fiction, and personal essays as well as documents of philosophy, history, 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. Development of modern 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. Classical Chinese is the language of the bulk of Chinese textual tradition from early historical and philosophical writings to early 20th century. Introduces basic structures and vocabulary of that language, which still has a large influence on the formal written prose of modern newspapers and documents.

320 Contemporary Chinese Film (3:3:0) Explores contemporary China (1949-present) through cinematic and literary representations. Examines various periods in the latter half of the 20th century with prominent films key to this era. Short literary works serve as background readings and documentaries, and provide basic historical narratives. Class discussions focus on Chinese 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 the instructor. Study of the works of
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354 Chinese (CHIN) • Civil and Infrastructure Engineering (CEIE)

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 Asian American women writers of Chinese, Filipino, Indian, Japanese, and Korean descent. Literary analysis focuses on themes, form, style, language, and structure of a variety of works, mainly novels and short stories. Assesses role and significance of the writings as part of the ethnic American and women’s literature by exploring questions of identity formation and disintegration, and how they are rooted in issues of 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 the instructor. Close readings and discussions of primary texts covering major periods in Chinese poetry to 1949. Literary analysis focuses on 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 the instructor. Close readings and discussions of primary texts after Cultural Revolution. Literary analysis focuses on 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 the instructor. Advanced work in major grammatical and lexical topics of Chinese. Application of theoretical principles on guided written and oral exercises.

481 Fourth-Year Chinese II (3:3:0) Prerequisites: CHIN 300, 301, 480; appropriate placement score or permission of the instructor. Advanced work in major grammatical and lexical topics of Chinese. Application of theoretical principles on guided written and oral exercises.

Civil and Infrastructure Engineering (CEIE)

Civil, Environmental, and Infrastructure Engineering

100 Environmental Engineering around the World (3:3:0) Introduction to environmental engineering as practiced in different societies around the world. Environmental engineering is broadly defined as the organizational and physical infrastructure employed to manage natural resources. Focuses on how different societies respond to environmental challenges, specifically as they relate 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) Prerequisite: civil and infrastructure engineering majors only. Preparation for summer work experience in civil and infrastructure engineering positions with land development, architecture/engineering, and construction firms or government. s

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. sum

199, 299, 399 Industrial Internship I-C, II-C, III-C (1:1:0) Prerequisites: CEIE 198, 298, 398. Evaluation of summer work experience in civil and infrastructure engineering positions with land development, architecture/engineering, and construction firms or government. Written report and presentation are required. f

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. s

290 Engineering Computation and Design (3:2:3) Prerequisite: ENGR 183. Introduction to the civil engineering design process. Methods and technologies for spatial data acquisition and specification are introduced, with special emphasis on land measurements, mapping, and surveying. Processing of field data for incorporation into computer aided design systems; conversion of raw data into finished design documents, including schematic layouts, digital terrain models, preliminary plans, topographic maps, detailed design plans, cut sheets, cross-sections, profiles, etc.; 2D and 3D computer aided design techniques; and application of digital computation are also covered. Design projects are included. f

301 Engineering and Economic Models in Civil Engineering (3:3:0) Prerequisites: STAT 344 and basic spreadsheet knowledge, or permission of instructor. Study of planning, analysis, control, and engineering economic models applied to the life cycle of physical infrastructure. Introduces the infrastructure design process and the application of quantitative and probabilistic models. Presents applications of model building for engineering economics; decision making; forecasting; resource scheduling and allocation; estimating; work measurement and materials; and quality and process control in water, transportation, environmental, energy, and telecommunications infrastructure systems and the built environment. f

305 Soil Mechanics (3:3:0) Prerequisite: ENGR 210. Formulation and engineering characteristics of soils. Strength and deformation characteristics of soils, consolidation and bearing capacities, and corrective measures are also covered. Foundation design fundamentals are introduced. s

340 Water Resource Engineering (3:2:3) Prerequisite: CEIE 230. Introduction to principles and practice of water resources engineering. Analytic methods and computer models for the design and evaluation of water resource projects such as flood control and river basin development. Topics include hydrology; governing principles, common models, and typical applications for water resource systems; and design of storm water management systems, and sanitary sewers. Laboratory and field work required on selected topics. f

360 Introduction to Transportation Engineering (3:2:3) Prerequisites: ENGR 210, ENGL 302, and CEIE 290. Introduction to transportation systems and the factors that influence their planning, design, and operation. Topics include fundamentals of urban travel, travel demand forecasting, and traffic flow; principles of highway design; highway capacity and level of services; introduction to traffic control; traffic signal control systems; intersection design; speed zoning and control; and an introduction to Intelligent Transportation Systems and travel demand management. Laboratory and field work are required on selected topics. Fulfills writing-intensive requirement for the civil and infrastructure engineering major. s

367 Behavior of Concrete and Steel Structures (3:3:0) Prerequisite: CEIE 311. Structural design process. Analysis and design of simple structural members, including tension members, beams, and columns. Analysis and design of bolted and welded connections in steel structures. Concrete and its structural characteristics. Analysis and design of simple reinforced concrete members, including beams and columns. Use of computer programs for the analysis, design, and optimization of 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 the site plan development, and approval process. Examines structure, function, and purpose of urban design systems and ways in which urban systems design can be achieved. Physical relationships between development, land use, transportation, energy, communications, and water systems are discussed. Students study the public- and private-sector urban development industry, including terminology, analytical techniques, evaluation techniques, and information sources at each phase. Other topics include issues and challenges associated with innovation and competition, new technology, and environmental issues in land use. Design projects are required. f

411 Introduction to Design and Inventive Engineering (3:3:0) Basic outline of the design and inventive engineering process and its major stages. Conceptual versus detailed design. Design theories, including the axiomatic design theory and the inferential design theory. Proactive design: its basic assumptions and industrial applications. Evaluation in design, including the multi-attribute utility models. Network computing in design. Inventive problem solving methods, including brainstorming, Synectics, TRIZ, and morphological analysis. Computer tools to support design creativity. Collaborative design: fundamentals and group projects dealing with the actual civil engineering problems provided by industry. f

440 Water Supply and Distribution (3:2:3) Prerequisite: CEIE 230. Introduction to the 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, flow distribution, pumps, valves, and storage; environmental impact assessments; and federal, state, and local government laws and regulations related to public water systems. Laboratory and field work are required on selected topics. f

450 Environmental Engineering Systems (3:3:0) Prerequisite: CEIE 445. Credit is not given for both CEIE 450 and 550. Introduction to systems analysis in environmental engineering. Applications of linear and dynamic programming, computer modeling, and other systems analysis methodologies to the solution of environmental engineering problems related to air, soil, and water pollution are presented. Experimental design approaches for the characterization of environmental sites are reviewed. s

452 Wastewater Management (3:3:0) Prerequisite: CEIE 455. Credit is not given for both CEIE 452 and 552. Exploration of the design fundamentals for the treatment of wastewater. Topics include environmental regulations pertaining to wastewater; wastewater characterization; pretreatment systems; biological, physical, and chemical treatment of wastewater; treatment and disposal of wastewater sludge; financing; and management. Tangible and intangible consequences of environmental policies; environmental impact assessments; and federal, state, and local government laws and regulations related to wastewater collection, treatment, and disposal are also covered. s, even years

455 Introduction to Environmental Engineering (3:3:0) Prerequisite: 3 credits of chemistry. Credit is not given for both CEIE 453 and 555. Introduction to the 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 (NEPA), Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 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. Analysis of public transportation systems in terms of their role in urban transportation. Topics covered include the history of public transportation in the United States, quantitative performance attributes of different modes, analytical techniques for planning and operation, and management and administrative concepts.

461 Traffic Engineering (3:3:0) Prerequisite: CEIE 360 or 365. Credit is not given for both CEIE 461 and 561. Elements of traffic engineering analysis; system components of traffic operations: the driver, vehicle, and roadway: trip and travel concepts; traffic flow: volume, density, and speed; intersection design elements including traffic control device warrants, signal timing, delay, capacity, and accident countermeasures; and terminal design elements including inflow, outflow, and circulation.

462 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 360 or 365. Credit is not given for both CEIE 462 and 562. Technical and qualitative aspects of the urban transportation planning process. Topics include urban travel characteristics and data collection methods; the 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 the urban construction industry, including its 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; legal theories and relationships between parties in the construction process, including the role of the design professional and manager. Value engineering is introduced.

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 considerations, regulatory considerations, sectioning, grading, and siting. Students focus on teamwork, interdisciplinary interaction, and tradeoff decision making. A design team analyzes all aspects of a major urban project, develops solutions to design problems, and produces a project report and oral presentation. Design effort is completed and a report is prepared, presented, and evaluated. Primary course goal is to produce a design for a contemporary civil infrastructure project.

498 Independent Study in Civil Engineering (1-3:0:0) Prerequisite: 60 credits; must be arranged with an instructor and approved by department chair before registering. Directed self-study of special topics of current interest in CEIE. May be repeated for a maximum of six credits if the 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 a maximum of six credits if the topics are substantially different.

500 Land Development Engineering (3:3:0) Prerequisite: graduate standing in CEIE. Credit is not given for both CEIE 490 and 500. Quantitative and qualitative analysis in planning, design, construction, and management of engineering systems and facilities. Introduces the policies, programs, and regulations that influence land development, history-enabling legislation, governing and regulating bodies, control of the site plan development, and approval process. Examines the structure, function, and purpose of infrastructure systems and ways in which infrastructure systems design can be achieved.

510 Geographic Information Systems in Engineering (3:2:3) Prerequisite: CS 112, CEIE 360; corequisite: CEIE 455. Credit is not given for both CEIE 410 and 510. Introduction to geographic information systems (GIS) and their application in environmental, transportation, land use planning, and other engineering-related decision situations. Introduction to methods and technologies for spatial data acquisition, specification, storage, manipulation, query, thematic analysis, presentation, and application in the design process. Introduction to relationships/integration of GIS with computer aided design (CAD) and the global positioning system (GPS) Hands-on projects.


516 Engineering Law and Ethics (3:3:0) Prerequisite: CEIE 400. Overview of the body of law surrounding design, construction, and facilities maintenance and operations. Tort law and its relationship to design and construction contracting are introduced. Contract form, general and special conditions, ethics, contract administration, claims, dispute resolution, arbitration, and the appeals process are studied through case studies.

530 Water Resource Systems Analysis (3:3:0) Prerequisite: CEIE 601 or equivalent. Introduction to the concepts, applications, and tools of systems analysis for the problems of water resources planning, management, and design. Problems including river basin planning, real-time hydrologic operations, water quality management, capacity expansion, urban drainage network design, and sanitary sewer design are used to illustrate the applications of systems analysis. Tools include optimization and simulation modeling, and knowledge-based systems. f, odd years

550 Environmental Engineering Systems (3:3:0) Prerequisite: CEIE 455. Credit is not given for both CEIE 450 and 550. Introduction to systems analysis in environmental engineering. Applications of linear and dynamic programming, computer modeling, and other systems analysis methodologies to the solution of environmental engineering problems related to air, soil, and water pollution are presented. Reviews experimental design approaches for the characterization of environmental sites. s, odd years

552 Wastewater Engineering (3:3:0) Prerequisite: CEIE 453 or 553. Credit is not given for both CEIE 452 and 552. Exploration of design fundamentals for treatment of wastewater. Topics include environmental regulations pertaining to wastewater; wastewater characterization; pretreatment
systems; biological, physical, and chemical treatment of wastewater; treatment and disposal of wastewater sludge; financing; and management. Tangible consequences of environmental policies; environmental impact assessments; and federal, state, and local government laws and regulations related to wastewater collection, treatment, and disposal are also included. s, even years

555 Introduction to Environmental Engineering (3:3:0) Credit is not given for both CEIE 455 and 555. Introduction to the principles of environmental engineering management and design pertaining to water supply and treatment, wastewater treatment, solid waste management, air pollution control, noise pollution measurement and control, and environmental impact assessment. f

556 Environmental Law (3:3:0) Formerly USE 650. 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 (NEPA), Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and other environmentally related legislation. Also reviews laws for allocation of surface and groundwater supplies and reviews environmental law databases. s

560 Public Transportation Systems (3:3:0) Prerequisite: CEIE 360. Credit is not given for both CEIE 460 and 560. Analysis of public transportation systems in terms of their role in urban transportation. Topics covered include the 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

561 Traffic Engineering (3:3:0) Prerequisite: CEIE 360 or 365 or equivalent. Credit is not given for both CEIE 461 and 561. Covers elements of traffic engineering analysis; system components of traffic operations: the driver, vehicle, and roadway; traffic flow design elements including volume, density, and speed; intersection design elements including traffic control device warrants, signal timing, delay, capacity, and accident countermeasures; and terminal design elements including inflow, outflow, and circulation. f

562 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 360 or 365 or equivalent. Credit is not given for both CEIE 462 and 562. Covers technical and qualitative aspects of the urban transportation planning process. Topics include urban travel characteristics and data collection methods; the 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. s

565 Design of Transport Systems (3:3:0) Prerequisite: CEIE 360. Design of streets and highway facilities emphasizing interaction among driver, vehicle, and geometric design elements. Design of interchanges and intersections; highway roadside safety and tort liability; pavement design, maintenance and safety; edge dropoff; clear zone concept; roadside barriers; guidetral 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 (roads, sewers, water distribution and other pipelines, telecommunications, and energy distribution systems). Includes study of relationship of urban growth and infrastructure reinvestment; mechanisms of deterioration; direct and indirect methods of assessment and degradation models; capital finance, budgeting, and programming; planning integration and coordination; quantitative applications in planning; uncertainty and reliability; public-private partnerships; operation and maintenance strategies; and future issues.

601 Infrastructure Modeling (3:3:0) Prerequisite: CEIE 605. Concepts of modeling for infrastructure engineering. Covers modeling, simulation, optimization, deterministic and stochastic models, and limitations of modeling approaches. Also included are multiple objective, multiple decision maker problems, and case studies in areas such as transportation, water resources, the environment, energy, telecommunications, and construction. s

605 Infrastructure Systems Analysis (3:3:0) Prerequisite: STAT 344. Probability and statistics topics for analysis of infrastructure systems; Bayesian decision theory, decision trees; Monte Carlo analysis and stochastic models. Economic analysis of infrastructure projects and systems, including life-cycle costing concepts, utility theory, and multiattribute utility analysis. Optimization concepts and methods. f

610 Construction Systems and Management (3:3:0) Prerequisite: permission of instructor. Study of applications of construction management concepts and techniques to the production of the constructed system. Construction industry and environment are explored through study of the project cycle design and construction phases with emphasis on estimating, planning, scheduling, and controlling labor, money, materials, machines, time, and information. Popular scheduling software is used with class projects and a case study.

632 Groundwater Systems Modeling (3:3:0) Prerequisite: CEIE 601. Introduction to groundwater hydrology and modeling, including quantity and quality aspects. Topics include characterization of the subsurface regime; well hydraulics; consideration of two-dimensional steady and unsteady state flows; exploration of the range of modeling approaches; simulation and optimization modeling; contaminant transport; parameter estimation; and design of systems to control groundwater quantity and quality. f, even years

660 Urban Transportation Planning (3:3:0) Prerequisite: CEIE 601. Quantitative and qualitative techniques in urban transportation planning. Topics include different levels of urban transportation planning; the technical transportation planning process, including travel demand estimation, establishment of transportation strategies, and utility analysis; and activity center planning including onsite vehicle and pedestrian circulation, transportation interface, environmental planning, and planning administration.
663 Intelligent Transportation Systems (3:3:0) Prerequisite: CEIE 561 or 562. Advanced transportation system operations and safety through the use of wireless and wireline communications; integrated transportation systems; in-vehicle technologies; industry standards; and systems architecture. Provides skills to apply advanced technologies to transportation systems to improve operational and safety performance. Provides nontraditional tools to address issues of congestion and improved safety performance.

670 Civil Engineering Decision Methods and Tools (3:3:0) Prerequisite: CEIE 605. Principles of decision making and knowledge acquisition in the context of building knowledge-based decision support tools for civil, environmental, and infrastructure engineering. Includes solving complex problems from several areas of urban systems engineering, including construction, environmental, and transportation engineering; and using various decision support tools based on the Bayesian decision theory and on the principles of artificial intelligence, including knowledge-based systems and learning systems. Even years.

671 Best Engineering Management Practices (3:3:0) Prerequisite: graduate standing. Covers strategies for identification and implementation of best management practices. Addresses development of performance standards. Introduction to quality improvement methods and standards, including Quality Functional Development (QFD), ISO 9000, the Baldridge Excellence Award, and the Six Sigma method will be presented. Relevant national standards, “engineered” standards, statistical norms, rules of thumb, selected statistics from comparative projects, excerpts from performance records, and performance targets will be presented. Case studies relating to management of infrastructure projects will be covered. Includes introduction to benchmarking methods. Addresses criteria for selection of a 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 in the management of 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 the 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, including evolutionary and co-evolutionary approaches; 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 historical and future concepts of security of infrastructure systems; identifies actors and their interactions in the organizational infrastructure, and threats—biological, chemical, physical, human—to water and wastewater infrastructure; describes behavior of the physical infrastructure under stress (threat, attack, recovery), and the behavior of the organizational infrastructure under stress; examines history of threats or attacks against water and wastewater systems, and evolution of design, operations, and maintenance paradigms in response to changes in threats. Covers proactive responses to security threats through the use of vulnerability assessments, and models of the organizational and physical infrastructure system.

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 (aviation, highway, mass transit, rail systems, ports, and container freight transportation), and the technologies for prediction and management for minimizing damage and disruptions caused by potential threats to security and safety, including natural and technological disasters and terrorist threats. Includes asset management, methodologies for assessing safety and security vulnerabilities, potential impact of damage and disruption, application of state-of-the-art technologies and R&D processes for harnessing best analysis methods, and technologies for hardening transportation infrastructure systems. Technology application components include 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 the process of making intelligent choices for implementing technology advances to transportation security and safety.

685 Civil Engineering Information Management (3:3:0) Advanced course in information resources management as applied to civil, environmental, and infrastructure engineering problems and microcomputer data management. Covers all phases of information management life cycle from the conceptual design and data collection phases through systems development, archiving and disposal. Software engineering (structured analysis, rapid prototyping, object-oriented analysis) as applied to urban systems infrastructure problem solving is covered. Reviews civil engineering applications of 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 structure (transportation, water resources, environment, facilities). Includes the design and development of a system for an engineering application.

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 a change in topic.

762 Transportation System Planning Models (3:3:0) Prerequisite: CEIE 562 or 660; CEIE 601. 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; model estimation and aggregation.

767 Traffic Engineering Modeling and Analysis (3:3:0)  
Prerequisites: CEIE 561, 601. Basic principles of simulation; queuing theory; traffic signal operations at individual intersections, arterials and networks; application of models related to traffic signalization, optimization and traffic simulation; development of skills to be able to select the most appropriate model for a given scenario.

795 Civil and Infrastructure Engineering Seminar (0:1:0)  
Prerequisite: graduate standing. Presentations on current topics and research in civil, environmental, and infrastructure engineering, by invited speakers, faculty, and CEIE graduate students. Partial fulfillment of the MS in civil and infrastructure engineering seminar requirement, and required for master's candidates during the semester in which they complete research project or thesis.

796 Directed Reading (1-3:0:0)  
Prerequisites: graduate standing and permission of instructor. Reading on a specific topic in civil, environmental, and infrastructure engineering under direction of faculty member. May be repeated with change in topic.

798 Research Project in Civil Engineering (3:0:0)  
Prerequisite: permission of instructor; corequisite: CEIE 795. 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.

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 of classical Greek. Basic structure and vocabulary, its place among other world languages, and its unique role in the development of modern thought. Lecture, discussions supplemented by over-the-web instructional module.

160 Readings in Classical Greek (3:3:0)  
Prerequisites: CLAS 150. Expands proficiency in classical Greek, refines grasp of morphology and syntax, and fosters a 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 students' word power in English (vocabulary, style). Special emphasis on bioscientific, medical, and legal terminology. Intended for both native and non-native speakers of English. Word analyses and vocabulary uses illustrated by literary texts.

250 Classical Mythology (3:3:0)  
Prerequisite: ENGL 101 or equivalent, or permission of instructor. Classical myths with illustration of their role 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. Introduction to 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 a genre from its beginnings with Homer to its 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 the 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 the Greco-Roman world. Traces development of New Comedy in the Hellenistic age and the translation and adaptation of New Comedy by the 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 their influences on post-classical and modern literature. Special emphasis to 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 a 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 with 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)

School of Computational Sciences

710 Introduction to Physical Climate System (3:3:0)
Prerequisites: BS or MS in mathematics or a physical science, or permission of instructor. Provides modern understanding of the system of ocean, atmosphere, and land based on fundamental physical laws. Describes current climate and physical processes by which climate is maintained. Covers theoretical models of general circulation of atmosphere, including time mean and transient behavior. Describes basics of ocean circulation and interactions between ocean and atmosphere. Reviews role of stratosphere and its interactions with troposphere, and role of land processes in modulating climate, and gives brief review of past climate change.

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 the 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. Introduction to climatology and dynamics of oceans. Covers the nature of seawater, heat, and salt budgets; general circulation of the ocean, including the Gulf Stream and thermohaline circulations; 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 a 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 associated applications in weather, climate, and hydrologic forecasting and simulation. Includes hands-on experience with land surface models in computer laboratory, including sensitivity experiments that provide practical understanding to reinforce theoretical concepts. Exposure to contemporary research through reading and reviewing seminal journal papers.

715 Numerical Methods for Climate Modeling (3:3:0) Prerequisites: CLIM 712 or 711 or equivalent, or permission of instructor. Foundation and theory of computational methods for atmosphere and ocean modeling, with special emphasis on finite-difference and spectral methods. Topics include accuracy, consistency, convergence and stability; time stepping schemes; nonlinear computational stability; energy and enstrophy conserving schemes for momentum equations; staggered and curvilinear grids; alternate vertical coordinate systems; implicit and split-explicit barotropic mode solution; pressure gradient errors and vorticity constraints; spectral methods for atmospheric models; treatment of model physics.

750 Geophysical Fluid Dynamics (3:3:0) Prerequisite: CLIM 711 or permission of instructor. Introduction to 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) Prerequisite: 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. Theory of the large-scale circulation of the world’s oceans. Covers Sverdrup theory for large-scale horizontal circulation, role of friction, and nonlinearity; western boundary layer dynamics; quasigeostrophic theory for stratified flow, geostrophic contours, and potential vorticity homogenization; theory of the ventilated thermocline; abyssal circulation.

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.

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 as needed; however, 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. Involves doctoral dissertation research under direction of dissertation director. May be repeated as needed; however, no more than 24 credits total in CLIM 998 and 999 may be applied to doctoral degree requirements.
College of Arts and Sciences (CAS)

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.

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 most fascinate and frighten us. Instructors from disciplines across the arts and sciences bring their 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, overall GPA of 3.00 or higher with a GPA of 3.50 or higher in the student’s major. Experiential learning course in the teaching of writing across disciplines. Students receive Writing Center training in theory and techniques of tutoring writing, and work a minimum of three hours per week in the 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 a final paper. May be repeated up to three times. Student must submit two faculty recommendations and a sample of recent academic writing, and complete an interview with the director of the Writing Center.

395 Technology Apprenticeship (3:1:0) Prerequisites: 30 credits; GPA of 2.50 or higher; ability to use Internet browser; and keyboarding, data entry, and word-processing skills. Experiential learning course in using technology in instruction. Students receive up to 45 hours of instruction and work 90 hours with faculty members, assisting them with a technology project. Students submit faculty recommendation and application to technology apprenticeship coordinator. May be repeated once for credit.

485 International Internship (3:9-0:0) Prerequisites: 60 credits, 2.50 GPA; successful completion of application and selection process. Students should contact faculty director one semester prior to semester of enrollment. Students work at overseas locations under faculty director and site supervisor. Predeparture orientation; minimum 45 hours of work for each credit (in 3, 6, and 9 credit increments); and written assignments as specified in a 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 students to scholarship in action in their 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 a review of its history, purpose, clientele, organization, finance, and social function. Attention to 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. Overview of and hands-on experience with technology tools to enhance classroom and online learning. Examines issues related to the use of technology in teaching and learning, and guides in development of 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. Focus 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 students to design, implement, and assess new courses, curricula, and programs. Examines relationships of courses and curricula to larger programs and institutional goals. Explores issues of 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 their 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. Study of 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 different levels of assessment, including classroom, program and institutional. Students develop skills in survey and focus group research,
and learn how to develop and implement an assessment plan.

**641 Introduction to Counseling (3:3:0)** Introduces profession of counseling and practice in various settings. Examines history and development of the profession, national associations, ethical code, and standards for counselor preparation and credentials, as well as counselor 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 used in their operation.

**645 The Contemporary College Student (3:3:0)** Provides understanding of the 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 current issues related to technology and impact on college students.

**792 Special Topics in Higher Education (1-6:1-6:0)** Prerequisite: admission to doctoral program or permission of instructor. Covers a variety of 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)** Prerequisites: admission to the 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 in the knowledge area. Students must contact the program at least one semester prior to enrollment. Supervised internship at a community college or in a nonteaching higher education setting such as a government agency or administrative office in higher education. 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: CTCH 998, two internships, and appointed dissertation committee: Doctoral dissertation research and writing under direction of dissertation committee. Graded S/NC.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>101</td>
<td>Interpersonal and Group Interaction (3:3:0)</td>
<td>Prerequisite: COMM 101 or equivalent course.</td>
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<tr>
<td>150</td>
<td>Communication Skills for International Students (3:3:0)</td>
<td>Prerequisite: international student in first year of study in the United States, or permission of instructor.</td>
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<tr>
<td>200</td>
<td>Small Group Communication (3:3:0)</td>
<td>Prerequisite: COMM 101 or equivalent course.</td>
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<tr>
<td>201</td>
<td>Mass Media and Communication Systems (3:3:0)</td>
<td>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.</td>
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303 Writing across the Media (3:3:0) Prerequisites: 30 credits and ENGL 302. Introductory course focusing on writing for newspaper stories (hard news and feature), press releases, computer-assisted reporting, writing for broadcast, and advertising. Lab work required. Prerequisite for all communication media writing courses.

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. Basic principles of intercultural communication applied to analysis of 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 centered on one to three weeks of travel in a foreign environment involving another country or a relevant subcultural group in the United States. Students must complete readings relevant to communication in the host society, laboratory assignments that require the student to make observations about intercultural communication, and a personal learning paper in which the student integrates learning from observation and interactions during the travel. Seminar sessions and lectures. Intercultural communication concepts and principles are used to analyze the students’ 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 development of 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 a communication perspective with emphasis on political leadership, pressures for social and political change, and transformations in the communicative environment.

330 Principles of Public Relations (3:3:0) Prerequisites: 3 COMM credits and 60 credits, or permission of instructor. Survey of nature, history, scope, and practice of public relations in business, trade associations, nonprofit organizations, educational and government institutions. Principles and 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 of analysis of 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 of analysis of communication within organizations. Emphasizes processes and structures, 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: 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 a student organization setting.

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 reporting. Numerous in-class and out-of-class writing assignments train students in the 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. Introduction to working on news copy desks.


354 Radio Production (3:1:4) Prerequisite: COMM 302 or permission of instructor. Theory and practice of operational radio broadcasting. Topics include programming, production, and promotion aspects of commercial and non-commercial radio.

355 Video I: Principles and Practices (3:3:2) Basic video production techniques. Emphasis on camera, audio, lighting, and editing. Lab work required. Prerequisite for all Video II level courses.

356 Video: Performance and Writing (3:3:0) Focus on writing for video, performance skills for on-air work, and interviewing.

358 Video II: Producing and Directing (3:2:4) Prerequisite: COMM 355 or portfolio assessment. Introduction to techniques, theory, and practices in producing, directing, and distributing video productions.

359 Media Management (3:3:0) Principles and practices of the management of media from general management 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 (both analog and digital), and visual communication theories that underlie video editing.

361 Advanced News Writing and Research: Electronic 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) Development of argumentative skills while examining contemporary public policy. Several methods of argumentative analysis applied to design and 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. Introduction to concepts of power and influence of mass media. Allows students to see themselves as products, as well as 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 that includes viewing of video modules, and using electronically mediated discussion.

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, materials for broadcasting, speeches, brochures, journals and advertisements. Includes writing styles, formats, organization, and writing research.

399 Special Topics in Communication (1-3:3:0) Prerequisite: permission of instructor. Topics vary; some require laboratories. May be repeated.

400 Research Methods in Communication (3:3:0) Prerequisites: COMM 250 and at least two of COMM 300, 301, 302 or 305. Exploring 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 the dynamics of interpersonal relationships in the workplace. Emphasizes individual motivation, interpersonal needs, communication styles in the workplace, 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. Responsibilities and freedoms of mass media in a democracy. Influence of media on citizens' opinions, elections, and decisions of public officials.

420 Senior Seminar in Theories of Communicative Interaction (3:3:0) Prerequisite: minimum satisfactory grade in COMM 250, 300, 301, and 302. Primary theories explaining human communicative behavior: traditional rhetorical, contemporary social science, critical, and mass communication theories.

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 theories; 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 functions to shape the development of “political reality.” Interactions between media and politics examined 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. 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 the future. Students contract for course assignments within course categories.

450 Internship in Communication (3:1:0) Prerequisite: 75 credits, major or minor in communication (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 the 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 creation of in-house productions for departments; and working as a cable caster for Master Control operations on campus.

454 Free Speech and Ethics (3:3:0) Prerequisite: 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 a free society.

455/HIST 455 History of Print Journalism (3:3:0) Prerequisite: 3 credits in COMM or HIST courses. Development of print journalism, with emphasis on interaction of technology, audience, and government intervention. Topics include birth of the press, development of the modern newspaper, and American development including Revolutionary and Civil wars, rise of the 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 the American system. Focuses on broad dimensions of international mass media, and describes the issues facing global journalism and media systems. Provides substantive framework for critical evaluation of various national media systems.

465 Topics in Communication and Gender (3:3:0) Explores selected topics involving gender and communication. Topics may include gender and culture, women as rhetors, male/female communication, and communication and gender roles. Specific interests examined, ideally in a seminar setting. Course may be repeated with approval of department.

475 Journalism Law (3:3:0) Prerequisite: 60 credits or permission of instructor. Law as it relates to the working journalist. Topics include libel, invasion of privacy, free press and fair trial, First Amendment, broadcast regulation, access to media, advertising, and the effect of new technologies on these issues. Extensive use of “case approach” involving the study of 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) Theoretical introduction and experiential learning in role of communication in conflict management. 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) Analysis of communication variables as they relate to organizational and managerial functions within 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) Comprehensive examination of 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. Examination of current research. Focus on learning applications of theories to relevant settings.

542 Directing Debate Activities (3:3:0) Theory and practice of competitive debate. Emphasis on traditional and contemporary theories of debate, administrative activities related to the direction of a debate program, and methods of instruction in debate, including analysis of current debate topic. Designed for novice and experienced debate coaches.

551 Developing Students’ Speaking and Listening Skills (3:3:0) Emphasis on development of assignments that develop communication competence in children and adolescents. Covers five functions of communication and their development in the context of integrating basic skills at the elementary level and direct teaching at the 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 communication. Specific content varies. May be repeated for credit.

601 Communication in Professional Relationships (3:3:0) Theoretical perspectives and relevant research related to communication strategies and skills useful in various professional roles and situations. Relates theoretical foundations to practice, allowing students to assess theories of communication and applications in individual professional fields.

602 Theories and Research of Mass Communication (3:3:0) Theories of mass communication that have guided development of mass media. Emphasizes major scientific and humanistic approaches to question of mass media effects.

604 Communication Research Practicum (3:3:0) Prerequisite: COMM 654 or permission of instructor. Helps students in the communication master’s program determine focus for program of study, thesis, and master’s projects. Readings in applied communication research. Exercises in topic selection and analysis.

605 Intercultural Communication (3:3:0) Analysis of communication variables as they relate to communication across cultures. Topics include nonverbal communication, time conceptualizations, perceptions and attitudes, values, social organization patterns, cultural norms, language, ethics, conflict across cultures, and research in intercultural communication.

620 Health Communication (3:3:0) Examines interpersonal communicative processes associated with health in consumer-provider, family, and health communication campaign contexts. Particular attention to understanding cultural differences in perceptions of and communication about health and disease.

621 Media Advocacy for Nonprofit Organizations (3:3:0) Drawing from scholarship in media studies, critical theory, and public health campaign literature, provides graduate-level introduction to media advocacy strategies for nonprofit organizations with limited financial resources.

631 Approaches to Group Facilitation (3:3:0) Introduction to 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. Analysis of contemporary theories, concepts, and approaches to the improvement of interpersonal communication. Extensive examination of interpersonal communication research.

635 Organizational Communication (3:3:0) Analysis of communication systems and 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 for the organization.

636 Communication Consulting (3:3:0) Investigation of 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, biohazards. Topics include communication concerning workplace safety, environmental problems, risk assessments, and scientific uncertainties.

650 Research Methodologies in Communication (3:3:0) Prerequisite: graduate standing. Introduces various research methods used by communication professionals. Focus is to achieve an understanding and knowledge of social scientific research (both 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. Nonverbal aspects of space, time, action, and form considered 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 Teaching the College Communication Course (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 the various telecommunication 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 telecommunication 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. Perspectives developed as to worldwide social, political, educational, and economic development.

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. Paper, journal are required, as well as minimum 60 hours work for each credit of enrollment normally, students enroll in internships at the end of their program of study.

696 Directed Readings and Research (1-3:0:0)
Prerequisite: permission of department. Reading and research on a 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. Completed production required; written report, oral exam may be required. May be repeated for maximum 6 credits.

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 Seminar in Communication Skills for Teaching (3:3:0)
Prerequisite: admission to doctoral program or permission of instructor. Study of principles and practices underlying effective lecturing and leading instructional discussion. Application to student’s field of study encouraged to establish teaching environment.

Comparative Literature (CL)

300 Introduction to Comparative Literature (3:3:0)
Prerequisite: 60 credits. Introduction to methods of comparative literature through study, in translation, of a selected theme or motif as it appears in various periods, genres, or national literatures. Readings drawn chiefly 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 the foreign language of their concentration; other texts studied in translation.

Computational Sciences and Informatics (CSI)

School of Computational 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. Introduction to 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. Introduction to 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. Introduction to 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. Introduction to 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.
661/ASTR 530 Astrophysics (3:3:0) Prerequisites: PHYS 303, 305, 308; MATH 214. Survey of contemporary astrophysics. Topics include physical concepts, stellar spectra, accretion disk formation, and shock formation.

660/ASTR 535 Space Instrumentation and Exploration (3:3:0) Prerequisites: PHYS 262, MATH 213, or equivalent; or permission of instructor. Surveys instruments, detection methods, and methods used 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.

659 Dispersal Methods of Hazardous Releases (3:3:0) Prerequisites: CSI 655, or permission of instructor. Covers physics of aerosols; engineering and 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 the atmosphere, and related atmospheric systems affecting dispersal of biological agents.

658/STAT 655 Time Series Analysis and Forecasting (3:3:0) Prerequisites: STAT 544 or permission of instructor. Covers critical aspects of stationary and nonstationary 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.

657/STAT 658 Statistical Inference (3:3:0) Prerequisites: PHYS 305 and 266. Introduction to basic physical and chemical processes that operate in Earth’s atmosphere. Emphasizes concepts that provide global description of the 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.

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. Illustrative examples are used from the physical sciences, including astronomy and space sciences; Earth sciences; Earth observing and other fields of physics; as well as model output data and associated special issues. Provides introduction to mathematical techniques particularly important for large databases.

653 Fundamentals of Materials Science (3:3:0) Prerequisite: undergraduate degree in physics, chemistry, materials, electrical or mechanical engineering, or related fields.

652 Global Ecology (3:3:0) Prerequisites: general chemistry, general physics, introductory statistics, and calculus. Intensive review of ecology necessary to begin research in global change. Covers basic principles of physiological ecology, population dynamics, dynamics of ecological communities and ecosystems, biogeography, biological diversity, and dynamics of biosphere, including effects of life on atmosphere, oceans, and solid surfaces.

639 Ethics in Scientific Research (3:3:0) Begins with reflection on purpose of scientific research and review of foundational principles used for evaluating ethical issues. Teaches skills for survival in scientific research through training in moral reasoning and teaching of responsible conduct. Discusses current ethical issues and application of critical-thinking skills to design, execution, and analysis of experiments. Issues include using animals and humans in research; ethical standards in the computer community; research fraud; and currently accepted guidelines for data ownership, manuscript preparation, and conduct of those in authority.
687/PHYS 512 Solid State Physics and Applications (3:3:0) Prerequisite: PHYS 502 or equivalent. Covers crystal structures, binding, lattice vibrations, free electron model, metals, semiconductors and semiconductor devices, superconductivity, and magnetism.

700/MATH 685 Numerical Methods (3:3:0) Prerequisites: MATH 214, 203, and some programming experience. Covers computational techniques to solve problems in science and engineering. Algorithms are developed for the treatment of typical problems in applications, with special emphasis on the types of data encountered in practice. Course covers theoretical development as well as implementation, efficiency, and accuracy issues in using algorithms and interpreting the results. When applicable, computer graphical techniques are used to enhance interpretation.

701 Foundations of Computational Science (3:3:0) Prerequisites: competency in UNIX and programming at CSI 601-604 level, CSI 700, or permission of instructor. Covers mapping of mathematical models to computer software, including all aspects of the development of 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 the software to address important scientific questions, and conducting computational experiments with it.

702 High-Performance Computing (3:3:0) Prerequisites: CSI 700 and CSI 701, or permission of instructor. Hardware and software associated with high-performance scientific computing. Computer architectures, processor design, programming paradigms, parallel and vector algorithms. Emphasizes importance of software scalability in science problems.

703 Scientific and Statistical Visualization (3:3:0) Prerequisite: STAT 354 or CSI 652, or permission of instructor. Covers visualization methods used to provide new insights and intuition concerning measurements of natural phenomena and computational 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. Students are required to work on a visualization project. Software tools on the Silicon Graphics workstation are emphasized, but other workstations and software may be used.

709 Topics in Computational Sciences and Informatics (3:3:0) Prerequisites: admission to PhD program and permission of instructor. Covers selected topics in computational sciences and informatics not covered in fixed-content computational sciences and informatics courses. May be repeated for credit as needed.

710 Scientific Databases (3:3:0) Prerequisite: INFS 614 or equivalent, or permission of instructor. Study of database support for scientific data management. Covers requirements and properties of scientific databases, data models for statistical and scientific databases, semantic and object-oriented modeling of application domains, statistical database query languages and query optimization, advanced logic query languages, and case studies such as the human genome project and Earth-orbiting satellites.

711/CHM 633 Chemical Thermodynamics and Kinetics (3:3:0) Prerequisites: CHM 331 and 332. Advanced study of thermodynamics and kinetics. Covers application of kinetics to the elucidation of reaction rates, gas, and application of statistical thermodynamics to the theory of elementary reaction rates.

712/CHM 728 Introduction to Solid Surfaces (3:3:0) Prerequisite: CHEM 422 or equivalent. Introduction to 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.

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, 780, or permission of instructor. Covers basic and advanced fluid mechanics and the continuous hypothesis to define fluids. Introduces tensor analysis; Euclidean and Lagrangian representation of fluid flow; Laplace’s equation; continuity equation; Navier-Stokes equations; Bernoulli theorem and Crocco’s form of the equations; steady and unsteady flows; potential, compressible, 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 the level of MATH 603 or CSI 740/MATH 625; coding experience in FORTRAN or C; or permission of instructor. Covers fundamentals of computational fluid dynamics, 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. Two major projects included: a Laplace solver, and a 2-D Euler solver on
unstructured grids. Students expected to write their own codes.

722 Computational Fluid Dynamics II (3:3:0) Prerequisites: 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 are expected to write their own codes.

723 Fluid Mechanics II (3:3:0) Prerequisites: 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 magnetohydrodynamics.

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.

734 Computational Neurobiology (3:3:0) Prerequisites: BINF 651 or equivalent and ordinary differential equations, or permission of instructor. Intense review of neurobiology for graduate students interested in studying how nerve cells integrate and transmit signals, and how behavior emerges from the integrated actions of populations or circuits of nerve cells. Covers electrical and biochemical properties of single neurons, and electrical and chemical communication between neurons. Emphasis is on mathematical descriptions and computational techniques used to study and understand neurons and networks of neurons.

735 Computational Neuroscience Systems (3:3:0) Prerequisites: CSI 734 (previously or concurrently), BINF 651, or permission of instructor. Overview of the nervous system and biological neural networks. Includes learning and memory, sensory systems, and motor systems. Stresses design and application of computational models. Students are required to propose and design a computational model that addresses some open issue in neuroscience.

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 the 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 a commonly used technique for developing numerical approximations to problems involving ordinary and partial differential equations. Course develops underlying mathematical foundation for the method, examines several specific types of finite elements, analyzes the convergence rates and approximation properties of the method, and uses it to solve a number of 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. Examples from across the sciences are considered. Topics include basic issues (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 an 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 a scientific programming language. Studies theory and computational aspects of wavelets and wavelet transforms. Emphasizes computational aspects of wavelets, defining Fast Wavelet Transform in one and two dimensions and developing the appropriate numerical algorithms, then develops theory of wavelet bases on the real line, discussing multiresolution analysis, splines, time-frequency localization, and wavelet packets.

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 notions of 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 are expected to complete projects.
749 Topics in Computational Mathematics (3:3:0) Prerequisite: permission of instructor. Selected topics in computational mathematics not covered in fixed-content computational mathematics courses. May be repeated for credit as needed.

750 Earth Systems and Global Changes (3:3:0) Prerequisite: course in ecology; environmental geology, atmospheric physics, or permission of instructor. Introduction to global system interactions responsible for global environmental change. Discusses natural causes of past and present global changes, and how human activities affect them; and ecological and human consequences of global changes. Topics include climate and hydrological systems, global warming, deforestation, ozone depletion, ecological system dynamics, introduction to climate and global change monitoring, satellite instrumentation and calibration, and model predictions.

758 Visualization and Modeling of Complex Systems (3:3:0) Prerequisite: permission of instructor. Covers elements of modeling and analysis of Earth and space sciences data and systems. Concentrates on both sample projects and student-initiated projects as a means of using visualization and graphical analysis techniques as they apply to modeling of complex data sets and systems. Several different analysis and visualization packages are used. Spacecraft data sets from the Naval Research Laboratory (NRL) Backgrounds Data Center and other NRL data sets are available for course projects; a perusal of web data sets is also possible. Modeling and analysis are accompanied by appropriate readings from current literature.

761/ASTR 761 N-Body Methods and Particle Simulations (3:3:0) Prerequisites: PHYS 613/CSI 780 and CSI 700 or permission of instructor. Covers particle methods as a tool 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.

763 Statistical Methods in Space Sciences (3:3:0) Prerequisite: ASTR 530 or permission of instructor. Covers statistical and data analysis methods applicable to problems in space science, remote sensing, and astrophysics. Includes parametric and nonparametric hypothesis testing, parameter estimation, correlation analysis, time series analysis, spatial analysis, and image reconstruction. Emphasizes the importance of actual data sets and hypotheses. Examples drawn from current space science research.

764/ASTR 764 Computational Astrophysics (3:3:0) Prerequisite: ASTR 530. Covers statistical mechanics concepts important in astrophysics. Presents unified approach to particle acceleration and interaction theory based on analytical and numerical analysis of Boltzmann and Liouville equations. Discusses computational methods relevant to particle transport problems, with emphasis on Fokker-Planck and Monte Carlo solution techniques. Applications from space sciences include studies of cosmic ray acceleration, photon 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) Prerequisite: PHYS 502, ASTR 530, PHYS 613/CSI 780, or permission of instructor. Overview of atomic and nuclear physics. Covers nuclear reactions of use to high-energy astrophysics; radiation processes in cosmic plasmas, emphasizing quantum mechanical calculations; stellar evolution and nucleosynthesis; computational models of stellar evolution; binary stars and accretion disks; numerical models of the structure of accretion disks; compact stars, white dwarfs, neutron stars, and black holes; acceleration processes and cosmic rays; interstellar medium and propagation of cosmic rays; high-energy processes in the center of galaxies; and ground- and space-based techniques and observations.

766/ASTR 766 Relativity and Cosmology (3:3:0) Prerequisites: ASTR 530 and MATH 314, or permission of instructor. Covers special relativity, four-dimensional spacetime, general relativity, non-Euclidean geometries, geodesic and field equations, test of general relativity theory, black holes, cosmic background radiation, thermodynamic considerations in cosmology, and cosmological models.

769/ASTR 769 Topics in Space Sciences (3:3:0) Prerequisite: permission of instructor. Selected topics in space sciences not covered in fixed-content space sciences courses. May be repeated for credit as needed.

771/STAT 751 Computational Statistics (3:3:0) Prerequisites: STAT 544, 554, and 652. Covers basic computationally intensive statistical methods and related methods, which would not be feasible without modern computational resources. Covers nonparametric density estimation including kernel methods, orthogonal series methods and multivariate methods, recursive methods, cross-validation, nonparametric regression, penalized smoothing splines, the jackknife and bootstrapping, computational aspects of exploratory methods including the grand tour, projection pursuit, alternating conditional expectations, and inverse regression methods.

773/STAT 663 Statistical Graphics and Data Exploration (3:3:0) Prerequisite: 300-level course in statistics; STAT 554 strongly recommended. Exploratory data analysis provides a reliable alternative to classical statistical techniques, which are designed to be the best possible when stringent assumptions apply. Topics include graphical techniques such as scatter plots, box plots, parallel coordinate plots, and other graphical devices; re-expression and transformation of data; influence and leverage; and dimensionality reduction methods such as projection pursuit.

775/OR 719/STAT 719 Computational Models of Probabilistic Reasoning (3:3:0) Prerequisites: STAT 632 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. 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 a semester-long project of their own choosing.

776/IT 746 Stochastic Calculus (3:3:0) Prerequisites: STAT 652, ECE 630 or 632, or permission of instructor. Introduction to modern theory of stochastic calculus.
Covers stochastic integrals, martingales, counting processes, diffusion processes, and Ito-type processes in general. Considers applications of these methods to engineering, biology, and economics.

777 Principles of Knowledge Mining (3:3:0) Prerequisites: INFS 614 or equivalent; or permission of instructor. Principles and methods for synthesizing task-oriented knowledge from computer data and prior knowledge, and presenting it in human-oriented forms such as symbolic descriptions, natural language-like representations, and graphical forms. Topics include fundamental concepts of knowledge mining; methods for target data generation and optimization; statistical and symbolic approaches; knowledge representation and visualization; and new developments such as inductive databases, knowledge generation languages, and knowledge scouts.

778/IT 776 Real Analysis and Statistics (3:3:0) Prerequisites: STAT 652; ECÉ 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. Covers application of numerical methods to the study of a variety of physical systems, with emphasis on modeling and simulation. Development of numerical algorithms and simulation codes used to gain understanding of the mechanisms and processes taking place 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) Prerequisite: PHYS 513 or PHYS 722/CSI 785, PHYS 711/CSI 782/CHEM 730; or permission of instructor. Study of ionized matter, theory, and some computation with application to astrophysics, industrial plasma processing, magnetosphere, and ionosphere problems. Vlasov and fluid equations are derived and applied in plasma science, including the study of plasmas with and without magnetic fields.

782/PHYS 711 Statistical Mechanics (3:3:0) Prerequisites: PHYS 502 and 613 or permission of instructor. Covers microcanonical, canonical, and grand canonical ensembles and fluctuations, Fermi-Dirac and Bose-Einstein statistics, the ideal monatomic gas and diatomic gas, the Liouville equation, equipartition of energy, crystals, imperfect gases, kinetic theory, quantum statistics, and transport processes.

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 a computational point of view, review of systems with spherically symmetric potentials, many electron-atom solutions to Schrödinger's equation, electron spin in many-electron systems, atomic structure calculations, algebra of many-electron calculations, Hartree-Fock self-consistent field method, molecular structure calculations, scattering theory computations, and solid-state computations.

784/PHYS 732 Quantum Mechanics (3:3:0) Prerequisite: PHYS 502 or permission of instructor. Study of the 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, boundary conditions, multipole expansions, 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. Introduction to simulation methods used 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 an 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 the computational aspects of condensed matter, such as methods of electronic structure calculations, surface science, molecular clusters, lattice dynamics, nanomaterials, semiconductors, superconductivity, quantum Hall effect, magnetism, Hubbard model, mesoscopic systems, and liquids.

788/PHYS 728 Simulation of Large-Scale Physical Systems (3:3:0) Prerequisites: PHYS 613/CSI 780 and CSI 700, or permission of instructor. Study of diverse, large-scale physical systems, with emphasis on 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 and research on a 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.

**853 Atmospheric Transport and Dispersion (3:3:0)** Prerequisites: 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, with emphasis on 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 trade-off between onboard versus ground-station processing. Also covers computer system performance appraising and computing systems 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)** Prerequisites: 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 neural 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 will make presentations on topics of their research interest, and work on projects involving state-of-the art systems.

**876/IT 876 Measure and Linear Spaces (3:3:0)** Prerequisite: IT 776/CSI 778 or permission of instructor. Covers measure theory and integration, convergence theorems, and the theory of linear spaces and functional analysis, including normed linear spaces, inner product spaces, Banach and Hilbert spaces, Sobolev spaces, and reproducing kernels. Topics include wavelets, applications to stochastic processes, and nonparametric functional inference.

**877/IT 877 Geometric Methods in Statistics (3:3:0)** Prerequisite: STAT 751 or permission of instructor. Develops foundations of geometric methods for statistics. Topics include n-dimension Euclidean geometry; projective geometry; differential geometry, including curves, surfaces, and n-dimensional differentiable manifolds; and computational geometry, including computation of convex hulls, tessellations of two-, three-, and n-dimensional spaces, and finite element grid generation. Examples include applications to scientific visualization.

**885 Atomic Modeling of Materials (3:3:0)** Prerequisite: PHYS 736/CSI 783 or PHYS 732/CSI 784, or permission of instructor. Covers 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 and/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; however, a maximum of 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; however, a maximum of 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. Methods of minimum variance unbiased estimation are covered in detail. 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, uniformly most powerful tests, unbiasedness of tests, invariance of tests, randomized tests, and sequential tests. Applications of testing principles are made to situations in the normal distribution family and to 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) Prerequisites: STAT 544 and 658 or equivalent. A second course in the analysis of discrete- and continuous-time signals using methods of stochastic processes, including stochastic differential equations and time series. Familiarity with the methods of harmonic analysis and times series modeling is presumed. 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) Prerequisite: permission of instructor. Seminar on the topics of current interest to students working in scientific computing in the center for social complexity. Emphasis on the Unified Modeling Language (UML) as a tool for rendering the structure and operation (UML) as a tool for rendering the structure and operation of complex social systems and processes.

996 Doctoral Reading and Research (1-6:0:0) Prerequisite: permission of instructor. Reading and research on a 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; however, 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; however, no more than a total of 24 credits in CSI 998 and 999 may be applied to doctoral degree.

Computational Social Science (CSS) Center for Social Complexity, Office of the Provost

600 Introduction to Computational Social Science (3:3:0) Graduate-level introduction to computational concepts, principles, and modeling approaches in the social sciences, with an emphasis on 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 the object-based modeling paradigm. Emphasis on the Unified Modeling Language (UML) as a tool for rendering the 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 the social sciences by examining and experimenting with a variety of social-simulation projects conducted in modeling environments such as Swarm, Repast, Ascape, and MASON (Multi-Agent Simulator OfNetworks 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 first emerged in human societies, with an emphasis on 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. Emphasis on data analysis, and modeling and interpreting complexity-theoretic dynamics.

630 Comparative Computational Social Science (3:3:0) Prerequisite or corequisite: CSS 600. Application of the 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, CSS 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. Emphasis on modeling project.

640 Human and Social Evolutionary Complexity (3:3:0) Prerequisite or corequisite: CSS 600, CSS 620, and permission of instructor. Examines the long-term evolution of human and societal complexity from a global, cross-cultural perspective, with an emphasis on computational aspects leading to today’s globalization. Global history from the computational social science perspective.
Courses

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: 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. Hand-on development of simple ABM models, and investigation of linkages between GIS and ABM.

650 Physics Methods for Analyzing Social Complexity (3:3:0) Prerequisite or corequisite: CSS 600 and permission of instructor. Survey of complexity theoretic tools including strange attractors, Ising models, correlation functions, ergodic theory, power spectra, mean-field theory, and renormalization group. Emphasis on application to social, economic, or political systems.

655 Social Systems Dynamics (3:3:0) Prerequisite or corequisite: CSS 600. Introduction to 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, 610, and permission of instructor. Focuses on goals, resources, history, and modeling issues concerning human and social dimensions of the 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 courses. May be repeated for credit as needed.

796 Directed Reading and Research (3:3:0) Prerequisite: permission of instructor. Reading and research on a specific topic in computational social science under the 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 the guidance of a faculty member, resulting in an acceptable technical report (master’s thesis) and oral defense. Graded S/IP.

898 Research Colloquium in Computational Social Science (1:1:0) Presentations in specific research areas in computational social science by Center for Social Complexity associated faculty and professional visitors. May be repeated for credit; however, a maximum of 3 credits of CSS 898, 899, and 991 may be applied toward the PhD.

899 Colloquium in Computational Social Science (1:1:0) Presentations in a variety of areas of computational social science by Center for Social Complexity associated faculty and professional visitors. May be repeated for credit; however, a maximum of 3 credits of CSS 898, 899, and 991 may be applied toward the 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 a specific topic in computational social science under the direction of a faculty member. May be repeated as necessary.

998 Doctoral Dissertation Proposal (1-12:0:0) Prerequisite: permission of advisor. Covers development of a research proposal, which forms the basis for a doctoral dissertation, under the guidance of the dissertation director and doctoral committee. May be repeated as needed; however, 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 the direction of dissertation director. May be repeated as needed; however, no more than 24 credits in CSS 998 and 999 may be applied toward satisfying doctoral degree requirements.

Computer Science (CS)

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, privacy, security, and crime. Students read, write, discuss, and present reports on these topics.

112 Computer Science I (4:3:2) Prerequisites: thorough understanding of high school algebra and trigonometry, and successful completion of math placement test offered through the Testing Center; or a grade of C or better in MATH 105. Introduction to computer science for majors and others with serious interest in computer science. Topics include overview of computer system hardware and organization, problem-solving methods and algorithm development, program structures, abstract data types, simple data and file structures, introduction to analysis of algorithmic complexity and program correctness, and applica-
tions development in a high-level programming language that supports modular design.

211 Computer Science II (3:3:0) Prerequisite: grade of C or better in CS 112. Continuation of CS 112. Topics include abstract data types and data structures (sets, files, strings, linked lists, stacks, queues, trees, graphs) and examples of their applications. Emphasis on program development continues and is reinforced through several larger programming projects. Additional programming language instruction supplements major topics.

261 Introduction to a Second Language (1:1:0) Prerequisite: grade of C or better in CS 211. Not available for CS major credit. Advanced programming, using the Java programming language. Other languages may be offered at times.

265 Assembly Language Programming (3:3:0) Prerequisite: grade of C or better in CS 211; corequisite: CS 105. Symbolic assembly language and computer structures; arithmetic and logical operations; machine representations of numbers, characters, and instructions; input-output and data conversions; addressing techniques; assembler directives; subroutine linkage; and macroprocessing.

305 Ethics and Law for the Computing Professional (3:3:0) Prerequisite: CS 105 or IT 103; junior standing (at least 60 credits). Practical course to assist students in becoming effective computer professionals by examining the challenging legal and ethical issues surrounding computer technology and its use, and building foundation 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 emerging legal and ethical issues involved in e-commerce and the widespread use of Internet.

306 Synthesis of Ethics and Law for the Computing Professional (3:3:0) Prerequisites: CS 105 or IT 103; junior standing; completion or concurrent enrollment in all required general education courses. For course description, see CS 305. Computer science majors may use this course to satisfy the general education synthesis requirement, as long as they have not previously taken CS 305 for credit.

310 Computer Science III (3:3:0) Prerequisite: grade of C or better in CS 211. Tools and techniques required to develop moderate to large programs. Topics include continued study of object-oriented techniques, data structures, recursion, and problem-solving skills. Students complete several moderate-size programs.

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 Object-Oriented Specification and Implementation (3:3:0) Prerequisite: grade of C or better in CS 310. Concentration on the transition from an abstract data type (ADT) specification to its implementation. Covers symbolic logic for reasoning about programs, axiomatic and algebraic methods for ADT specification, and introduction to goal-directed programming. Term project involves the design and construction of a program incorporating several ADTs.

363 Comparative Programming Languages (3:3:0) Prerequisite: grade of C or better in CS 363. 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) Prerequisites: grade of C or better in ECE 303. Computer hardware organization, software structure, and data organization. Students complete term project that simulates one computer system on another.

367 Computer Systems and Programming (3:3:0) Prerequisite: grade of C or better in either ECE 303 or 445. Uses bottom-up approach to teach how high-level language control and data structures are represented at the 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 application of familiar and new algorithms and data structures to novel circumstances.

421 Introduction to Software Engineering (3:3:0) Prerequisites: grade of C or better in CS 310 (or both CS 211 and SYST 301) and ENGL 302. Techniques in software design and development. Discusses formal models of structured programming, software engineering methods and tools, functional or object-oriented design, and documentation. Working in teams, students organize, manage, and develop software engineering project.

440 Language Processors and Programming Environments (3:3:0) Prerequisites: 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 syntactic definition methods, parsing techniques, and code generation techniques.

450 Database Concepts (3:3:0) Prerequisite: grade of C or better in CS 310 and 330. Data models and data sublanguages for the relational, hierarchical, and network approaches to database management systems. Covers normal forms, external models, implementation, data independence, alternative logical views of data, and object-oriented design. Various approaches are compared.

451 Computer Graphics and Software Design (3:3:0) Prerequisites: grade of C or better in MATH 203, and CS 310 and 365. Basic graphics principles and programming. Topics include graphics hardware, graphical user interfaces, scan conversion, transformations, viewing, hidden surface removal, illumination, and graphics software design and 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 the layers of the Internet Protocol Suite (the 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.
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 management, file management, I/O management, deadlock management, performance of operating systems, and projects dealing with synchronization in a multiprogrammed OS and with 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 and 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 coarse-grained parallelism at the application level. Projects involve network programming at the 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. LISP, PROLOG, or an expert system programming language is used. 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. f,s

483 Data Structures and Analysis of Algorithms (3:3:0) Prerequisites: grade of C or better in CS 310 and 330, and MATH 114. Analyzes computational resources required for important problem types by alternative algorithms and their associated data structures, using mathematically rigorous techniques. Specific algorithms analyzed and improved. f,s

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 a major software project, encompassing a broad spectrum of knowledge and skills, developed by team of students. Final exhibition to faculty/industry panel required. 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 an instructor and approved by department chair before registering. May be repeated for a maximum of 6 credits if topics are substantially different.

499 Special Topics in Computer Science (3:3:0) Prerequisite: 60 credits and permission of instructor. Specific prerequisites vary with nature of topic. Topics of special interest to undergraduates. May be repeated for a maximum of 6 credits if topics are substantially different.

540 Language Processors (3:3:0) Prerequisites: MATH 125; CS 265, 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.

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. Uses LISP, PROLOG, or an expert system programming language.

583 Analysis of Algorithms (3:3:0) Prerequisites: CS 310 and 330, and MATH 125. Topics include the analysis of sequential and parallel algorithmic strategies (such as greedy methods, divide and conquer strategies, dynamic programming, search and traversal techniques, approximation algorithms), analysis of specific algorithms falling into these classes, NP-Hard and NP-Complete problems.

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 are created in the logic view of the 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.

635 Foundations of Parallel Computation (3:3:0) Prerequisites: CS 583 and 540 or 571, or equivalent. Survey of the field of parallel computation. Three major parallel computing paradigms (MIMD computation, SIMD computation, and data flow computation) are covered. Emphasizes interfaces between algorithm design and implementation, architecture, and software. Parallel algorithms and parallel programming languages examined 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.

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.

656 Computer Communications and Networking (3:3:0) 
Prerequisites: CS 571 and STAT 344 or equivalent. Techniques and systems for communication of data between computational devices and layers of Internet Protocol Suite. Topics include the 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.

667/IT 667 Biometrics (3:3:0) 
Prerequisites: CS580 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.

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, VAX architecture, 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.

673 Multimedia Computing and Systems (3:3:0) 
Prerequisite: CS 571. Focuses on technological and development environments in developing multimedia applications. Projects involve experience with multimedia authoring tools and simulations to assess performance.

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 for the study of 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) 
Prerequisites: CS 580; or ECE 650; or SYST 611 or 535; or equivalent. Review of 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 of concepts and procedures, self-organization, and adaptation to the environment.

686 Image Processing and Applications (3:3:0) 
Prerequisites: CS 583 and either STAT 344 or MATH 351, or equivalent. Concepts and techniques used in image processing. Discusses methods for image capture, transformation, enhancement, restoration, and encoding. Students complete projects involving naturally occurring images.

687 Advanced Artificial Intelligence (3:3:0) 
Prerequisite: CS 580. Explores foundational issues of artificial intelligence, such as the roles of knowledge and search, formalization of knowledge and inference, and symbolic versus emergent approaches to intelligence. Studies advanced programming techniques for artificial intelligence and their relationship to foundational issues and most important application areas for artificial intelligence. Major programming project required.

688 Neural Network Principles (3:3:0) 
Prerequisite: CS 580 or equivalent. Study of neural network models, algorithms, and applications. Introduces several connectionist and biologically based models, and discusses their capabilities and limitations. Presents variety of application areas. Network simulation project is required.

697 Independent Reading and Research (1-3:0:0) 
Prerequisites: graduate standing, completion of at least two core courses (CS 540, 571, 580, 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.
699 Advanced 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.

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. Study of issues related to development of concurrent software systems. 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 their solutions by using verification, testing, and debugging tools.

707 Distributed Software Systems (3:3:0) Prerequisite: CS 706 or permission of instructor. Issues in design and implementation of distributed applications. Topics include distributed programming using sockets as well as higher-level technologies such as remote procedure calls and distributed object middleware technologies including Java RMI, CORBA, and DCOM.

735 Concurrency (3:3:0) Prerequisite: CS 635, 706, or equivalent. Study of techniques and 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) Prerequisite: CS 450 and 580 or permission of the 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 required.

752 Interactive Graphics Software (3:3:0) Prerequisite: CS 652. Advanced graphics methods and tools. Topics include visualization, modeling, rendering, animation, simulation, virtual reality, graphics software tools, and current research topics.

755 Advanced Computer Networks (3:3:0) Prerequisite: CS 656. 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 analysis of 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.

773 Real-Time Systems Design and Development (3:3:0) Prerequisite: CS 656 or 671. Real-time systems and principles supporting design and implementation. Emphasis on 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.

775/ECE 749/IT 844 Pattern Recognition (3:3:0) Covers statistical pattern recognition, neural network, and statistical learning theory approaches. Topics include decision theory and Bayes’ theorem, density (parametric and non-parametric) 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. Experimental design, applications, and performing prevaluation emphasized.

777 Human-Computer Intelligent Interaction (3:3:0) Prerequisites: CS 580 and 652 or 682, or permission of the 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, speech and natural language processing. Term project and topical review required.

780/IT 835 Computational Vision (3:3:0) Prerequisites: CS 682, 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. Emphasis on system integration in terms of perception, control, action, and adaptation. Presents applications to robotics, intelligent highways, inspection, forensic, and data compression.

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 (systematic elicitation of expert knowledge, knowledge base refinement, and knowledge base optimization) in the context of general problem-solving methods. Case studies of successful knowledge acquisition and problem solving systems. Projects include development or application of knowledge acquisition tools for knowledge-based systems.
798 Project Seminar (3:3:0) Prerequisite: 18 credits applicable toward MS in computer science. Master’s degree candidates undertake a project using the knowledge gained in the MS program. Topics chosen in consultation with advisor. Meets project or thesis requirement for the 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 a committee of three faculty members.

803, 804 Doctoral Tutorial in Information Technology (3:3:0) Individualized intensive study of information technology. May be repeated as needed.

809/IT 809 Scaling Technologies for E-Business (3:3:0) Prerequisites: at least one operating system and one networking course, and admission to an IT&E doctoral program. Discusses, from a quantitative point of view, characteristics of the most important technologies used to support the 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.

811/IT 811 Principles of Machine Learning and Inference (3:3:0) Prerequisite: CS 580, 681, or permission of instructor. Presents unifying principles that underlie diverse methods, paradigms, and approaches to machine learning and inference. Reviews the most known learning and inference systems, discusses strengths and limitations, and suggests most appropriate areas of their application. Hands-on experience by experimenting with state-of-the-art learning and inference systems, and working on projects tailored to research interests.

812/IT 812 Advanced Topics in Natural Language Processing (3:3:0) Prerequisite: CS 680. Advanced treatment of topics in syntax, semantics, and generation of linguistic output. Implementation and applications also discussed.

815/IT 815 Parallel Computation (3:3:0) Prerequisite: CS 635 or IT 816, or CSI 801. Topics illustrating some of the contemporary thinking on architectures, application, development environments, algorithms, operating system related issues, language requirements, and performance for parallel computation.

816/IT 816 Parallel Architectures, Algorithms, and Applications (3:3:0) Prerequisites: CS 583 and computer architecture course. Familiarization for students in area of parallel architectures, algorithms, and parallel computers. Discusses various algorithms and their applicability to certain architectures. Compares parallel algorithms with certain tools, and explores applications to artificial intelligence, image processing, and database machines.

817/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.


840/CS 685/ECE 750/SYST 672/IT 840 Intelligent Systems for Robots (3:3:0) Prerequisite: SYST 535, 611; ECE 650; CS 580; 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, and algorithms and architecture for planning, navigation, sensory data understanding, visual inspection, spatial reasoning, motion control, learning, self-organization, and adaptation to the environment.

852/IT 852 Graphical Real-Time Simulation (3:3:0) Prerequisite: CS 652 or IT 875. Current research in advanced computer graphics, and its applications in realistic real-time simulations. Topics include physically based modeling, real-time simulation, distributed interactive simulation (DIS), network virtual environments (NVE), and virtual reality (VR)

858/IT 858 Logic Models in Artificial Intelligence (3:3:0) Prerequisite: CS 580. Examines relevance of logic theory to artificial intelligence. Familiarizes students with variety of formal logics used in artificial intelligence, as well as ongoing research in new logics. Topics include first-order predicate calculus, resolution and non-resolution theorem proving, nonmonotonic logic, assumption-based reasoning, relationship between symbolic and quantitative theories of uncertainty, temporal logics, and their application to planning and metareasoning.

910/IT 910 Advanced 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.

915/IT 915 Advanced Topics in Parallel Computation (3:3:0) Prerequisite: CS 815. Discussion of current research topics in parallel computation. Topics vary according to student and faculty interest. Possible topics include formal models of concurrency, specification and design of parallel programming languages, logic programming in a parallel environment, and parallel distributed processing (neural networks).

990/IT 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 their 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 a change in topic, although degree credit is given once.

998 Doctoral Dissertation Proposal (1-12:0:0) Work on a 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 Introduction to Conflict Resolution (3:3:0) Brief history of the 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 and organizational, and international situations.

300 Conflict Resolution Techniques and Practice (3:3:0) Prerequisites: CONF 101 and 60 credits; or permission of instructor. Advanced consideration of CONF 101 topics, introduction of the 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 and 60 credits; or permission of instructor. Introduction to social science research methods at the undergraduate level. Covers basic epistemology of social research, including quantitative and qualitative methods, with emphasis on participatory action research and evaluation and assessment work.

302 Identity Conflicts and their Resolution (3:3:0) Prerequisites: CONF 101 and 60 credits; or permission of instructor. 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) Prerequisites: CONF 101, 300, and 60 credits; or permission of instructor. Covers conflict at the micro level, introducing theories drawn from various disciplines including psychology, anthropology, and conflict resolution. From readings, case studies, and role plays, students develop the 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) Prerequisites: CONF 101, 300, and 60 credits; or permission of instructor. Covers conflict at the mezzo level, introducing theories of social harmony and conflict, drawing on sociology, social psychology, community psychology, organizational psychol-
611 MS Research II (3:3:0) Prerequisite: CONF 501 and 610. Builds on foundation of CONF 610. Guides students through the design, execution, interpretation, analysis, presentation, and evaluation of field research into conflict and conflict resolution.

642 Integration of Theory and Practice (3:3:0) Taken in the last semester of master’s students’ course work. Assists in developing students’ own “generic” theory of conflict by reviewing and integrating prior course work. Students are expected to demonstrate a holistic comprehension of the field by writing a major essay of publishable quality about the causes, events, and resolution of a particular conflict of their own choosing.

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, taken 3 credits per semester. In-depth field study of ongoing conflict situations, and design and delivery of intervention processes to manage or resolve the conflicts.

694 Internship (1-6:0:1-6) Prerequisite: 21 credits, including CONF 713 and 714. CONF 715 recommended. Under direction of career coordinator, students spend at least 160 hours working on a project involving the study and resolution of conflict. Students are expected to mesh theory and practice through observation and experience. Includes comprehensive report analyzing the individual’s experience.

695 Selected Topics (3:3:0) Topics vary from year to year; 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 a series of theory courses and the 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 (interpersonal to international), 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 the field of conflict analysis and resolution. Links peace keeping, peace building, and peace making in an 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 or develop their own theories of practice.

709 War, Violence, and Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801. Considers various theories of violence, causes and conditions, and applies them to a variety of cases: family abuse, religious and ethnic violence; terrorism, revolution, and warfare. Insights gained from study of initiation, escalation, management, resolution, and prevention of violence are applied to theories about the resolution of deep-rooted conflicts.

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 the resolution process; precisely stating the agreed-upon solution.

715 Laboratory and Simulation III: International and Intercultural Conflict (3:0:3) Prerequisites: CONF 501, 713, and 714; or permission of instructor. Continuation of the study of resolution processes as applied to highly complex systems, especially where one party denies the legitimacy of existing political authority. Considers third-party options for intervention in revolutionary and international conflicts, and means for 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 these variables to the success or failure of conflict resolution.

721 Conflict and Race (3:3:0) Prerequisite: CONF 501 or 801. Cross-listed as SOCI 523. 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 a critical analysis of theory and practice. Feminist theories are reviewed for their contributions to social and conflict theories. Narratives used to explore how gender and power dynamics interact in conflict.

724 Conflict and “-isms” (3:3:0) Prerequisite: CONF 501 or 801. “Them” and “Us”. Deals with the identification and analysis of interrelationships and similarities among the various ways human beings bifurcate themselves based
on national, ethnic, religious, gender, and other criteria. Explores the role these divisions play in the development and intractability of identity-based conflicts, and implications for conflict analysis and resolution. Examples include nationalism, racism, sexism, ageism, classism.

725 Conflict and Spirituality (3:3:0) Prerequisite: CONF 501 or 801. Explores role of spirituality in the naming, framing, and unwinding of conflict. Roles of apology, reconciliation, and forgiveness are considered as they relate to the deconstruction of enemy images in protracted communal and interpersonal conflicts. Examines relational empathy, and ways of cultivating connection across perceived deep differences.

726 Moral and Philosophical Foundations of Conflict (3:3:0) Prerequisite: CONF 501 or 801. Overview of moral, philosophical, and ethical underpinnings of conceptions of conflict and conflict resolution. Enhances ability to engage in discourse approaching conflict from moral or philosophical disciplinary background.

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 for facilitating with groups outside their own “worldview.” Highly recommended for students interested in understanding diverse groups and gaining insights into the wide variation in world views and values understandings held by different people.

728 Human Rights Theory and Practice in Comparative Perspective (3:3:0) Prerequisite: CONF 501 or 801, or permission of the instructor. Introduces major controversies and debates surrounding the use of human rights theory and practice crossculturally. After a 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 a variety of intellectual and political perspectives. Readings are wide-ranging and interdisciplinary, addressing levels of analysis from the biological to the national 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 a political process proving 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. Theoretical perspectives and cases examine issues involved in conflict analysis and resolution. Strategies for prevention and intervention are practiced. Students conduct field research in the greater metropolitan area to help integrate 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 of 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.

734 Crime and Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801 or permission of instructor. Explores usefulness of conflict analysis and resolution perspectives in analyzing causes, nature, and consequences of criminal behavior, and alternative approaches to crime problem.

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. Root causes of conflict in a global context examined in terms of gender inequality, cultural differences, unequal North and South relations, militarism, economic oppression, genocide, maldevelopment, religious and ethnic struggle, and environmental scarcity. Students develop their own conceptual toolboxes 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 meanings of globalization—economic, political, social, and cultural—and examines how they affect conflict processes at international level. Students explore when and under what conditions globalization promotes cooperation or conflict.

737 Societies, Globalization, and Conflict (3:3:0) Prerequisite: CONF 501 or 801, or permission of instructor. Explores how globalization affects conflict processes at the domestic level. Topics include economic interdependence and civil war; structural adjustment policies and distributional conflicts; changing cultural norms and gender roles, migration, tourism, and conflict.

738 Researching Conflict in Health Systems (3:3:0) Capstone seminar; final course in the graduate certificate program in conflict resolution for health professionals. Involves conducting research and analyzing a 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) CONF 501 or 801, or permission of the instructor. Explores how people translate underlying grievances into collective action. Examines how groups organize, frame, and develop strategies and tactics to pursue their agendas, and how the processes of globalization have influenced social movement dynamics.

740 Conflict Roles, Resources, and Ethics (3:3:0) Prerequisites: CONF 501 or 501, 713. Analyzes and critiques nature and roles in conflicts. Theoretical perspectives and case histories are used to understand how settings affect roles. Includes ethical assessment of interventions in a variety of conflict settings.

741 Negotiations (3:3:0) Prerequisite: CONF 501 or 801 or permission of the instructor. Student’s negotiating experiences are used to construct a framework for thinking about and analyzing negotiation processes. The framework is then
used to organize a review of the research literature on the “rhythms” and “patterns” of negotiation as well as to analyze a variety of actual cases. Exercises and class projects interwoven with state-of-the-art concepts and findings.

742 Mediating Policy Conflict (3:3:0) Prerequisite: CONF 501 or 801 or permission of the instructor. Analyzes disputes involving the formation, implementation, and reform of social policy. Development and assessment of the roles of mediation and other intervention approaches in policy conflicts in the public, private, and citizens sectors.

743 Dynamics of Conflict Termination (3:3:0) Prerequisite: CONF 501 or 801 or permission of the 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 the overall process, including implementation and monitoring of agreements. Takes as exemplary case studies efforts to terminate such conflicts of the Iran-Iraq war, the Cyprus dispute, and the Eritrean conflict.

744 Peace Keeping (3:3:0) Prerequisite: CONF 501 or 801. To what degree do international “peace-keeping” forces embrace conflict resolution and peace-building as part of their mission? To what degree could conflict resolution be integrated? What are the roles conflict resolvers can play in peace-keeping environments?

745 Leadership Roles in Conflict and Conflict Resolution (3:3:0) Prerequisite: CONF 501 or 801 or permission of the instructor. 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 a range of conflict scenarios at the interpersonal, community, organizational, and international levels.

746 Peace Building (3:3:0) Prerequisite: CONF 501 or 801. Building on initiatives of the 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. Literature, case studies, and other research are reviewed to assess the applicability and impact of these efforts.

748 Comparative Peace Processes (3:3:0) Prerequisites: CONF 501 or 801, 601 or 803, or permission of the instructor. Compares case studies drawn from actual peace processes, both successful and unsuccessful, to illuminate principles and complexities.

795 Professional Development Seminars (1-3:1-3:0) Prerequisite: CONF 501 or 801. These 1- and 2-credit courses scheduled nonconventionally using weekends, concentrated presentations, and intersession periods to give students 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.

799 Master’s Thesis (1-6:0:1-6) Prerequisites: CONF 501, 713, 610. Two semesters, normally 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. Introduction to field of conflict analysis and resolution for doctoral students. Examines definitions of conflict and divergent views of “resolution.” Explores thinking about human behavior and social systems as they relate to origins of conflict and the 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 in the 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 their 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, 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 the building of scientific hypotheses. Assumes that the ways we think, as human beings, and the ways we build and test our theories about the world are closely linked. Explores and critiques the thinking of major 20th century thinkers from the social sciences, thus forming an introduction to research methodology.

811 Advanced Research Methods I (3:3:0) Prerequisite: CONF 801, 810, or permission of instructor. A prior course such as STAT 510 in intermediate statistics is presumed. Building on the logic of inquiry, introduces students to steps in the research process needed to prepare a dissertation and implement published research. Covers a wide array of quantitative and qualitative research approaches used in the social sciences, with an emphasis on conflict analysis.

812 Advanced Research Methods II (3:3:0) Prerequisite: CONF 811 or permission of instructor. Continuation of steps in the research process needed to prepare a dissertation and implement published research. Builds on CONF 811 by extending the coverage of quantitative and qualitative research approaches used in the social sciences, with emphasis on conflict analysis.

890 Practicum in Conflict Analysis and Resolution (6:1:5) Prerequisite: CONF 801 and 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 a student and faculty member.
Courses

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 used 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: EDUC 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 the counseling and development program, and EDCD 601. Prepares students to become skilled practitioners of psychological and educational tests and assessment procedures that are used and applied in a counseling context.

606 Counseling Children and Adolescents (3:3:0) Prerequisites: admission to the counseling and development program and EDCD 603, or permission of instructor. Presents theories, techniques, and strategies for working with children and adolescents and their families. Explores counseling issues related to this population. Provides practice of techniques and strategies with emphasis on supervised practice sessions.

608 Group Processes and Analyses (4:3:1) Prerequisites: admission to the 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 application of theory to practice. Includes lab.

609 Advanced Counseling Skills and Strategies (3:3:0) Prerequisites: EDCD 603 and admission to the counseling and development program, or permission of instructor. Covers counseling skills and strategies associated with major counseling theories, principles, and topics. Provides intensive practice in both technical and conceptual skills, with emphasis on case studies and supervised practice.

610 Career and Educational Counseling (4:3:2) Prerequisites: admission to the counseling and development program and EDCD 602. Introduces principles, practices, and application of ethical and legal issues in counseling.

616 Counseling Skills in International Schools (3:3:0) Introduces counseling skills applicable to international school settings. Students will study, discuss, and develop counseling skills with an emphasis on multicultural counseling and multiethnic student populations.

617 Group Counseling in International Schools (3:3:0) Discusses group counseling within the context of international schools and multicultural counseling describing various types of groups, group counseling practices, methods, group dynamics, and facilitation skills. Attention is given to application of 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 the 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) Admission to the program: EDCD 603; EDCD 626 or EDCD 634; or permission of instructor. Studies the 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) Prerequisites: master’s degree in counseling or related counseling field from an accredited institution of higher education; or permission to the 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 a career in school counseling leadership and administration. Introduces specific school counseling leadership and administrative responsibilities at the secondary level (to include middle and high school).

630 School Counseling Leadership (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from an accredited institution, or admission to the 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 the counseling and development program and EDCD 605, or postgraduate counseling students by permission of program coordinator/instructor. Covers principles, practices, and application of ethics and law in counseling.

652 Introduction to Substance Abuse Counseling (3:3:0) Prerequisites: admission to the counseling and development program and EDCD 603, or permission of instructor. Introduction to 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) Prerequisite: admission to the counseling and development program. Emphasizes the types of services and facilities provided, needs and problems of the client population served, role and function of the counselor in the agency setting, and personnel needs of the individual agency.

656 Diagnosis and Treatment Planning for Mental Health Professionals (3:3:0) Prerequisites: admission to the counseling and development program, and 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 the 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 the transition from theory to practice.

660 Multicultural Counseling (3:3:0) Prerequisites: Admission to the counseling and development program; EDCD 608; EDCD 603 or 605; and EDCD 606, 607, or 609. Covers the issues, characteristics, and needs relevant to diverse populations as they relate to counseling. Explores counseling from a multicultural perspective.

754 Practicum in Counseling and Development (3-6:3:3) Prerequisites: completion of the counseling and development program except for practicum and internship; permission of advisor; overall GPA of 3.00; no grade of C in any 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 the counseling and development program. Provides supervised practice in a counseling setting similar to the setting in which the student may work. Weekly graduate class emphasizing site processing.

755 Practicum in Counseling (3:3:3) Prerequisites: Completion of the counseling and development program except for practicum and internship; permission of advisor; overall GPA of 3.00; no grade of C in any 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 the counseling and development program. Provides supervised practice of at least 200 hours minimum in a counseling setting similar to the setting in which the student may work. Weekly graduate class emphasizing site processing.

790 Internship in Counseling and Development (3-6:3:3) Prerequisites: completion of the counseling and development program except for internship; permission of advisor; overall GPA of 3.00; no grade of C in any skills courses (EDCD 603 or 605; 608; 606, 607, or 609; and 754); no more than two grades of C in any other graduate course work required by the counseling and development program. Provides supervised practice of at least 200 hours in a counseling setting similar to the setting in which the student may work. Skills and practice build on previous practicum experiences. Weekly graduate class emphasizing site processing.

791 Internship in Counseling (3:3:3) 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 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 the counseling and development program. Provides supervised practice of at least 200 hours in a counseling setting similar to the setting in which the student may work. Skills and practice build on previous practicum experiences. Weekly graduate class emphasizing site processing.

795 Advanced Internship in Counseling and Development (2-6:3:0) Prerequisites: master’s degree in counseling or related counseling field from an accredited institution of higher education; or admission to the school counseling leadership certificate program; or permission of counseling and development coordinator; and EDCD 629. Supervised practice of counseling in a setting similar to the setting in which the 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 the PhD program, or
permission of instructor. Examines current and controversial issues in the counseling profession, including counseling theory and methodology, development of client groups, new roles and settings for counselors, emerging assessment procedures, and new understanding of diagnosis, as well as the impact of societal changes on counseling profession.

896 Advanced Multicultural Counseling (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from an accredited institution of higher education; EDCD 660 or equivalent; EDCD 895; and admission to the counseling and development PhD specialization or permission of instructor. Focuses on advanced issues in multicultural counseling, including an examination of multicultural counseling theories, skills, assessment, supervision, research, ethics, and current multicultural issues.

897 Advanced Group Counseling (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from an accredited institution of higher education; EDCD 608 or equivalent; EDCD 895; and admission to the counseling and development PhD specialization or permission of instructor. Focuses on group leadership setting or position. Emphasizes counseling leadership setting or position. Examines theories of power indebted to Foucault, and taking in such diverse sources as Baudrillard, Bourdieu, Harvey, Jameson, Mauss, Mill, Polanyi, Sahlin, A. Smith, and Weber.

898 Grant Writing and Publishing (3:3:0) Prerequisites: master’s degree in counseling or related counseling field from an accredited institution of higher education; EDCD 895; and admission to the 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 the counseling and development PhD specialization; EDCD 895; and EDCD 628 or equivalent. Provides supervised practice in a counseling leadership setting or position. Emphasizes counseling leadership practice. Biweekly class emphasizing site processing, leadership skills, and topical seminars.

991 Advanced Internship in Multicultural Counseling (3:3:0) Prerequisites: admission to the counseling and development PhD specialization; EDCD 895; and EDCD 628 or equivalent. Provides supervised practice in a multicultural counseling leadership setting or position. Emphasizes 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 the counseling and development PhD specialization; EDCD 628 or equivalent; and EDCD 895. Provides opportunities to implement programs and strategies to affect social justice for clients in school or community settings. Biweekly class emphasizes topical seminars and supervision.

Cultural Studies (CULT)

Cultural Studies

320 Globalization and Culture (3:3:0) Examines relationship between cultures and globalization through texts and points of view. Starting from development of capitalism, looks at age of imperialism and colonialism, and finishing in present. Considers how dynamics of cultural change affected by globalization. Particular attention to extraordinary role of new media and technologies in defining and shaping the 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. 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. Introduction to 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: from Marx to Lukacs to the Frankfurt School, from work in semiotic neo-Marxism to productivist theories of power indebted to Foucault, and taking in such diverse sources as Baudrillard, Bourdieu, Harvey, Jameson, Mauss, Mill, Polanyi, Sahlin, A. Smith, and Weber.

812 Visual and Performance Culture (3:3:0) Prerequisite: admission to program or permission of instructor. Examines theories of visual culture, covering film, video, visual arts, music, display, ritual, performance, performance-art, theories of the aesthetic, as well as their production, consumption, and reception. 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 maintenance and analysis of issues of social and cultural power. Examines conflicting notions of sexuality and their role in cultural signification. Seeks to explicate relationship between sexuality and gender.

816 Science/Technology (3:3:0) Prerequisite: admission to program or permission of instructor. Considers theories of and major debates about culture of science, social construction of nature, and effects of technology on modern cultural forms. Readings from such theorists as Nietzsche, Heidegger, Horkheimer, Feyerabend, Bahro, Haraway, and Latour.
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 enrolling in 998 must have completed all cultural studies course work, fulfilled the foreign language requirement, and passed the comprehensive exam. Course may be repeated once for credit. Graded S/NC.

999 Doctoral Dissertation (1-12:0:0) Prerequisites: completion of CULT 998 and public presentation of the dissertation proposal. Doctoral dissertation research and writing under direction of dissertation committee. Graded S/NC.

Dance (DANC)
College of Visual and Performing Arts

101 Dance Appreciation (3:3:0) Introduction to dance as universal human activity, expression of cultural identity and art form. Survey of global dance includes folk, ceremonial and ritual, trance, court, classical, and theatrical.

114 Rhythmic Analysis and Music Resources for Dance (3:3:0) Prerequisite: admission to dance major, or permission of instructor. Introduction to 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. May be repeated for total 6 credits.

120 Special Topics in Dance (1-3:1-3:0) Rotating topic. Introduction and exploration of topical studies in dance or related study areas; topic depends on instructor. May be repeated for total 9 credits if course content differs.

125 Beginning Modern Dance (3:3:0) Develops knowledge, skills, and appreciation of modern dance through presentation of fundamental techniques and creative movement experiences. May be repeated for total 6 credits.

131 Beginning Jazz Technique (3:3:0) Introduction to fundamentals of jazz dance technique and its historical context. Emphasis on improving anatomical awareness and alignment, increasing strength and flexibility, and developing rhythmic sensitivity. Also introduces jazz improvisation and choreography. May be repeated for 6 credits.

145 Beginning Ballet (3:3:0) Introduces elements of ballet technique and vocabulary. Stresses learning elementary positions and movements characteristic of this highly stylized art form. 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.

161 Beginning Tap Dance (3:3:0) Elementary exploration into rhythms and steps basic to art form of tap dancing. May be repeated for total 6 credits.

170 Orientation to Dance Production (1:1:1) Prerequisite: admission to dance major, or permission of instructor. Introduction to sound, lighting, and stage management elements and terminology as related to dance performance. Taught in an intensive workshop setting emphasizing laboratory experience.

210 Dynamic Alignment (3:3:0) Prerequisite: admission to dance major or permission of instructor. Aspects of anatomy and kinesiology that directly apply to correct development of dance technique. Emphasizes exercise correctives and imagery to correct insufficient muscle pattern and reduce stress on the body.

225 Beginning Intermediate Modern Dance (3:3:0) Prerequisite: DANC 125 or permission of instructor. Further develops knowledge, skills, and appreciation of modern dance through continued exploration of techniques, aesthetics, and creativity. May be repeated for total 9 credits.

231 Intermediate Jazz Technique (3:3:0) Prerequisite: DANC 131 or permission of instructor. Continued study of the concepts of jazz dance technique and in-depth study of 20th century jazz dance forms. Emphasizes furthering anatomical awareness and alignment, developing technical clarity, and mastering rhythm and syncopation. Continues exploration of jazz improvisation and choreography. 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 the technique, vocabulary, and history of ballet. May be repeated for total 9 credits.

251 Dance Composition I (3:3:0) Prerequisite: DANC 150 or permission of instructor. Introduction to basic principles for composing dance movement. Focuses on simple compositional forms as they apply to the 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 231 or permission of instructor. Explores compositional elements in dance as they apply to group forms. Continued
experience in developing and manipulating movement phrases, using a variety of compositional forms. Introduces conducting rehearsals and selecting music. Students discuss, analyze, and evaluate artistic choices in composition using appropriate dance arts vocabulary and terminology, and maintain video and written journals to document their 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.

314 Music Accompaniment for Dance (3:3:0) Prerequisite: DANC 114, or permission of instructor. Lecture practice course that gives both dance and music students practical experience in dance accompaniment, primarily through using percussion instruments. Students use their 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 indepth study of a 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.

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 a modern dance vocabulary, and developing flow and dynamic range. May be repeated for total 12 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 3 credits.

330 Dance/Movement Therapy I (3:3:0) Prerequisites: DANC 325, 150; PSYC 100, 211; or permission of instructor. Overview of dance/movement therapy exploring the 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.

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 a foundation to teach and perform. May be repeated for 12 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, 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 a dance performance. Taught in a series of workshop settings.

390 Dance History: Pre-Twentieth Century (3:3:0) Examines dance as it developed as a Western theatrical form from its beginnings in social and folk dance through its evolution into ballet. Emphasizes romantic and classical ballet. In addition, American dance forms are studied as they evolved in spectacles, burlesques, minstrelsy, and social dance. All forms of dance placed within social, political, cultural, aesthetic and historical contexts.

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 their predecessors. Development of contemporary dance carried with it reflections of the influence of technology and the 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. These dance forms placed within social, political, cultural, aesthetic and historical contexts.

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 and study of selected dance idiom within cultural and artistic contexts. Course work supplemented by participation in and observation of the ambient culture. Comparative analysis of 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. May be repeated for 24 credits.

430 Dance/Movement Therapy II (3:3:0) Prerequisites: DANC 210, 330, PSYC 324, 325; or permission of instructor. Application of dance/movement therapy as a psychotherapeutic process that furthers emotional, cognitive, social, and physical integration of the individual.

445 Advanced Ballet (1-3:1-3:0) Prerequisite: admission to the 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. 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. Curriculum development, proper course sequencing, implementation of teaching strategies, and classroom management techniques also emphasized. Students study teaching methods appropriate for K–12, gifted and talented, and special needs students. Intensive practice in implementing these skills includes lab and 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. Introduction to the 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 the 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 the 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. Introduction to 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) 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, fund-raising, publicity, incorporation,
booking, nonprofit vs. profit-making groups, and issues relating to current practices in performing arts industry.

790 Internship (1-3:0:0) Prerequisites: admission to MFA in dance program and permission of advisor. Study involving intensive professional experience through sponsorship by a dance company, agency, or other arts organization in management, administration, performance, choreography, or teaching. May be repeated for total 6 credits.

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.

Decision Sciences (DESC)
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 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 better in MATH 108 or 113. Co-requisite: MIS 102 or IT 103. Introduction to the application of statistical methods to support quantitative decision analysis in resolving business problems.

301 Operations Management (3:3:0) Prerequisite: DESC 210, and sophomore standing. Examines principal aspects of an organization’s operations in various settings. Emphasizes planning and decision-making activities associated with the management of operations with a focus on service operations. Analytical models used to describe key planning and control activities managing operations.

320 Supply Chain Management and E-Business (3:3:0) Prerequisites: DESC 301, MKTG 301, and degree status. Introduction to the 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 the value chain from providers to customers.

352 Methods and Models of Management Science (3:3:0) Prerequisites: DESC 301; degree status. Operation 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 Simulation for Business Decision Making (3:3:0) Prerequisites: DESC 301; degree status. Introduction to computer simulation of complex business systems. Topics include Monte Carlo methods, discrete-event modeling, simulation experiment design, simulation output analysis, simulation validation, and specialized simulation languages.

Examples from all types of business operations. Methods demonstrated and used through computer software.

452 Business Forecasting (3:3:0) Prerequisites: DESC 301; degree status. Introduction to 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, autoregressive and ARIMA models. Methods demonstrated and used through computer software.

456 Quality Management (3:3:0) Prerequisites: DESC 301, and degree status. Provides an understanding of the 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. Use of software and case studies.

493 Management of Technology Projects (3:3:0) Prerequisites: DESC 301, and degree status. Focuses on managerial problems associated with meeting the technical, cost, and time constraints of technology projects. Discusses various areas of project management such as project organizations, teams, scheduling, cost control, earned value analysis, risk management, and managing project quality. Discusses software cost estimation models. Software and case studies.

499 Independent Study in Operations Management (1-3:0:0) Prerequisites: DESC 301; degree status. Investigates business problem according to interest, using state-of-the-art decision science methodology. By special arrangement with instructor and approval from associate dean for undergraduate programs.

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. Students explore the role of culture and theories for understanding and interpreting child and family growth and development. Students learn about various disabilities, and acquire an appreciation for the critical role of families.

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. Students also gain 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 under-
standing 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 each 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 the 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 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 the cultural context of the 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 the instructor. Provides knowledge of child and family development from diverse and cultural perspectives. Students explore the role of culture and theories for understanding and interpreting child and family growth and development; learn about various disabilities; and acquire appreciation for the critical role of families.

**512 Assessment of Diverse Young Learners, Ages 3–5 (3:3:0)** Prerequisite: admission to UTEEM program, or permission of the instructor. Provides understanding of the forms, functions, methods, and roles of assessment for planning and implementing effective early childhood programs for children ages 3–5 years 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 the 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 the 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 the instructor. Teaches about development of infants and toddlers in family and cultural contexts. Students explore the 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 the 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 the instructor. Provides understanding of early language development in terms of five major components of language. Speech, language, and communication are discussed, particularly in terms of their 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 the 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 the cultural context of the 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 the K–3 grade learner. Analyzes, synthesizes, and applies knowledge. Develops and 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) 
Pre-requisite: 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 a community of learners inclusive of children with diverse abilities and needs. Integrative class enables students to link knowledge in specific content areas to the broader picture of managing the classroom day, to implementing an 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) 
Pre-requisite: 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 and 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 the needs of a 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) 
Pre-requisite: admission to UTEEM program, or permission of the instructor. Provides opportunity to analyze foundational frameworks for developing a unified perspective for their work with culturally, linguistically, and ability diverse young learners, birth to age 8, and their families. Students examine foundational work from the 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) 
Pre-requisites: admission to UTEEM program, or permission of the 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 the early childhood education. Provides understanding of the continuum of services and the context of service delivery.

790 Internship with Diverse Learners, Ages 3–5 (3:3:0) 
Pre-requisite: admission to the UTEEM program, or permission of instructor. Enables students to participate full time in an inclusive early childhood setting serving families of infants and toddlers with diverse learning needs. Students continuously link university course work to the real world of working with diverse families and their infants and toddlers. Students engage in a 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) 
Pre-requisite: admission to UTEEM program, or permission of the instructor. Students participate full time in an early childhood setting serving children with diverse learning needs. Students continuously link university course work to the real world of teaching. Students engage in a carefully planned learning sequence, beginning with targeted observations and culminating with their taking responsibility for the entire planning process for a three- to four-week period.

793 Specialization Internship with Diverse Learners and Their Families (6:6:0) 
Pre-requisite: passing scores on Praxis I and II and admission to the UTEEM program, or permission of instructor. Students participate full time in an education setting serving diverse children and their families, becoming involved in a range of activities to ensure that they experience and understand the complexity, uniqueness, and significance of the work done.

Earth Observing Systems (EOS)
School of Computational Sciences

304 Population Dimensions of Global Change (3:3:0) 
Prerequisites: 30 credits of prior course work. Interdisciplinary course combining knowledge from social sciences and environmental science to develop global understanding of the world’s population condition, issues, and related problems. Demographic concepts are applied using GIS and quantitative methods.

600 Communication Skills for Computational Scientists (1:2:0) 
Prerequisites: graduate standing. Develops basic set of essential skills for scientific communication and delivery of successful and informative oral presentations, with a 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. Objectives are met through a combination of activities, including practical writing assignments, training in composing grants for extramural competition, and advice in developing and delivering oral presentations.

656/EVPP 652/GEOG 570 The Hydroosphere (3:3:0) 
Prerequisites: two semesters of calculus (partial differential equations recommended) or permission of instructor. Components and transfer processes within the hydrosphere, which consists of the aqueous envelope of Earth, including oceans, lakes, rivers, snow, ice, glaciers, soil moisture, groundwater, and atmospheric water vapor. Students gain understanding of the various components of the hydrosphere, spatial and temporal distributions, physics of transfer processes for redistribution, and an 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 the 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. Students will gain understanding of the materials, features, and landforms of solid Earth, and the processes by which they formed.

680 Environmental Applications of Integrated Geographic Information Technologies (3:3:0) Prerequisites: EOS 753, GEOG 550 or 585, or permission of instructor. Focuses on how geoinformation technologies, including GIS, RS, and GPS, and spatial analytical tools can be used in an integrated manner to address various situations in environmental risk assessment, monitoring, and planning.

704 Spatial Analysis and Modeling of Population (3:3:0) Prerequisites: courses in quantitative methods and GIS recommended. Intermediate-level, population geography course discussing demographic concepts and spatial dimensions of population. Various indices, measures, and models commonly used in human geography are featured.

721 Biogeography (3:3:0) Prerequisites: courses in ecology, chemistry, and geology. Provides broad understanding of how physical geography and the 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 the Earth sciences at regional and global scales, utilizing interdisciplinary scientific principles.

725 Advanced Hydrosphere (3:3:0) Prerequisites: two semesters of calculus (partial differential equations recommended), or permission of instructor. Uses mathematical and modeling approaches for in-depth study of the different components and transfer processes within the 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) Prerequisites: 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. Ground, airborne, and spaceborne hyperspectral remote sensing systems are discussed.

753 Observations of the Earth and Its Climate (3:3:0) Prerequisites: 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 systematical study of how each part of the 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 the atmosphere, land masses, and oceans. Includes discussions of current efforts by NASA and NOAA to provide integrated data gathering and dissemination systems.

754 Earth Observing/Remote Sensing Data and Data Systems (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 (EOS), as well as the National Polar-Orbiting Operational Environmental Satellite Systems (NPOESS), and the NPOESS Preparatory Project (NPP) 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 Quantitative Methods in Remote Sensing (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. Programming projects emphasized.

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/global changes courses. May be repeated for credit as needed.

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 the surface radiation budget, land cover, inland and coastal waterways, and soil moisture. Algorithms/techniques and examples discussed in detail.

771 Algorithms and Modeling in GIS (3:3:0) Prerequisites: prior course or experience in GIS and knowledge of a computer programming language. Examines several fundamental GIS algorithms based upon computational geometry and computer graphics. Also discusses issues in modeling features of different dimensions and surfaces in GIS. Significant programming expected.
772 Distributed Geographic Information Systems (3:3:0)  
Prerequisites: introductory course in GIS and some programming experience; or permission of instructor. Examines different aspects of science and technology in the context of distributed GIS. Includes general concepts, architecture, component design and development, and system integration as well as other advanced topics, including interoperability and agent-based GIS.

773 Interoperability of Geographic Information Systems (3:3:0)  
Prerequisites: EOS 754 and GEOG 553 or a course in GIS. Advanced course addressing theories, standards, and implementations of web-based interoperable geographic information systems for online data and information services. International standards, including OGC, and associated tools for interoperability reviewed in detailed.

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. Higher moments, point pattern analyses, and interpolations of points to surfaces will be addressed. Spatial regression also included.

792/EVPP 792/GEOG 792 Seminar in Earth Systems Science (2:2:0)  
Prerequisites: 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.

840 Hyperspectral Imaging Applications (3:3:0)  
Prerequisites: 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. Vertical distributions of meteorological variables such as wind, temperature, and humidity discussed, as well as 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. Introduction to physical and numerical modeling issues involved in mesoscale atmospheric flows. These flows involve time and space scales associated with the diurnal cycle, atmospheric inertial mode, thermal and mechanical forcing due to mesoscale terrain inhomogeneities, mesoscale precipitation systems, and downscale 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 PhD faculty and staff, Mason faculty in related programs, and professional visitors. May be repeated for credit; however, a maximum of 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 the guidance of dissertation director and doctoral committee. May be repeated as needed; however, no more than 12 credits of EOS 998 may satisfy doctoral degree requirements.

999 Doctoral Dissertation (1-12:0:0)  
Prerequisite: admission to and permission of instructor. Doctoral dissertation research under direction of dissertation advisor. May be repeated, but no more than a total of 24 credits in EOS 998 and 999 may be applied to doctoral degree.

E-commerce (EC)

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 multilayered e-commerce architectures of e-commerce sites. The ISO OSI Reference Architecture. Functions and main features of the IP protocol. Functions and main features of the TCP protocol: connection establishment, error control, congestion control. The HTTP protocol. Load balancers, web servers, application servers, and databases servers in an e-commerce site architecture. Discusses software architecture elements such as servlets, transaction processing services, remote method invocation, CGI scripts, active server pages.

512 E-commerce Software Services (3:3:0)  
Prerequisite: EC 511. Flow analysis of e-commerce transactions and the role of the various software servers (web servers, application servers, and database servers) in executing e-commerce transactions. Examples of various technologies are used to illustrate typical designs. Protocols used for authentication and payment in e-commerce. Introduction to symmetric and public-key encryption. Digital signatures. Digital certificates. The Secure Sockets Layer (SSL) protocol. The Transport Layer Service (TLS) protocol. 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. Principles of microeconomic theory are explored fully, 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 the 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 the specialization area of the 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. Concepts developed and applied to current economic and social problems and issues. Less formal modeling than in the 103–104 sequence.

103 Contemporary Microeconomic Principles (3:3:0) Introduction to 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) Prerequisites: registration is controlled; contact instructor for guidelines to register. Introduction to 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) Prerequisites: registration is controlled; contact instructor for guidelines to register. Participate 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, 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 the measurement of national income; determinants of levels of income and output; and causes and solutions for problems of unemployment, inflation, and economic growth.

316 Economic Growth and Business Cycle (3:3:0) Prerequisite: ECON 310 or 311, or permission of instructor. Factors contributing to sustained economic growth with additional emphasis on business fluctuations and their measurement.

320 Labor Problems (3:3:0) Prerequisites: ECON 103 and 104, or permission of instructor. American labor unions and their effect on society. Causes of and proposed solutions to selected problems.

321 Economics of Labor (3:3:0) Prerequisite: ECON 306. Factors that determine levels of wages and employment and economic consequences. Attention to recent developments in unionism, collective bargaining, and industrial technology.

330 Public Finance (3:3:0) Prerequisite: ECON 306, or permission of instructor. 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 an analysis of 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 DESC 210, or STAT 230. 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. Issues of economic development as applied to Africa. Includes overview of early economic history in Africa and post-independence development, as well as contemporary development problems.

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, as well as 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 the behavior of agents affect the 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 make the transition to more market-oriented economies. Includes market economics and central planning.

385 International Economic Policy (3:3:0) Introduction to economic way of thinking on trade and international finance. Presents historical and current information on consequences of trade and protectionism. May not be taken for credit by students who have completed ECON 390.

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. Application of economic theory and methodology to the study of nonmarket decision making.

412 Game Theory and Economics of Institutions (3:3:0) Prerequisite: ECON 306 or permission of instructor. Introduction to game theory and its relevance for analyzing framework of rules and institutions within which economic processes occur. Application of game theoretical concepts to a comparative analysis of the 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.

440 Economic Systems Design: Principles and Experiments (3:3:0) Prerequisite: MATH 213. Introduction to design principles used in developing systems 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.

441 Economic Systems Design: Case Studies and Analysis (3:3:0) Prerequisite: ECON 440. Involves students in designing allocation mechanisms for specific problems. Students required to design and develop mechanism to specific allocation problem. Students must develop analytical and a working engineering models of their mechanism.

442 Economic Systems Design: Implementation (3:3:0) Prerequisites: ECON 441. Involves students in developing experimental design to test proposed allocation solution. Design process include construction of experimental parameters and treatments to test the mechanism, and initial test in laboratory setting.

445. Design and Analysis of Experiments (3:3:0) Prerequisites: STAT 250, 344; MATH 351 or IT 250, or permission of the instructor. Topics include comparing two or more treatments, and computation and interpretation of 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, DESC 210, and 90 credits; economics majors only. Application of 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. 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. Additional prerequisites are noted. With permission of instructor, additional prerequisites may be required.
Economics (ECON) 399

sites may be waived. Individual study of selected area of economics. Directed research paper required.

535 Survey of Applied Econometrics (3:3:0) Prerequisites: DESC 210, ECON 306 and 311, or permission of instructor. Applied introduction to estimating economic relationships. Simple equation and simultaneous equation system estimation along with associated problems. Students who take ECON 535 may not take ECON 637 for credit.

611 Microeconomic Theory (3:3:0) Prerequisite: admission to doctoral or master’s program or ECON 306, ECON 311, and MATH 113, or permission of graduate coordinator. Theory of behavior of consumers, firms, and resource suppliers. Theories of choice under conditions of risk and uncertainty. Partial equilibrium analysis of competitive and noncompetitive markets. General equilibrium analysis, welfare economics, and introduction to capital theory.

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. Growth and 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, ECON 311, and MATH 113, or permission of instructor. 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: Course in linear and nonlinear optimization, and course in linear algebra. Introduces analytical and engineering principles to develop exchange systems. Students required to become familiar with literature on applied mechanism design, and understand behavioral aspects of auction systems, matching, assignment and transportation problems, and information markets. In addition, students introduced to 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 associated with research project.

634 Economic Systems Design—Implementation (3:3:0) Prerequisite: ECON 633. Students do original research in economic systems design by constructing engineering model of a solution to an allocation problem. Research includes experimental and statistical design along with a complete description of hypothesis related to construction of experimental parameters and treatments to test their mechanism. Requires initial test of mechanism in laboratory setting.

637 Econometrics I (3:3:0) Prerequisite: Acceptance to PhD program, DESC 210, or permission of instructor. Techniques of estimating relationships between economic variables. Introduction to 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. Classical, neoclassical, Keynesian, and post-Keynesian theories of income and employment determination. Theories of inflation and growth. The demand for money and its implications for the effectiveness of monetary vs. fiscal policy.


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. Development of monetary theory with emphasis on current theories and controversies in the field.

820 History of Economic Thought (3:3:0) Major figures in history of economic thought and the tools of analysis they created; emphasis on classical, neoclassical, and Keynesian theories.

821 History of Economic Thought II (3:3:0) Development of economic analysis from the “marginal revolution” of 1877 to present. Emphasis on the development of neoclassical economic theory.

823 Topics in Economic History (3:3:0) Prerequisites: ECON 611 and 615. Economic analysis of various historical epochs, such as the Industrial Revolution, evolution of political reform, rise of unions, growth of government.

825 Political Economy and Public Policy I (3:3:0) Prerequisite: ECON 611 or permission of instructor. Economic process of public policy formulation and implementation. 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. Topics include 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. Interrelations between economics and legal and political institutions. Philosophical presuppositions of a capitalist economy under constitutional democracy. Considers alternative presuppositions for noncapitalist
828 Constitutional Economics (3:3:0) Prerequisite: ECON 611 or permission of instructor. Analyzes existing and proposed elements of the “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 within which economic activities and transactions are carried out. Emergence and working properties of different institutions. Comparative discussion of classical and contemporary approaches to economic theory of institutions.

831 Mathematical Economics II (3:3:0) Prerequisite: ECON 630 or permission of instructor. Mathematical treatment of economic theories. Static and dynamic analysis of macromodels. Input-output analysis. 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. Econometric models and simultaneous equation systems. Identification of parameters and least squares bias; alternative estimation methods and block recursive systems.


846 Industrial Organization and Public Policy II (3:3:0) Prerequisites: ECON 611 and 844. Relation between law and economics and theories of social control of property rights. Theories of market structure and industrial 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. Allocative and distributional effects of alternative tax and subsidy techniques. Principles of benefit-cost and cost-effectiveness analysis for government decisions.

854 Public Choice II (3:3:0) Prerequisite: ECON 611 or permission of instructor. Public choice approach applied 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) Analysis of economic models of ecosystems and pollutant discharges into environment. Methods of improving economic efficiency; review of public policies.

866 Economic Development (3:3:0) Prerequisites: ECON 611 and 615 or permission of instructor. Forces contributing to and retarding economic progress in developing countries. Role of foreign trade, economic integration, foreign investment, multinational corporations, and technological transfers.

869 International Trade and Policy (3:3:0) Prerequisite: ECON 615 or permission of instructor. Classical, neoclassical, and modern theories of international trade. Studies theory and practice of world trade models such as project LINK. Analysis of foreign investment and economic growth, tariffs and nontariff barriers, and economic integration; 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.

880 Austrian Theory of the Market Process I (3:3:0) Prerequisite: ECON 611. Economic theory developed by Menger, Mises, Hayek, and others of the Austrian School, and comparison with other currently popular theories.

881 Austrian Theory of Market Process II (3:3:0) Prerequisites: ECON 611 and 615. ECON 880 is recommended. Continuation of ECON 880. Topics vary and include emphasis on market-process approach to analysis of capital accumulation, growth, money and credit institutions, inflation, unemployment, and industrial fluctuations.

885 Experimental Economics (3:3:0) Prerequisites: ECON 611 or permission of instructor. Designed for graduate students who desire 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 Economic Systems Design (3:3:0) Prerequisites: ECON 885 or permission of instructor. Research in applied mechanism design. Topics represent basic tools required to build, test, and implement mechanisms in an applied setting.

895 Special Topics in Economics (3:3:0) Topics vary according to interests of instructor. Emphasis on 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 discussed.

950 Seminar in Public Finance (3:3:0)  
Prerequisites: ECON 811 and 849. Important public finance issues treated in seminar format.

985 Workshop in Experimental Economics (3:3:0)  
Prerequisites: ECON 883, 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 their course work but who 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

300 Introduction to Teaching (3:3:0)  
Introduces the teaching profession by examining the roles of a teacher, the nature of American schools, and the students' potential contributions. School-based field experience required during course. Note: Intended as an introduction to educational issues; not applicable in Mason's graduate-level teacher education programs.

301 Educationally Diverse Populations: Handicapped, Gifted, Multicultural (3:3:0)  
Introduces psychological, sociological, educational, and physical aspects of diverse populations in today's schools for early and middle education. Emphasizes litigation and legislation pertaining to the education of diverse populations. School-based field experience required during course. Note: Intended as an introduction to educational issues; not applicable in Mason's graduate-level teacher education programs.

302 Human Growth and Development (3:3:0)  
Examines human development through the 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. School-based field experience required during course. Note: Intended as an introduction to educational issues; not applicable in Mason's graduate-level teacher education programs.

303 Politics of American Education (3:3:0)  
Examination of the American political system for students studying the American political system, and those interested in a career in education. Explores how interactions between various levels and branches of government affect education.

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 the student's area of concentration (vocal and choral or instrumental). Experiences are in elementary or secondary school settings.

500 In-Service Educational Development (1-6:0:0)  
Prerequisite: employment in professional capacity by sponsoring division or agency. Offered at the request of the school division or other educational agency. Content varies; may be repeated for credit.

511 Introduction to Education in International Schools (3:3:0)  
Structure and variations of international schools. Includes analysis of human growth and development, overview of educational psychology, and introduction to the use of technology across the curriculum.

512 Teaching Elementary Social Studies in International Schools (3:3:0)  
Focuses on the translation of knowledge and data-gathering processes from the social sciences into appropriate and meaningful K–8 social studies experiences. Develops understanding of the 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 the exploration, verification, and explanation of 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 the 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 interrelations of instruction, curriculum, and assessment in international schools. Includes review of research and effective practice.

521 Foundations of Education PK–12 (3:3:0)  
Overview of the various ways of educating, and socialization processes operating in American educational institutions and other organizations. Analyzes current education practices in terms of history, philosophy, psychology, and sociocultural factors of formal and informal learning. Emphasizes trends, issues, and alternative futures. Field experience in public schools required.

522 Introduction to Secondary Education (3:3:0)  
Analyzes philosophical assumptions, curriculum issues, learning theories, and history associated with current teaching styles. Emphasizes applications to all disciplines taught in secondary schools. Examines current educational trends and issues in relation to the sociology of secondary school settings. Field experiences required.
537 Foundations of Multicultural Education (3:3:0)
Examines multicultural education through historical, sociological, and philosophical foundations. Emphasizes role of ethnicity in the development of the nation and its education system. Includes overview of multicultural and multilingual curricula, and culturally and linguistically responsive instructional and assessment techniques. Field experience required.

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. Field experience in public schools 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. Develops understanding of the relationship between society and education; explores contemporary innovations that influence curriculum. Field experience required.

543 Children, Family, Culture, and Schools, 4–12 Year Olds. (3:3:0)
Prerequisite: admission to the elementary education licensure program. Examines child and family development and the ways that children, families, schools, and communities interrelate. Children’s developing physical, social, emotional, and cognitive abilities linked to planning curriculum and developing instructional strategies. Field experience required.

597 Special Topics in Education (1-6:1-6:0)
Prerequisite: admission to a program in the Graduate School of Education. Provides advanced study on a 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 a degree program, and permission of dean. Presents various subjects and projects, principally by directed study, discussion, research, and participation under the supervision of graduate faculty member. May be repeated for up to 12 credits.

599 Thesis (6:0:0)
Prerequisite: EDRS 590. Study of a problem of significant interest to the student using accepted research methods and under the 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)
Practitioners use the Cultural Inquiry Process (CIP) and web site to acquire cultural, social, and language-related perspectives on educational processes; learn skills in analyzing educational settings; and expand strategies to address “puzzlements” in their own practice.

611 Cultural Issues in Second Language Acquisition (3:3:0)
Prerequisite: admission to TESL or bilingual/multicultural education program, doctoral status, or permission of instructor. Explores impact of linguistic and cultural diversity among students on the teaching of second language across the curriculum. Draws on theoretical foundations in second language acquisition, crosscultural communication, socio- and psycholinguistics, and educational anthropology.

612 Inquiry into Practice (2:2:0)
Provides experience using research skills to foster systematic and thoughtful inquiry into classroom practice. Practitioners explore 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 the study of learning based on research and theory from different disciplines. Focuses on increasing students’ learning through the study of different learning systems, and understanding each learner in the context of the 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 the needs and interests of students. Investigates factors that affect teaching and learning, and examines multiple ways of knowing that teachers bring to classrooms.

615 Educational Change (2:2:0)
Explores influences on educational change at the 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.

616 Counseling Skills in International Schools (3:3:0)
Introduces counseling skills applicable to international school settings. Students study, discuss, and develop counseling skills with an emphasis on multicultural counseling and multiethnic student populations.

617 Group Counseling in International Schools (3:3:0)
Discusses group counseling within the context of international schools and multicultural counseling describing various types of groups, group counseling practices, methods, group dynamics, and facilitation skills. Attention to application of 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 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.

634 The Role of the School Library Media Specialist (3:3:0)
Introduces basic concepts of library science, and the professional responsibilities and ethical standards of the library media specialist. Addresses this role as an 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 within the 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 the needs of library patrons seeking information.

642 Organization and Technical Processing of Materials (3:3:0) Emphasizes application of basic cataloging principles in the bibliographic description of print and nonprint materials. Students develop procedures for organizing, cataloging, and maintaining a 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 evaluation of 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 in the planning, production, and presentation of useful instructional materials.

645 Literature for Young Adults (3:3:0) Provides in-depth knowledge of young adult literature and the ability to relate that knowledge to library programs. Extensive reading of young adult literature is required.

646 Literature for Children (3:3:0) Develops critical abilities in selecting and using literature for children. Focuses on selecting materials to support the curriculum and promote reading.

670 The Culture of Teaching (3:3:0) Prerequisite: admission to the 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. Corequisite: EDUC 672. Focuses on relationship between schools and the 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 as well as theories that provide a basis for understanding the learning process. Addresses implications for the design of instruction and curriculum. Field experience in public schools required.

674 Assessing Learning and Teaching in the Secondary 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) To be taken in last year of course work. Helps beginning teachers understand various research paradigms for using research literature and systematic evidence to improve practice. Emphasis on linking research and practice, and making informed instructional decisions.

695/ENGL 695 Northern Virginia Writing Project Inservice Program (1-3:0:0) Prerequisite: admission to graduate program, or permission of dean. Offered at the request of a school division or other educational agency. Content varies. May be repeated with permission of department, but no more than 6 credits in EDUC 695, 695, or 699 may be applied toward a master's degree.

697/ENGL 697 Theory of Composition (3:3:0) 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 the works of leading theorists, and developing a statement describing the implications of theoretical consistency in the teaching of writing.

751 Mentoring/Supervising Intern Teachers and Mentor Teacher Career Development (3:3:0) Examines multiple roles of mentor teachers as they mentor and supervise intern teachers in schools. Career development, leadership, and instructional roles and strategies are integral. Leadership and developmental issues are central to the discussion ensuring quality performance in the classroom. Designed to assist intern teachers in their first year, and provide quality career and staff development to their mentors.

797 Advanced Topics in Education (1-6:1-6:0) Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education. May be repeated for credit with the GSED approval.

800 Ways of Knowing (3:3:0) Prerequisite: admission to PhD program. Provides understanding of characteristic ways of knowing in various liberal arts disciplines while examining subject matter, scope, key concepts, principles, methods, and theories. Analyzes philosophical traditions underlying educational practice and research. Required course during first spring semester of study in the program.

802 Leadership Seminar (3:3:0) Prerequisite: admission to PhD program. Intensive study of leadership, emphasizing decision and change processes, and the assessment and development of leadership skills. Required course during first semester of study in the program.

805 Doctoral Seminar in Education (1:1:0) Prerequisite: admission to PhD program. Covers in-depth selected topics in education. Students, faculty members, and scholars discuss current research interests and ideas.

870 Education Policy: Process, Context, and Politics (3:3:0) Prerequisite: admission to PhD in education program, or permission of instructor. Examines public policy decision-making in education at the local, state, and national levels and its impact on education institutions, students, and public. Particular attention to government entities' authority over education decision-making, and resolution of competing policy arguments in political arena.

871 Advanced Policy Issues in Education (3:3:0) Prerequisite: EDUC 870 or equivalent. In-depth analysis of selected education policy issues. Attention to issue interactions and education-related policy actions by different levels of government.

872 Social Science Research and Education Policy (3:3:0) Prerequisite: admission to PhD program; EDUC 870 and
871; or equivalent doctoral-level policy course work. Focu-
ses on the research base used to support education policy
actions. Attention to analyzing the strength of this research.

881 Seminar in Bilingual Education: Policy (3:3:0) Pre-
requisite: admission to PhD program. Examines historic-
ical development of education for language minority
students in the United States, including federal and state
legislation and court decisions. Explores in-depth policy
issues regarding administrative program models, instruc-
tional approaches, curricular reform, and assessment poli-
cies for language minority students developed in response
to legal mandates, legislative decisions, and school re-
form movement.

882 Seminar in Bilingual Education: Theory and Re-
search (3:3:0) Prerequisite: admission to PhD program.
Examines theoretical foundations of bilingual and ESL
education through focus on linguistics, anthropology, so-
ciology, psychology, and education research addressing
language minority students.

890 Doctoral Internship in Education (3:3:0) or (1:1:0
to 6:6:0) Prerequisites: admission to PhD program, and
prior approval of advisor and PhD director. Requires
100 hours of on-site internship completed over at least a
five-week period. Interns work with an appropriate
staff member in a cooperating school, school system, or
other educational institution, agency, or setting. Up to 6
credits of EDUC 890 may be applied toward PhD
degree requirements.

893 Seminar in Educational Anthropology (3:3:0) Pre-
requisite: admission to PhD program, or permission of in-
structor. Examines theories and research from educational
anthropology and educational sociology to clarify and ad-
dress contemporary educational issues and concerns. Fo-
cuses on U.S. public schools, with comparative materials
from other educational settings and societies.

894 Seminar in Multicultural Education (3:3:0) Exam-
ines the knowledge base, policy issues, and curricular and
instructional features of multicultural education in the
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. Stu-
dents 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 pro-
gram, and prior approval of advisor and PhD director.
Structured learning experience to extend and develop skills
and knowledge relative to a field of professional expertise.

994 Advanced Internship in Education (3:3:0) Pre-
requisite: admission to PhD program, and prior approval of
advisor and PhD director. Internship in a setting related to
the student’s major area of study. Requires minimum of
100 hours completed over at least a five-week period. Each
intern works with an appropriate staff member in a cooper-
ating school, school system, or other educational institu-
tion or agency. Internship must be in a setting that differs
from regular employment.

998 Doctoral Dissertation Proposal (1-3:1:3:0) Pre-
requisite: admission to candidacy in the PhD program; suc-
cessful completion of the doctoral qualifying exam; and
EDRS 810, 811, and 812 or their equivalents.

999 Doctoral Dissertation Research (1-9:1-9:0) Prere-
quises: admission to candidacy in the PhD program, and
faculty approval of dissertation proposal. Provides contin-
ued faculty assistance on an individual basis to complete
the 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.

Other Courses For other PhD courses, see EDUC 840,
881, 882; EDRS 810, 811, 812, 820, 895; EDCI 701, 705;
EDLE 895; EDCD 895; 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) Exam-
ines critical functions of leadership and management, com-
plex 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 struc-
ture on reform and student achievement. Emphasizes lead-
ership skill development.

612 Education Law (3:3:0) Prerequisites: EDLE 610 and
admission to the program. Corequisite: EDLE 791. Pro-
vides legal foundations of U.S. public schools. Examines
general principles of statutory and case law, and applies
judicial decisions to educational environments. Focuses on
legal responsibilities, constraints, and opportunities of pub-
lic school officials. Includes a component of Special Edu-
cation law.

614 Managing Financial and Human Resources (3:3:0)
Prerequisites: admission to the program and EDLE 610,
612. Corequisite: EDLE 791. Explores basic functions in
financial and human resource management. Examines le-
galities, ethics, and politics of resource procurement
and allocation. Provides experiences to help students bet-
ter 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 the
written, taught, and tested curriculum, and identifies criti-
cal leadership decisions that can positively impact student
achievement. Identifies components of effective curricu-
lam guides, and constructs guide for personal use.

618 Supervision and Evaluation of Instruction (3:3:0)
Prerequisites: admission to the program and EDLE 610,
612, 614, 616. Corequisite: EDLE 791. Provides theoreti-
cal 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 the 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 the program. Examines current and emerging issues and trends impacting education. Inquires about 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 the program. Uses case-studies learning approach 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.

791 Internship in Educational Leadership (3:3:0) Prerequisites: admission to the program and EDLE 610. Corequisite: EDLE 612. Course must be taken in second term of program. Offers a 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 a corequisite with EDLE 801. First in a three-course sequence. Focuses on historical foundations of U.S. education and evolution of school, district, and state leadership. Students begin work on an analytical literature review.

802 Foundations of Education Leadership: Ethics, Philosophy, and Law (3:3:0) Prerequisites: EDLE 801. May be taken as a corequisite with EDLE 801. Second in a 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 an analytical literature review.


815 Conceptual Frameworks in Education Leadership (3:3:0) Prerequisites or corequisites: admission to PhD in education program, or permission of instructor. Introduces three different disciplinary perspectives on education leadership, and helps students 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 basic to performing research, with emphasis on interpretation and application of research results. Course 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 the study of 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 the PhD program or permission of instructor. Advanced course in the interpretation and application of 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 its 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 quasiexperimental research studies, and methods of analysis appropriate to these studies, including the analysis of variance and multiple linear regression.

812 Qualitative Methods in Educational Research (3:3:0)  
Prerequisite: successful completion of EDUC 810 or its equivalent, or permission of instructor. Students study and apply qualitative data collection and analysis procedures used in educational research, including ethnographic and other field-based methods, and unobtrusive measures. Emphasizes evaluation techniques and other field-based methods, and unobtrusive measures. Emphasises 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.

820 Evaluation Methods for Educational Programs and Curricula (3:3:0)  
Prerequisites: 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 a modular approach, and provides an 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. Students learn through a combination of 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 the 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 the salient features as well as the advantages and 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 current 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 the 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 being implemented 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 the results. Addresses issues in educational policy, philosophy, and ethics pertaining to assessment and testing.

652 Process of Learning and Development (3:3:0)  
Prerequisite: EDEP 550. Explores different theoretical perspectives on learning and development. Focuses on historical and contemporary theories of learning and cognitive development, and examines current research and its application in educational settings.

653 Culture and Intelligence (3:3:0)  
Explores different theoretical perspectives on intelligence as they relate to individual and cultural differences. Examines issues related to heritability and measures of intelligence, and intelligence in the cultural context.

654 Learning, Motivation, and Self-Regulation (3:3:0)  

Electrical and Computer Engineering (ECE)  
Electrical and Computer Engineering

101 Introduction to Information Technology (3:3:1)  
Introduces fundamental concepts in information technology that provide the technical underpinning for state-of-the-art applications. Fundamental engineering skills and a perspective on the range of information technology presented through lectures and hands-on experiments. Historical development and social implications of efforts in information technology are integral part of course. f,s

201 Introduction to Electrical Engineering (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. Standard software packages for electrical engineering are introduced as tools to simulate engineering problems on a 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: Corequisites: MATH 203, 214. First of a 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. Analysis of signals and sys-
tems via differential equations and transform methods is discussed. Laplace and Fourier transforms as convenient analysis tools are presented, and the powerful concept of frequency response of systems is emphasized. Stability of systems studied in both the time and frequency domains. Application examples from communications, circuits, control, and signal processing are presented. f,s,summer

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 with or before ECE 280. Builds on simple circuit concepts (current, voltage, ohm's law, Kirchhoff Voltage Law) introduced in PHYS 260. Circuit analysis using superposition, equivalent circuits, transient and steady state analysis of RL, RC, and RLC circuits. Applications of Laplace transform in circuit analysis, sinusoidal excitations and phasors, resonance, filters, AC steady-state analysis, coupled coils, and three phase circuits. Includes lab demonstrating and investigating circuit analysis concepts. f,s,summer

301 Digital Electronics (3:2:2) Not intended for those majoring in electrical or computer engineering. Introduces to 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 (3:3:0) Prerequisites: CS 211 or IT 101, 108, and 212. Not intended for those majoring in electrical or computer engineering. Introduction to 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. Assembly language, including instruction format, data definition, load/store/arithmetic instructions, and addressing. Laboratory included. f,s

305 Electromagnetic Theory (3:3:0) Prerequisites: PHYS 260 and MATH 214, with grades of C or better in both. 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 a two-semester sequence of courses 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 the Z-transform presented as convenient analysis tool. Powerful concept of frequency response of systems developed in the first semester of the sequence continues to be emphasized. Random signals are studied in both continuous time and discrete time. Application examples from communications, circuits, control, and signal processing are presented. f,s,summer

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. Principles of digital logic and digital system design and their 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 an 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,summer

333 Linear Electronics I (3:3:0) Prerequisite: grade of C or better in ECE 280. ECE 334 is normally 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,summer

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,summer

410 Introduction to Signal Processing (3:3:0) Prerequisites: grade of C or better in ECE 320 and STAT 346. Introduction to statistical signal processing. Reviews probability theory with emphasis on continuous random variables and transformations; treatment of discrete-time signals with introduction to sampling and filtering of random signals; and spectral analysis of random signals, detection of signals in noise, and estimation of signal parameters. f

421/SYST 421 Classical Systems and Control Theory (3:3:0) Prerequisite: grade of C or better in ECE 220, or permission of instructor. Introduction to analysis and synthesis of feedback systems. Covers functional description of linear and nonlinear systems, block diagrams, and signal flow graphs; state-space representation of dynamical systems, frequency response methods, and Root Locus, Nyquist, and other stability criteria. Performance indices and error criteria, and applications to mechanical and electromechanical control systems are also discussed. f,s,summer

422 Digital Control Systems (3:3:0) Prerequisite: grade of C or better in ECE 320 and 421. Introduction to analysis and design of digital control systems, Z-transform, discrete linear systems, frequency domain, and state variable techniques. Use of microcomputers in control systems is discussed. f

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 an emphasis on the use of 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. Introduction to 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. s

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 covering the following topics: 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 the 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 335 or 430 or permission of instructor. Introduces fundamentals of microelectronic semiconductor device fabrication technology. Processing steps include photolithography, oxidation, diffusion, ion-implantation, chemical vapor deposition, ohmic contact metallization, interconnects, packaging, MOS process integration, and bipolar process integration, etc. Laboratory project integral part of course.

442 Digital Computer Design and Interfacing (3:3:0) Prerequisite: grade of C or better in ECE 445. Overview of digital computer development. Computer design principles, design of processors, instruction sets, memory systems, cache, interface, RISC principles, and principles of pipelining and pipeline hazards are examined. 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 the operation of a digital computer. Topics include computer arithmetic, the arithmetic unit, hardwired and microprogrammed control, memory, register-to-register, input-output operations, and behavioral modeling of computer organization using VHDL. f,s

447 Single-Chip Microcomputers (4:3:3) Prerequisites: CS 211, ECE 332, and 445, all with a grade of C or better, and 90 credits toward electrical or computer engineering degree. Designing with single-chip microprocessors and microcomputer interfacing. Topics include role of microcomputers as compared with 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 a project and design and construct a system including a single-chip microcomputer and the ancillary hardware to implement a control system. Completing this course with a C or better satisfies university’s general education synthesis requirement. f

448 FPGA and ASIC Design with VHDL (4:3:3) Prerequisites: 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 the 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 the design and fabrication of a digital computer using field programmable arrays (FPGA) and/or other VLSI-integrated circuits. Includes specification of a simple computer using VHDL, simulation of the computer, and fabrication of the computer in programmable logic devices (FPGA, PLA, PAL, etc) Compares simulation and hardware implementation. s

450 Introduction to Robotics (3:3:0) Prerequisite: ECE 320. Introduction to robotic manipulator systems. Topics include an overview of manipulation tasks and automation requirements; actuators, sensors, and computer interfaces; arm and hand kinematics; path, velocity, and force control; elements of computer vision; and real-time programming languages. Design projects are conceived, simulated, and tested by the students. f

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 from 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, affects of noise on analog communication systems.

461 Communication Engineering Laboratory (1:0:3) Prerequisites: ECE 460 and ECE 334. Lab experiments in the analog and digital communication areas covered in ECE 460. f,s

462 Data and Computer Communications (3:3:0) Prerequisites: STAT 346 or 344, ECE 220 and 331 or 301 or 303, all with a grade of C or better. Introduction to modern data communications and computer networks. Topics include point-to-point communication links and transmission of digital information, modems, and codecs, packet switching, multiplexing and concentrator design, multiaccess and broadcasting, local area networks, wide area networks, and ISDN. Course discusses the architectures and protocols for computer networks and the concept of OSI reference model, the OSI seven layers; physical interfaces and protocols, data link control layer, and network layer. Examples of data networks are provided. s

463 Digital Communications Systems (3:3:0) Prerequisite: ECE 460. Introduction to 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, voiceband 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. Solution to the 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.

465 Computer Networking Protocols (3:3:0) Prerequisites: STAT 346 or 344, CS 211, and either ECE 331 or 361. Introduction to computer networking protocols and concepts, with emphasis on the Internet and the Internet Protocol Suite. Covers computer networking protocols at the application, transport, and network layers, including multimedia networking protocols. Other topics include network security and network management.

467 Network Implementation Laboratory (1:1:2) Prerequisite: ECE 462. Corequisite: ECE 465. Hands-on experience in the implementation, configuration, and operation of local and wide area networks in a live laboratory environment equipped with modern local and wide area network devices and technologies. Students are 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 the computer network protocol stack.

469 Microwave Circuit Laboratory (1:1:2) Prerequisites: ECE 305 and 334, or permission of instructor. Introduction to microwave engineering laboratory techniques and measurements. Design, fabrication, and test of microwave microstrip circuits.

491 Engineering Seminar (1:1:0) Prerequisite: 90 credits in electrical or computer engineering program. Engineering ethics, professionalism, role of engineer in society, current topics, and employment opportunities.

492 Senior Advanced Design Project I (1:1:0) Prerequisite: senior status in electrical engineering program. Concept of the senior design project and determination of the feasibility of the proposed project. Work includes developing a preliminary design and an implementation plan.

493 Senior Advanced Design Project II (2:2:0) Prerequisite: ECE 492, preferably in the preceding semester. Implementation of project for which preliminary work was done in ECE 492. Project includes designing, constructing of hardware, writing required software, conducting experiments or studies, and testing the complete system. Oral and written reports are required during project and also at project’s completion. Completing this course with a C or better satisfies university’s general education synthesis requirement.

498 Independent Study in Electrical and Computer Engineering (1-3:0) Directed self-study of special topics of current interest in ECE. Topic must be arranged with an instructor and approved by the department chair before registering. Maximum 3 credits.

499 Special Topics in Electrical Engineering (1-3:0) Prerequisites: permission of instructor; specific prerequisites vary with the nature of the topic. Topics of special interest to undergraduates. May be repeated for maximum 6 credits if topics substantially differ.

511 Microprocessors (3:3:0) Prerequisite: ECE 445 or equivalent. Introduction to microprocessor software and hardware architecture. Fundamentals of microprocessor system integration, instruction set design, programming memory interfacing, input/output, direct memory access and interrupt interfacing. Microprocessor architecture evolution. Study of the Intel family of microprocessors. Review of other microprocessor families and trends in microprocessor design.

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.

520 Applications of Analog and Digital Integrated Circuits (3:3:0) Prerequisites: ECE 433 and 431, or permission of instructor. Study of analog and digital integrated circuits mainly from communications applications point of view. Covers analog, digital, and mixed (analog/digital) building block circuits used in system design including operational amplifiers, comparators, voltage regulators, video amplifiers, oscillators, modulators, phase-locked loops, multiplexers, active filters, A/D and D/A converters, and optoelectronic circuits.

521 Modern Systems Theory (3:3:0) Prerequisite: ECE 320 or equivalent. Introduction to linear systems theory. Review of 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, stability theory, and introduction to design of linear feedback control systems.

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 vectors, functions of random variables, expectation and variance, conditional expectation, moment generating and characteristic functions, random processes (such as white noise, Gaussian), autocorrelation and power spectral density, linear filtering of random processes, basic ideas of estimation and detection.

535 Digital Signal Processing (3:3:0) Prerequisites: ECE 320 and 528 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, the Fast Fourier Transform algorithms, and spectrum analysis. Additional topics may include adaptive filtering, homomorphic digital signal processing, digital interpolation and decimation, and VLSI signal processors.

537 Introduction to Digital Image Processing (DIP) (3:3:0) Prerequisite: graduate standing. First course in digital-image processing in which concepts of scanning systems, focal plane array detectors, data acquisition methods, display hardware, image preprocessing algorithms, feature extraction, and basic image processing methods are introduced. Semester-long image processing project included utilizing modern image processing system prototyping software.

540/TCOM 500 Modern Telecommunications (3:3:0) Prerequisite: graduate standing. For students outside of the program. Cannot be applied toward degrees in electrical or computer engineering. Comprehensive overview of telecommunications including current status and future
directions. Topics include review of evolution of telecommunications; voice and data services; basics of signals and noise, digital transmission, network architecture, and protocols; local area, metropolitan, and wide area networks and narrowband ISDN; asynchronous transfer mode and broadband ISDN; and satellite systems, optical communications, cellular radio, personal communication systems, and multimedia services. Examples of real-life networks provided to illustrate the basic concepts and gain further insight.

542 Computer Network Architectures and Protocols (3:3:0) Prerequisite: STAT 344 or equivalent, and graduate standing in IT&E: Introduction to architectures and protocols of computer networks and the 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. f,s,summer

545 Introduction to VHDL (3:3:0) Prerequisite: graduate standing. Introduces hardware description language and hardware design through VHDL. An understanding of the impact and uses of VHDL is emphasized through VHDL models of typical digital computers and processors. Semester-long project in which a digital system is implemented and simulated in VHDL. f

548 Sequential Machine Theory (3:3:0) Prerequisite: ECE 331 or permission of instructor. Theoretical study of sequential machines. Topics include sets, relations and lattices, switching algebra, functional decomposition, iterative networks, representation, minimization and transformation of sequential machines, state identification, state recognizers, linear and stochastic sequential machines. s


563 Introduction to Microwave Engineering (3:3:0) Prerequisite: ECE 305 or permission of instructor. Study of the generation, control, and propagation of microwave signals. Course examines transmission lines, waveguides, resonators, scattering parameters, Smith charts, measurement techniques, instrumentation, and microwave striplines and microstrip.

565 Introduction to Optical Electronics (3:3:0) Prerequisites: ECE 305 and 333. Introduction to optoelectronic devices for generation, detection, and modulation of light. Topics include electrooptic 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. Study of the 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 450 or permission of instructor. Study of the principals of operation of semiconductor devices based on solid state physics. Topics include band theory of solids, intrinsic and extrinsic semiconductor properties, pn junction diode, bipolar junction transistor, Schottky diode, metal insulator semiconductor junctions, field-effect transistors, and heterostructures. f

586 Digital Integrated Circuits (3:3:0) Prerequisites: ECE 331 and 430, or permission of instructor. Study of the design and analysis of digital integrated circuits, with emphasis on CMOS technology. Review of MOSFET operation and SPICE modeling. Analysis and design of basic inverter circuits. Structure and operation of combinational and sequential logic gates. Dynamic logic circuits, chip I/O circuits, and a brief introduction to VLSI methodologies. f

587 Design of Analog Integrated Circuits (3:3:0) Prerequisites: ECE 333 and 430, or permission of instructor. Study of the design methodologies of CMOS based analog integrated circuits. Topics include differential amplifiers, current sources, output stages, operational amplifiers, comparators, frequency response, noise, computer-aided design. f

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. Microprocessor structure and architecture, pipelined execution and pipeline hazards, instruction-level parallelism, superscalar and superpipelined execution, and thread-level parallelism. Intel IA-32, Intel and HP IA-64, and Motorola M68000 families are studied in detail. RISC principles and advantages. Examples of RISC-type microprocessors.

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. Basic input/output operations, analog to digital conversion methods, I/O programming techniques and process, and communication control methodologies are covered. 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, the calculus of variations and Pontryagin's minimum principle, computational methods in optimal control, and applications of optimal control.

621 Systems Identification (3:3:0) Prerequisites: ECE 521 and 528 or permission of instructor. Foundations of parameter estimation using the least squares method. Identification of static and discrete dynamic system models. Batch and recursive (online) approaches. Model order estimation. Persistent excitation requirements. The effect of noise on
model accuracy. Nonlinear estimation methods: generalized least squares and maximum likelihood. Applications in control, diagnostics, and economy.

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 a simulation and design project.

630 Statistical Communication Theory (3:3:0) Prerequisite: ECE 528. Introduction to optimum receiver design in the additive white Gaussian noise environment. Topics include efficient signal set design, modulation techniques, matched filter, correlation detection, coherent and noncoherent detection, 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 codes, convolutional codes; and implementation of encoders and decoders.

635 Adaptive Signal Processing (3:3:0) Prerequisite: ECE 528. Introduction to adaptive systems and adaptive signal processing. Topics include correlation functions and correlation 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; adaptive beam forming and adaptive arrays. Simulation of the adaptive algorithms.

638/IT 838 Fast Algorithms and Architectures for Digital Signal Processing (3:3:0) Prerequisite: ECE 535 or permission of instructor. Study of recent advances in the 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. Definitions, multiple processors, VLSI architecture, data flow, computation, the semantic gap, high-level language architecture, object-oriented design, RISC architecture, and current trends in computer architecture are covered.

642 Design and Analysis of Computer Communication Networks (3:3:0) Prerequisites: ECE 542 and 528 or equivalent. Introduction to 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 Telecommunication Switching Systems (3:3:0) Prerequisites: ECE 528 and 542. Basic concepts of switching with application to digital telecommunication networks. Topics include circuit switched networks, space-division and time-division switching, digital switching system architecture, stored-program control, traffic theory, numbering concepts, signaling networks, intelligent networks, and fast-packet switching.

644 Architectures and Algorithms for Image Processing (3:3:0) Prerequisite: ECE 511 and 537 or equivalent. Architectures and algorithms for the analysis and processing of pictorial information. Topics include systems and techniques for the digital representation of images; image scanning methods and their applications; picture processing languages; image data structures; feature detection, extraction, and reconstruction; detection of symmetries; systems and methods for regular decomposition, image desegmentation, object thinning, real-time orthogonal transformations, and applications. Includes design project.

645 Computer Arithmetic: Hardware and Software Implementations (3:3:0) Prerequisites: 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 the Galois Fields GF(2^n). Provides the way of choosing between various hardware algorithms and architectures depending on primary optimization criteria, such as speed, area, and power consumption. Compares, contrasts the best algorithms for implementing arithmetic operations in software and hardware.

646 Cryptography and Computer Network Security (3:3:0) Prerequisites: ECE 542 or permission of instructor. Topics include need for security services in computer networks, basic concepts of 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, quantum computing.

650 Robotics (3:3:0) Prerequisite: ECE 521 or permission of instructor. Introduction to robotics and advanced automation from an electrical engineering standpoint. Topics include hardware overview; coordinate systems and manipulator kinematics; differential motion and the inverse Jacobian; manipulator path control and motion planning; design and control of articulated hands; sensory feedback; machine vision; applications to industrial automation.

662 Microwave Devices (3:3:0) Prerequisites: ECE 563 or permission of instructor. Study of the generation of microwave signals. Topics include solid-state microwave devices and high-power microwave devices and microwave applications.

667 Fourier Optics and Holography (3:3:0) Prerequisites: ECE 567. Study of 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/SYST 680 Principles of Command, Control, Communication, and Intelligence (C3I)—Part I (3:3:0) Prerequisites: ECE 528 or SYST 590, or equivalent. See SYST 680.

671/SYST 681 Principles of Command, Control, Communication, and Intelligence (C3I)—Part II (3:3:0) Prerequisite: ECE 670/SYST 680 or permission of instructor. See SYST 681.


673/SYST 620 Discrete Event Systems (3:3:0) Prerequisites: ECE 521 or SYST 611 or equivalent. Introduction to modeling and analysis of discrete event dynamical systems. Covers elements of discrete mathematics and then 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. Issues in Petri Nets and temporal logic. Stochastic Petri Nets. Relation to other discrete event models of dynamical systems. Applications of the theory to modeling and simulation and to systems engineering problems, especially in systems architecting.

674/SYST 621 Systems Architecture Design (3:3:0) Prerequisites: SIST 619/ECE 672 and SYST 620/ ECE 673. Intensive study of the relationships between different types of architecture representations and the methodologies 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 the systems architect and the systems engineer are discussed. Examples from current practice including the C4ISR architectures are used. Considered an “out of department” course for the MSEE and MS CpE programs.


680 Physical VLSI Design (3:3:0) Prerequisites: ECE 586 or permission of instructor. Introduction to NMOS, CMOS and BiMOS integrated circuit technology and fabrication. Review of MOS and BicMOS inverter structures and operation. MOS and BicMOS circuit design processes, MOS layers, stick diagrams, design rules and layout. Subsystem design and layout illustration of the design process through the design of a 4bit arithmetic processor and its parts, adder, multiplier, register, and memory cells. Aspects of system timing: test and testability; and a review of 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).

682 VLSI Test Concepts (3:3:0) Prerequisite: ECE 586. Broad introduction to basic concepts, techniques, and tools of modern VLSI testing. Fundamentals of defect modeling, fault simulation, design for testability, built-in self test techniques, and failure analysis. Test economics, physical defects and fault modeling, automated test pattern generation, fault simulation, device for test, build-in self test, memory test, PLD test, mixed signal test, Idq test, boundary scan and related standards, test synthesis, diagnosis and failure analysis, automated test equipment, embedded core test.

684 MOS Device Electronics (3:3:0) Prerequisite: ECE 586 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. These steps include thermal oxidation, diffusion, ion-implantation, epitaxial growth, poly-silicon, metal and insulator layer deposition, photolithography, and MOS processing integration. Involves hands-on laboratory projects and use of the 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. Study of a selected area in electrical and computer engineering under the supervision of a faculty member. Written report is required. May be taken no more than twice for graduate credit.

699 Advanced Topics in Electrical and Computer Engineering (3:3:0) Prerequisites: permission of instructor. Advanced topics of current interest in electrical and computer engineering. Topics are chosen so they do not duplicate any of the other courses in the department. Active participation of students encouraged in the form of writing and presenting papers in the research areas.
720/IT 843 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, parameterization of controllers, loop shaping and loop transfer recovery, and the H methodology.

721/IT 846 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. Course also covers computational synchronization, intersymbol interference, adaptive equalizer's direct method, nonlinear control systems: input-output stability, 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 are also included.

722/IT 841 Kalman Filtering with Applications (3:3:0) Prerequisite: 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. Provides background in random processes needed for pursuing graduate studies and research in the areas of statistical signal processing, communications, control, and computer networks. It is recommended for advanced master's and doctoral students. Course 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, intersymbol interference, adaptive equalization, frequency spreading, encryption, transmission codes, digital transmission using bandwidth compression techniques, and satellite communications.

732 Mobile Communication Systems (3:3:0) Prerequisites: ECE 542 and 630. Introduction to mobile communication system design and analysis. Topics include modeling of the mobile communication channel, signal set and receiver design for the mobile communication channel, access and mobility control, mobile network architectures, connection to the fixed network, and signaling protocols for mobile communication systems. Examples of mobile communication systems are presented, including the pan-European GSM system, the North American D-AMPS system, 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 codes, multidimensional codes, Leech lattice, rotationally invariant codes, spectral analysis and transform coding. Applications of contemporary coding theory in mobile communications, magnetic and optical recording, high-speed modern, and high-density data storage design are presented.

734/IT 830 Detection and Estimation Theory (3:3:0) Prerequisite: ECE 528. Introduction to detection and estimation theory with communication and radar/sonar applications. Topics include classical detection and estimation theory, detection of known signals in Gaussian noise, signal parameter estimation, linear wavefront 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. Vector quantization of both signal's waveform and commonly used parametric statistical models such as the autoregressive model are covered. 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.

737/IT 932 Spread Spectrum Communications (3:3:0) Prerequisite: ECE 630. Introduction to spread spectrum communications. Topics include pseudonoise 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, multisresolution 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. Introduction to 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. Emphasis is on mobility and teletraffic modeling aspects. Networking issues and state of the art performance evaluation methods of radio and system infrastructure applicable to wireless cellular and local networks are discussed. Topics include analysis of mobility, handoff, control traffic loading, resource allocation techniques, multi-access protocols, admission control, call control, network infrastructure and multi-layer configuration, wireless LANs, and packet data systems.
742/IT 834 High-Speed Networks (3:3:0) Prerequisite: ECE 528 and 642, or permission of instructor. Theories for design, analysis and evaluation of high-speed networks. Scalability, performance, and issues related to local area, metropolitan, and wide area networks. Course includes architecture, protocols, and applications of high-speed networks; performance modeling of high-speed networks; flow control and routing; design issues for high-speed switches, interfaces, and controllers; all optical networks and their architectures; examples of high-speed computer networks and internetworking; video, imaging, and multimedia applications; software issues, robustness, and applications; and selected topics in current research areas in high-speed computer networks.

743/IT 848 Multimedia Networking and Communications Software (3:3:0) Prerequisite: ECE 642 or equivalent. Advanced modern networks and services rely ever increasingly on communication protocols and their implementation in software. Course provides an overview of methodologies, constraints, and technologies for advanced store-and-forward or packet-switched communications nodes, networks and protocols as well as their emerging software-based applications. Specific examples include next generation integrated Internet and Intranet, their underlying transport infrastructure over wired and wireless media, switching, routing, multi-point and real-time multimedia and web-based services, and quality of services aspects.

744 Computer Vision and Expert Systems (3:3:0) Prerequisite: ECE 644 or permission of instructor. Brief review of image analysis; vision system architectures (human visual system, computer visual systems); vision system operations (focus and zooming); picture recognition languages; introduction to knowledge-based systems; learning algorithmic schemes; and applications to text processing/analysis (as expert systems) Design project is conceived, simulated, and tested by the students.

745 ULSI Microelectronics (3:3:0) Prerequisite: ECE 684. Study of UltraLargeScaleIntegration (more than a million devices in a single chip) by considering the limits of packing density, modeling of the devices, and the circuit topology. Semiconductor material and device physics imposed “second order effects” and limitations on deep submicron CMOS performance and reliability will be studied through analytical (compact) modeling and numerical simulations. New ULSI technologies such as SOI CMOS will be presented and evaluated, as they become available.

746 Secure Telecommunication Systems (3:3:0) Prerequisites: ECE 646 or permission of instructor. Discussion of integration of cryptographic algorithms with standard and emerging communication protocols. Issues related to implementation of security services in different kinds of telecommunication networks and at different layers of the network model. A study of selected cryptographic algorithms, including Advanced Encryption Standard and elliptic Curve Cryptosystems. Choice of a cryptographic algorithm depending on the type of a network and implementation medium. Analysis of 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-trout time (BTT), adaptive critic, 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: SIST 611 or ECE 650 or CS 580, or SIT 555 or equivalent. Robotic system development in the area of intelligent autonomous systems. The applications of artificial intelligence, control theory, operations research, decision sciences, computer vision, and machine learning to robotics are studied 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 the environment.

751/IT 886 Information Theory (3:3:0) Prerequisite: ECE 528 or permission of instructor. Introduction to information theory which is the mathematical theory of communication systems. Topics include: measures of information: entropy, relative entropy, and mutual information, the Shannon-McMillan-Breiman theorem and its applications to data compression, entropy rate and the source coding theorem, Huffman, arithmetic and the Lempel-Ziv codes, the method of types, channel capacity, and the channel-coding theorem, the joint source-channel coding theorem, differential entropy, the 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 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 the Periodogram and the window approaches; maximum entropy spectral estimation and its relation to autoregression modeling; signal subspace approaches for frequency estimation; and the wavelet transform and its relation to the short-time Fourier transform.

753/IT 888 Distributed Estimation and Multisensor Tracking and Fusion (3:3:0) Prerequisite: ECE 734 or SIST 611. Centralized and distributed estimation theory, hierarchical estimation, tracking and data association, multisensor multtarget 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. SMR and RLS

780/IT 845 High-Frequency Electronics (3:3:0) Prerequisite: ECE 563 and 684, or permission of instructor. Study of devices and circuits used in high-speed communications systems. Topics include microwave bipolar transistors, and high-speed integrated circuits; and the design of linear and power amplifiers using S-parameter techniques and computer simulation.

798 Research Project (3:0:0) Prerequisite: 9 graduate credits. Research project to be chosen and completed under the 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 an oral defense acceptable to three-faculty-member thesis committee.

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 when covering different topics.

945/IT 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.

998 Doctoral Dissertation Proposal (1-12:0:0) Work on research proposal that forms basis for a doctoral dissertation. May be repeated. No more than 24 credits of ECE 998 and 999 may be applied to doctoral degree requirements.

999 Doctoral Dissertation (1-12) Prerequisite: admission to candidacy. Formal record of commitment to doctoral dissertation research under direction of ECE faculty member. May be repeated as needed. Students must complete minimum 12 credits of doctoral proposal (ECE 998) and doctoral dissertation research (ECE 999) Maximum of 24 credits of ECE 998 and 999 may be applied to the degree. Students who choose to take less than 24 credits of ECE 998 and 999 may earn the remaining credits from approved course work. Students cannot enroll in ECE 999 before research proposal is accepted and approved by dissertation committee.

Elementary/Secondary Education (EDCI)

500 In-Service Educational Development (1-6:0:0) See EDUC 500.

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 a bilingual person’s two languages, with applications for classroom. Field experience in public schools required.

519 Methods of Teaching Multilingual Students (3:3:0) Prerequisite: EDCI 516. Examines approaches, methods, and techniques for teaching English as a Second Language (ESL) in bilingual and ESL classrooms, as well as resources available in the 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 linkage of assessment and instruction.

549 Foreign Language Immersion in the Elementary School (3:3:0) Covers theories and methods of teaching foreign language through the 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 the elementary grades. Focuses on using manipulatives and technologies to explore mathematics and solve problems. Field experience in public schools required.

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 the creation of integrated science curricula. Examines science teaching based on contemporary theory,
practice, and standards. Field experience in public schools required.

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 the social sciences. Develops interdisciplinary units based on the Virginia Standards of Learning and various national social studies standards. Field experience in public schools 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. 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. Field experience in public schools 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 the curriculum, and inclusion of special needs and culturally diverse students. Field experience required.

558 Integrating Fine Arts, Movement, and Health Elementary Education (2:2:0) Prerequisite: admission to elementary education licensure program. Examines children’s creative expression and physical development through movement, art, drama, and music. Emphasizes stages and types of movement, health and safety issues, developmental stages of art, interpreting music, and creativity in the classroom. Emphasizes integrating technology into all areas of the early childhood curriculum. 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 the classroom. Students demonstrate teaching strategies, develop lesson and unit planning skills, and evaluate curriculum and materials. Field experience in schools required.

567 Teaching Social Studies in the Secondary School (3:3:0) Prerequisite or corequisite: EDUC 522. Advanced course in the methods, materials, content, and organization of social studies programs in the secondary schools. Field experience required for those seeking initial teacher licensure.

569 Teaching English in the Secondary School (3:3:0) Prerequisite or corequisite: EDUC 522. Provides study of advanced methods, materials, content, and organization of English programs in the secondary school. Field experience required for those seeking initial teacher licensure.


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 the design of individual and group language experiences.

602 Technology Applications in Early Childhood Education (3:3:0) Prerequisite: admission to the Graduate School of Education. Examines criteria and methods for integrating technology into all areas of the 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) Prerequisite: 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 children preschool through third grade. Overview of effective ways to plan and implement integrated curriculum with a special focus on content and 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. Emphasis on action research.

615 Advanced Human Development (3:3:0) Advanced course in development and learning across the lifespan. Critically reviews contemporary research and theories of human development and learning, and their 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 the creative arts and play as central approaches to teaching and learning. Focuses on an integrated approach to what an 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 the characteristics of gifted and talented students, and examine the role of culture in the manifestation of gifts and talents as well as gifted behaviors in special populations.

622 Curriculum Differentiation for Diverse Learners (3:3:0) Participants develop a personal and professional rationale for differentiating instruction in mixed-ability classrooms, and acquire skills and knowledge of strategies
623 Models and Strategies for Teaching Gifted Learners (3:3:0) Framework for examining and applying curriculum models and instructional strategies currently advocated for use with gifted students according to criteria 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 the knowledge and skills to serve as advocates for gifted child education.

626 Action Research in Gifted Education (3:3:0) Opportunity for students to identify and investigate a school-based problem and apply inquiry, writing, and research skills to a 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 an accredited elementary or secondary school. Students supervised in a setting that includes scheduled observations and seminars.

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 their 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 the teaching of social studies in elementary education. Focuses on using 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 the use of student data in instructional decision-making and improvement. Extensive field experience in public schools required.

633 Advanced Mathematics Methods for the Elementary Classroom (3:3:0) Prerequisites: completion of elementary education (PK–6) licensure and EDCI 631. Focuses on teaching all children, including those from nonmainstreamed populations. Emphasizes teaching problem solving and higher-order thinking skills promoted by the National Council of Teachers of Mathematics and the Virginia Mathematics Standards of Learning. Uses techniques and materials to develop specific problem-solving strategies in a hands-on, activity, and workshop-oriented experience. Explores the teaching of problem-solving, reasoning, communications, and connections in PK–6 mathematics by working with manipulatives and technologies. Field experience in public schools required.

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. Helps students develop expertise in teaching and assessment and incorporate technology, safety, and issues of culture and gender into the experiences of 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 an action research project related to teaching assignment. Students apply research methods explored throughout the prerequisite series of courses.

645 Curriculum Development in Mathematics Education (3:3:0) Prerequisites: admission to the mathematics education leadership master’s degree program, or instructor permission. Yearlong seminar for master’s level students in the mathematics education leadership cohort program. Analysis, design, and evaluation of school mathematics curricula.

646 Mathematics Education Leadership for School Change (3:3:0) Prerequisites: admission to mathematics education leadership master’s degree program, or instructor permission. Yearlong seminar for master’s level students in the 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 impact teaching and learning of mathematics in school settings.

663 Research in Science Technology (3:3:0) Prerequisites: course in teaching science in the elementary school /or permission of instructor. Provides advanced study of the methodology and materials involved in teaching the 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) Prerequisites: EDUC 522 and EDCI 567. Emphasizes interdisciplinary curriculum and instruction, implementing national and state standards, authentic assessment, and adaptations for diverse populations. 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.

672 Advanced Methods of Teaching Mathematics in the Secondary School (3:3:0) Prerequisites: EDUC 522 and EDCI 572. Focuses on learning processes fundamental to the development of mathematical thinking from a problem-solving perspective. Introduces students to national and state standards regarding content and methodologies appropriate for teaching school mathematics. Examines a
variety of instructional strategies and materials, and relates them to the broad scope of mathematical content in secondary curriculum. Field experience required for those seeking initial teacher certification.

673 Advanced Methods of Teaching Science in the Secondary School (3:3:0) Prerequisites: EDCI 522 and EDCI 573. Provides advanced study of teaching and curriculum development based on research and current issues. Emphasizes integrating science and technology, adapting instruction to the needs of diverse learners, and promoting safety. Field experience required.

683 Curriculum Development and Evaluation in Science Education (3:3:0) Prerequisites: EDCI 663, or permission of instructor. Advanced course in science curriculum design and development. Emphasizes instructional materials and assessment.

684 Advanced Methods of Teaching Foreign/Second Languages in PK–12 Schools (3:3:0) Prerequisite: EDCI 516, or current teaching position. Blends theoretical knowledge and practical application. Provides advanced study of second language pedagogy and teaching trends. Topics include multiple learning styles, alternative forms and assessment, and teaching diverse populations. Field experience required.

693 Leadership and Organizational Issues in Science Education (3:3:0) Prerequisites: EDCI 663 and 683, or permission of instructor. Advanced course in current issues for leadership in science education. Emphasizes technology, safety, professional development, and related organizational change issues.

705/EDIT 705 Instructional Design (3:3:0) Prerequisite: teaching experience. Helps students analyze, apply, and evaluate principles of instructional design to develop education and training materials spanning a wide range of knowledge domains and instructional technologies. Focuses on a variety of instructional design models, with emphasis on recent contributions from cognitive science and related fields.

710 Technology and the Culture of Schools (2:3:0) Corequisite: EDCI 711. Explores the relationship between human inventions and social, political, cultural, and epistemological constructions. Examines history of technology, relationship between technology and human behavior, and theories of social change and technology. Focuses on the ways technological and social changes influence and shape goals and outcomes of K–12 educational process. Included in the broader discussion of technology, change, and education is a consideration of the linkages between technology and educational reform, the ways technology is associated with the educational reform movement, and the ways educators can take leadership roles in facilitating the intersection of educational reform and technology.

712 Technology and Learning (3:3:0) Corequisite: EDCI 713. Explores ways of knowing and theories of learning as reflected in and influenced by technology. Covers analysis, application, and evaluation of current theories such as constructivism, multiple intelligences, role of symbolization in human cognition, development of problem-solving and critical thinking strategies, and conditions of learning. Covers relationship between technological forms and the nature and structure of human cognition, especially as it influences K–12 educational practice. Explores relationship between technology and the nature of individual learner attributes, learners in context, special needs learners, and issues of access, equity, and values.

714 Methods of Integration (3:3:0) Corequisite: EDIT 715. Considers curriculum design strategies that facilitate the integration of technology. Includes examples of curriculum design strategies, readings, discussions, and design of lessons or units appropriate to students’ various contents. First course in sequence focuses on disciplinary standards, role of technology applications in support of these standards, and strategies for curriculum design, such as the learning cycle, thematic design, interdisciplinary/transdisciplinary approaches, and writing across the curriculum.

716 Principles of Integration (3:3:0) Corequisite: EDCI 717. Continued consideration of curriculum design strategies appropriate for the integration of technology. Includes examples of curriculum design strategies, readings, discussions, and design of lessons or units appropriate to students’ various contexts and contents. Second course in sequence builds on previous student learning, and focuses on technology’s role in problem-based learning, problem-centered curriculum design, authentic instruction, and rationales and processes for implementing authentic assessment strategies.

725 National and International Leadership Issues in Mathematics Education, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; students study research on mathematics teaching and learning, including issues and trends in mathematics education leadership at the national and international levels.

726 State and Local Leadership Issues in Mathematics Education, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; students study issues and policies that impact mathematics teaching and learning, including current trends in mathematics school reform at the state, district, and individual school levels.

777 Research to Practice (3:3:0) Prerequisites: all other program courses except EDRS 590 and elective, or permission of instructor. Provides a culminating experience that synthesizes and applies essential elements of second language teaching and learning. Emphasizes teacher as a change agent through critical inquiry into practice. Aims to promote collaboration between ESL and grade-level teachers to advance the achievement of English language learners and language minority students.

784 Capstone Seminar in Early Childhood Education (3:3:0) Culminating seminar devoted to analyzing and synthesizing knowledge and skills gained through graduate course work as it applies to early childhood education.

790 Internship in Education (1-6:1-6:0) Prerequisite: passing scores on Praxis I and II, ESL Praxis I only, and permission of advisor. Intensive, supervised clinical experience for a full semester in an accredited school. Students must register for the appropriate section.

795 Science Education Research (3:3:0) Prerequisite: EDCI 891. Explores science education research, theory, and practice, including sources and methods of study. Students review and report on research literature and teaching practices on topics of interest.
893 Science Education Staff Development (3:3:0) Prerequisite: EDCI 891. Explores science education curriculum from preschool through high school, including identifying and evaluating curriculum materials and resources. Emphasizes research-based exemplary materials and use of technology.

894 Science Education Leadership and Policy (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; students survey the 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.

855 Mathematics Education Research on Teaching and Learning, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; students engage in research, analysis, design, and evaluation of school mathematics curricula.

857 Preparation and Professional Development of Mathematics Teachers, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; 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 Curriculum Design and Evaluation, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; 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.

897 Advanced Topics in Education (1-6:1-6:0) See EDUC 797.

855 Mathematics Education Research on Teaching and Learning, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; students engage in research, analysis, design, and evaluation of school mathematics curricula.

857 Preparation and Professional Development of Mathematics Teachers, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; 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 Curriculum Design and Evaluation, K–8 (3:3:0) Prerequisite: admission to the mathematics education leadership PhD program. Yearlong seminar; 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.

894 Science Education Leadership and Policy (3:3:0) Prerequisite: admission to the PhD program, or permission of instructor. Covers issues in curriculum and instruction through individual and group research, discussions, writing, and presentations by experts. Each student conducts critical analysis of specific field.

Engineering (ENGR)

School of Information Technology and Engineering

107 Introduction to Engineering (2:2:0) Introduction to 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. f,s

183 Engineering Computer Graphics (3:2:3) Fundamentals of engineering drawing, graphic communication, descriptive geometry, multiview projection, and graphical analysis. Computer-aided drafting, visualization, and pictorial views are introduced as well as reading of engineering drawings. f,s


307 Engineering Thermodynamics (3:3:0) Prerequisites: MATH 213 and PHYS 250. Classical concepts of energy and temperature, first and second laws and their application to closed and open thermodynamic systems. Properties of pure substances, equation of state, and analysis of thermodynamic processes and systems are covered. 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

400 Principles of Professional Practice in Engineering (3:3:0) Prerequisite: engineering majors within 30 hours of graduation. Overview of all engineering disciplines focusing on engineering ethics and professionalism, need for life-long 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. Does not satisfy requirements for CEIE technical elective. s

490 Human Practice of Engineering Design (3:3:0) Prerequisites: senior standing (at least 90 credits) in an 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 a project with a client for whom they must produce a measurable innovation supported by an 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 are 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 are substantially different.

English (ENGL)

English

Three credits of a 100-level English course are prerequisite to all 200-level and above English courses. Three credits of a 100-level English course and 6 credits of general education literature and humanities courses are prerequisite to all English courses numbered above 302.

Non-native speakers of English with limited proficiency in the language 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 speakers of English with limited proficiency in the language. Intensive practice in drafting, revising, and editing expository essays of some length and complexity. Study of the 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. Students must attain minimum grade of C to fulfill degree requirements.

101 Composition (3:3:0) Intensive practice in drafting, revising, and editing expository essays of some length and complexity. Study of the logical, rhetorical, and linguistic structure of expository prose. Methods and conventions of preparing research papers. Students must attain a 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. Emphasis on reading and writing exercises to develop basic interpretive skills. Examination of figurative language, central ideas, relationship between structure and meaning, narrative point of view.

202 Texts and Contexts (3:3:0) Prerequisite: ENGL 201 or permission of department. Study of 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) Prerequisite: ENGL 201 or permission of department. 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.

209 EdiT: Enhanced Digital Text (1:1:0) Corequisite: ENGL 201. Four-week linked course that teaches students to use and understand technology in literary framework. Provides skills to more effectively use computers in other courses. Addresses ways of presenting or encountering a text, concentrating on history and politics of print, web, and digitization; and hypertext theory and technological enhancements that add to a text without diluting its argument. Students learn principles of integrating text, image, and sound. Assumes no prior computational experience.

302 Advanced Composition (3:3:0) Prerequisites: Completion of 45 credits, 3 credits of composition, and up to 6 credits of literature (literature requirements vary among degree programs) Intensive practice in writing and analyzing such expository forms as the essay, article, proposal, and technical or scientific reports with emphasis on research related to the student’s major field. Schedule of Classes designates particular sections of ENGL 302 in business, humanities, natural sciences and technology, social sciences. Students must attain a minimum grade of C to fulfill degree requirements.

309 Introduction to Nonfiction Writing (3:3:0) Not to be taken concurrently with ENGL 399 or 489, and not to be taken by students who have already taken ENGL 489. Advanced practice in analyzing and writing such nonfiction forms as the essay, profile, article, and technical or scientific report, depending on interests of individual student. Not a remedial course.

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) Examines English as a discipline, and develops interpretive skills for further study in the major. All sections cover such issues as form, genre, point of view, figurative language, conventions of close reading and of literary interpretation, and how culture shapes texts. Regular class meetings; weekly lectures, performances, or readings. 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.

326 General Linguistics (3:3:0) See LING 326.

327 Introduction to Cultural Studies (3:3:0) Introduction to interpretive practices associated with field of cultural studies.

332 Introduction to Film (3:3:0) Introduction to 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, folk craft, and folk architecture. Consideration of ethnicity, community, family, festival, folklore in literature, and oral history. Discussion of traditions in students' own lives.

334 Literary Approaches to Popular Culture (3:3:0) Emphasis on popular fiction and adaptation of popular prose genres to media that have strong verbal and visual elements. Relationship between verbal and nonverbal elements of such media 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) Study of how traditional mythologies have been 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 seeks 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) Prerequisites: ENGL 209 or permission of instructor. Critical reading of new media texts and creation of technology-enriched texts in variety of rhetorical genres. Instructs students in the rhetoric of new media, whether produced as hypertext, multimedia, or interactive digital productions. Technology-enhanced activities present a complex textuality of words, images, words-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 hypertext and 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 multimedia 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, ENGL 100 or 101, and ENGL 201. Study of two cultures (other than contemporary British or American) through exploring 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) Prerequisites: 45 credits, ENGL 100 or 101, and ENGL 201. 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) Study of literature by topics, such as women in literature, science fiction, and literature of the avant garde. Topic changes each time course is offered. May be repeated when course content differs.

368 Beginnings of African American Literature through 1865 (3:3:0) Concentrating on such poets as Phillis Wheatley, Jupiter Hammon, Lucy Terry, and George Moses Horton, examines significant African American literary, social, and political texts produced through 1865. Special attention to narrative accounts of enslavement and freedom by Frederick Douglass, Harriet Jacobs, and Olaudah Equiano; political writings and orations of David Walker and Sojourner Truth; fiction of Harriet Wilson and William Wells Brown; and nonwritten cultural artifacts such as slave songs and spirituals.

369 Women and Literature (3:3:0) Exploration of experience of women as both authors of and subjects in imaginative literature. May be repeated for credit when subtitle is different.


371 African American Literature through 1946 (3:3:0) Focusing on fiction, poetry, drama, and autobiography, explores evolution of African American literature and aesthetics and major social, cultural, and historical movements such as the Harlem Renaissance of the 1920s and the emergence of black naturalism, realism, and modernism in the 1930s-40s. Major authors include Zora Neale Hurston, Langston Hughes, Jessie Fauset, James Weldon Johnson, Jean Toomer, Nella Larsen, Margaret Walker, Chester Himes, Richard Wright, and Ann Petry.

372 Contemporary African American Literature (3:3:0) Encompassing an 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 the Black Arts Movement of the 1960s and the Third Renaissance of the 1980s-90s. Examines how musical forms such as blues, jazz, and rap have shaped literary production. Major authors include Ralph Ellison, Gwendolyn Brooks, James Baldwin, Lorraine Hansberry, Amiri Baraka, Alice Walker, Ernest Gaines, Gloria Naylor, August Wilson, and Toni Morrison.

380 Recent American Fiction (3:3:0) American short story writers and novelists from World War II to the present, including Mailer, Barth, Cheever, Oates, Gass, Beattie, Updike, and Morrison.

390 Recent American Poetry (3:3:0) Major American poets from World War II to present, emphasizing Roethke,

396 Introduction to Creative Writing (3:3:0) Assignments include writing exercises and original works of poetry and fiction. May also include drama or creative nonfiction. Includes reading assignments in covered genres, and may include oral presentations or in-class performance. Original student work read and discussed in class and conference with instructor.

397 Poetry Writing (3:3:0) Prerequisite: ENGL 396 or permission of instructor. Workshop in reading, writing poetry. Original student work read and discussed in class and conferences with instructor. Technical exercises in craft of poetry; may include reading assignments.

398 Fiction Writing (3:3:0) Prerequisite: ENGL 396 or permission of instructor. Workshop course in reading and writing fiction. Original student work read and discussed in class and conferences with instructor. Includes technical exercises in craft of fiction; may include reading assignments.

399 Creative Nonfiction Writing (3:3:0) Prerequisite: ENGL 309 or 396 or permission of instructor. Workshop in reading and writing of nonfiction that makes use of literary techniques normally thought of in the context of fiction, such as evoking senses and use of dialogue. Original student work read and discussed in class and conferences with instructor. Includes technical exercises in artful creating of nonfiction; may include reading assignments.

400 Literature of the Middle Ages (3:3:0) Selected English narrative, dramatic, and homiletic literature written between 1300 and 1500, exclusive of Chaucer.


402 English Poetry and Prose of the 17th Century (3:3:0) English poetry and prose from 1603 to 1688, excluding Milton.

404 The Augustan Age (3:3:0) English literature from late 17th century to middle of the 18th century. Writers such as Dryden, Rochester, Behn, Defoe, Swift, Pope, and Montagu.

405 The Age of Sensibility (3:3:0) English literature of later 18th century, time of the American and French Revolutions, including new developments in novel, drama, biography, and poetry. Writers such as 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 a selected period of British literature. In addition to literary examples, materials may be chosen from the 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) Prerequisites: 6 credits of composition, including ENGL 302, and 6 credits in humanities or permission of instructor. Intensive study and practice in various forms of technical writing, including formal and informal reports, proposals, and technical correspondence. Emphasis on writing for a 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. Emphasizing growth in the student's awareness of literary scholarship as a discipline, provide opportunity for advanced study in literary and cultural criticism. Cover a 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) Prerequisite: 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 one another's works in progress in a workshop format. Students may take the seminar concurrently and in coordination with another approved course offered by the English Department. In this case, the thesis of about 30 pages explores area covered by second course, and instructor in that course serves as a reader and advisor to the thesis. Students receive credit for thesis seminar and second course; however, thesis work may substitute for some assigned work in second course by arrangement of instructors of thesis seminar and the second course.

416 Honors Independent Study (1-3:0:0) Prerequisites: admission to honors program in English, and permission of instructor. Advanced study of one topic. May be repeated for credit when topic is distinctly different.

422 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.

423 Colonial and Federalist American Literature (3:3:0) Works of the first 200 years of American literature, including Edwards, Franklin, Irving, Cooper, and Bryant.

425 Literature of the American Renaissance (3:3:0) Major writers of the American Renaissance (1830–1865), with emphasis on Emerson, Thoreau, Hawthorne, Melville, Whitman, Poe, Stowe, Douglass, and Dickinson.

429 Special Topics: American Literary Periods (3:3:0) In-depth study of a selected period of American literature. In addition to literary examples, materials may be chosen from art, philosophy, or popular culture of the 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 the intellectual history of the Middle Ages. Specific topic may vary. Primary emphasis is literary or historical, depending on discipline of the instructor. May consider relevant material from philosophy, theology, and art.

436 Nineteenth-Century Continental Novels in Translation (3:3:0) Selected European novels in translation. Course focus is continental novel from the 18th century to end of 19th century, and includes works of Balzac, Goethe, Gogol, Stendhal, Turgenev, Flaubert, Dostoevski, Tolstoy, and Chekhov.

437 Twentieth-Century Continental Novels in Translation (3:3:0) Focuses on continental novel from the beginning of the 20th century to the present. Includes Proust, Mann, Gide, Kafka, Youincevar, Beauvoir, Calvino, and Garcia Marquez. Attention to the influence of this literature on the novel in English. (Offered in cooperation with the Department of Modern and Classical Languages.)

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 the 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. Writers such as Wycherley, Bohn, 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, Friell, Churchill, and Gems.

447 American Drama of the Twentieth Century (3:3:0) American drama of the 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 the most influential European and American dramatists, with emphasis on dramatic styles such as realism, expressionism, epic, and existentialism. Chekhov, Ibsen, Strindberg, Brecht, and Beckett are studied.

449 Special Topics in Drama (3:3:0) Study of selected topics, periods, or playwrights. May be repeated once for credit when subtitle is different, with permission of department.

450 English Novel of the 18th Century (3:3:0) English novel from its beginnings through the turn of the 19th century. Works by Behn, Defoe, Haywood, Richardson, Fielding, Sterne, Burney, Smollett, and Austen.

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 or equivalent and permission of instructor. Students must submit a typed manuscript at least one week before registration. Workshop: intensive practice in creative writing and study of creative process. Intended for students already writing original creative work. By 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) Emphasis on 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) Emphasis on the work of Robinson, Frost, Stevens, Williams, Pound, Crane, Eliot, and Lowell. Work of fiction employing poetic techniques, such as Faulkner’s The Sound and the Fury, may also be studied.

464 Advanced Poetry Writing Workshop (3:3:0) Prerequisites: ENGL 397 or equivalent, and permission of instructor. Students must submit a typed manuscript at least one week before registration. Intensive practice in the craft of poetry and study of the imagination in the creative process. Intended for students already writing original poetry. At discretion of instructor, technical exercises and assigned reading may be required. By 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
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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; emphasis on 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. Focus on novels and short stories from early 19th century to the present.

493 Special Topics in Popular Literature (3:3:0) Study of a 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) Study of a 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 the 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 a typed manuscript at least one week before registration. Workshop course. Intensive practice in creative writing and study of the creative process. Concentrates on specialized literary type other than short story or poetry (for example, playwriting, screenwriting, children’s literature, travel literature, autobiography, the gothic novel, translation). Concentration is announced in the department’s Course Description Booklet before pre-registration. Intended for students already writing original creative work. By permission of instructor; may be taken second time for credit.

498 Internship: Special Topics (1-3:0:0) Prerequisites: 60 credits including 3 credits of a 100-level English course, 6 credits of 200-level English courses, 6 credits of English 302, 6 additional credits of upper-level English courses (English majors), 3 additional credits of upper-level English courses and 3 credits of upper-level courses in the major (non-English majors). Unpaid, approved work-study positions at specific sites arranged by interested students and their advisors. Under supervision of faculty advisor, students work as intern with site supervisor in agency of the student’s choosing, given advisor’s permission.) For 3 credits, students work 120 hours on site and write 3,500 words, or the equivalent, given their contracts with their advisors. Contact the English Department one semester prior to enrollment. No more than 3 credits can be counted in a concentration or the English minor. May be repeated for credit once with permission of department.

499 Independent Study (1-3:0:0) Prerequisites: permission of department and permission of instructor. Open only to English majors with 90 credits, and 15 credits in 300- and 400-level courses. Intensive study of a particular author, genre, period, or critical or theoretical problem in literature or linguistics, to be conducted by student in consultation with instructor. Student produces at least one substantial piece of written work during the semester on research findings. (By 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 a 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 advanced writing course—309, 311, 396, 397, 398, 410, 458, 464, 489, 497—or permission of department. Instruction in revising, editing, and preparing specialized writing for printing. Emphasis on 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) Prerequisite: Open to senior English majors and graduate students pursuing MA in English or MFA. Contact the English Department one semester prior to enrollment. Internships are approved work-study positions in writing or editing established by the English Department with specific employers. Variable credit and prerequisites.

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. Course work 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 of differing lengths.

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 a 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 selected topics involving literary or other texts (film, television, opera, folklore). May be repeated for credit with permission of department.

514/CL 514 Theories of Comparative Literature (3:3:0) Prerequisites: 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.


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) Advanced introduction to film study, including overview of approaches to the study of cinema, methods of close analysis, basic concepts of film form and style, and contemporary theories of film. Students who have taken ENGL 332 may not take this course for credit.

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 a typed manuscript of original poetry. Intensive study of and practice in the formal elements of poetry through analyzing models and weekly or biweekly writing assignments. Intended for students already writing original fiction. Students study 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) Exploration of various aspects of folklore and folklife such as narrative and storytelling, folklore and literature, and song and arts. May be repeated once for credit when subtitle is different, with permission of department.

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 a literary language in representative texts of the period. May be repeated for credit with permission of department.

604 Internship in Folklore (1-6:0:0) Prerequisites: 1 undergraduate or graduate course in folklore, which may be taken concurrently. Internships are unpaid, approved work-study positions at specific sites arranged by interested students and their advisors. 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 the equivalent, given contract with advisor. Contact the 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. Focus 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 a teaching program such as in school or writing center. Students, under direction of faculty member, must secure the cooperation of on-site supervisor. Students work a minimum of three 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 of 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 the concentration. Intensive practice in craft of nonfiction and study of the creative process. Intended for students already familiar with traditional and contemporary nonfiction, and already writing original nonfiction. At the 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 the concentration. Intensive practice in the 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 the 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 the concentration. Workshop course. Intensive practice in creative writing and study of the creative process. Concentrates on a specialized literary type other than the short story (essay, playwriting, film writing, children’s literature, travel literature, autobiography, the gothic novel, translation); concentration is announced in the 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 between 1300 and 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 the 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 the 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 the 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 the 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 the 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.

665 Texts in Global Contexts (3:3:0) Examines various cultural texts (literature, drama, film, folklore) in terms of transnational circulation or production and reception in particular 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 will be 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.

675 Feminist Theory and Criticism (3:3:0) Presents historically based introduction to the major debates within feminist theory and criticism. Stressing gender in literature and its interpretation, explores diverse collection of feminist interpretive practices.

676 Introduction to Cultural Studies (3:3:0) Advanced introduction to the theoretical practice now known as “cultural studies,” with particular attention to role in textual studies. Part of the interdisciplinary cultural studies PhD program, as well as the MA in English.

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 the request of a 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 current findings related to com-posing process and methods of studying writing in a school setting. Focuses on developing proposal investigating some aspect of the composing process. Teachers who have de-veloped a proposal before enrolling conduct the research during the course.

697/EDUC 697 Theory of Composition (3:3:0) Prereq-uisite: ENGL 615, ENGL 695/EDUC 695, or equivalent. Acquaints classroom teachers with current theory relating to writing and teaching of composition. Focus is on mak-ing explicit the theories of the participants, reading works of leading theorists, and developing a statement describ-ing implications of theoretical consistency in the teaching of writing.

699 Workshop in English (1-3:0:0) Prerequisite: admis-sion to graduate program or permission of department. Concentrated workshops, educational tours, independent studies, and special seminars dealing with selected topics in writing, linguistics, film, the 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 toward 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) Introduction to 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 the-ories 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) Pre-requisites: 9 credits of graduate English courses including 701, or permission of department. Analysis of historical shifts in literary and cultural discourse or of relationships between literary and non-literary elements of a 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) Prerequi-site: open only to degree students who have completed 15 credits including ENGL 701, and have preregistered. Reading, research, and writing on specific project under direction of department member. Oral or written report re-quired. MA students may repeat once for credit with per-mission of department. MFA students may present up to 12 credits of ENGL 798 for graduation, but no more than 3 may count toward completing the 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 the PhD in education program to study in English. Program of studies designed by student’s discipline director and approved by doctoral committee that prepares student for research and writing in area of interest of discipline director. Enroll-ment may be repeated.

801 New Developments in English (3:3:0) Designed for students in the doctor of arts in community college educa-tion program. Focuses on major original texts that have influenced the discipline of English in the late 20th cen-tury. 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: Engineer-ing and Policy (3:3:0) Provides overview of extended enterprise integration using modern standard software solutions and tools. Focuses on integration and manage-ment aspects of extended enterprise solutions. Topics include enterprise resource planning and e-business exten-sions. Students must demonstrate complete proficiency in a modern implementation methodology and supporting tools.

602 Decision Support for Enterprise Integration (3:3:0) Prerequisite: EEP 601. Lectures focus on the use of “business intelligence” to enhance competitive advantage, developing an information-driven set of controls to improve profitability, and creation of balanced business with aligned corporate direction and strategic intent. Solutions within enterprise resource planning systems are examined.

603 Supply Chain Integration and Management (Busi-ness-to-Business Electronic Commerce) (3:3:0) Prereq-uisite: EEP 601. Focuses on two issues: supply chain integration from an information technology perspective, and supply chain management from a decision support perspective. Course motivation is the 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. Introduction to network and system architectures that support high-volume, business-to-consumer web sites and portals. Provides insight into the structure of the modern
web-enabled storefront. Critical business and technology issues include storage area networks, server clustering, load balancing techniques at the server and network level, 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; the identification and growing of new market opportunities and electronic enabling of existing business relationships; business-to-consumer relationships and the 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. Lectures focus on the “front office” and its integration with the “back office.” The 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. The 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.

607 Critical Information Technology Infrastructures (3:3:0) Prerequisite: EEP 604. Focuses on the 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 will be examined in detail.

608 Optimization of Supply Chains (3:3:0) Prerequisites: MATH 203 and 213, and graduate standing. Focuses on both supply chain optimization from an enterprise-wide perspective, and supply chain optimization from a business-to-business e-commerce perspective. Explores optimizing the value of goods and services and assuring a reasonable return on such sales. Describes heuristic and exact algorithms for scheduling, production, inventory management, logistics, and distribution. New software that enables such optimization is presented, and manufacturing and service examples from public and private sectors are outlined. New techniques to handle risk, quality of data, and robustness of solutions are presented. Students perform case studies using state-of-the-art software.

609 Special Topics in Enterprise Engineering and Policy (1-3:1-3:0) Topics not covered in the regular EEP course offerings; content varies each semester.

610 Project in Enterprise Engineering and Policy (3:3:0) Focuses on completing a capstone project in enterprise engineering and policy. Designed as a two-semester project, with the student being closely guided by a faculty advisor. Topic is selected by mutual agreement between students and the faculty advisor.

Environmental Science and Public Policy (EVPP)

110 The Ecosphere: An Introduction to Environmental Science I (4:3:3) Study of the components and interactions that make up the 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 a two-semester lab science sequence that can fulfill the science requirements for BA students in CAS.

111 The Ecosphere: An Introduction to Environmental Science II (4:3:3) Prerequisite: EPP 110. Study of 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) Introduction to broad aspects of anthropocentric environmental considerations in the 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) Prerequisites: EVPP 110 or GEOL 101 or SOCI 101 or ANTH 201. Study of the components and interactions of 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.

350 Freshwater Ecosystems (4:3:3) Prerequisites: CHEM 211/212 and either EVPP 110/111 or BIOL 307. Study of 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 and 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. Examination of 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 or BIOL 309 or GEOL 317; or 9-credit hours in geography, including GEG 309. Study of global and 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.

377 Applied Ecology (3:3:0) Prerequisite: 60 credits, including 8 credits of biology, geology, or chemistry, or permission of the instructor. Introduction to ecosystem concepts and their applications to natural and managed ecosystems.

395 Undergraduate Research in Environmental Science and Policy (1-3:0:0) Prerequisites: 45 credits including at least two upper-level science lab courses. Original research project. May involve field and lab study, computer modeling and analysis, or other original research as appropriate. Research formulated and completed under instructor’s guidance. Culminates in final report. May be repeated for total 10 credits.

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 their effects on biogeochemical cycling, primary and secondary production, and regulating community structure and populations of individual species through activities as symbionts and parasites. Discusses the role of fungi in ameliorating pollutants produced by anthropogenic activities.

490 Special Topics in Environmental Science and Policy (1-4:0) Prerequisites: 60 credits and permission of instructor. Study of 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 are significantly different.

503 Field Mapping Techniques (3:0:6) Prerequisites: MATH 105 or equivalent; 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.

515 Molecular Environmental Biology I (3:3:0) Prerequisite: introductory biology and genetics or permission of instructor. Introduction to molecular environmental biology covering basic concepts of molecular biology, molecular evolution, and bioinformatics, and their application to problems in molecular and environmental biology.

524 Introduction to Environmental and Resource Economics (3:3:0) Prerequisite: basic algebra skills. Introduction to theory of external costs and benefits, public goods, natural resource management, and benefit and cost analysis for noneconomists. 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 noneconomist. Emphasis on 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. Survey of literature on spatially explicit empirical models of land-use change. 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. Study of systematics, evolution, physiology, ecology, and behavior of fishes. Lab time used for field trips, practice in identifying species, and hands-on experience with lecture subjects.

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. Field trip to tropics required 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 the 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) Prerequisite: one course in chemistry, and one course in ecology. Study of physical, chemical, and biological components of freshwater ecosystems with emphasis on streams, rivers, and lakes; links between watersheds and freshwater ecosystems; and the 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 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.

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. Study of 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.

576 Microbial Ecology of Soils (3:3:0) Prerequisite: course in microbiology or permission of instructor. Survey of microbial ecology in surface and subsurface soils. Describes organisms, 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 their integration at the 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 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.

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 considers sustainability and emerging issues.

621 Overview of Biodiversity Conservation (3:3:0) Prerequisites: 8 hours of graduate courses 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 concepts in physiological, population, community, and ecosystem ecology restricted to graduate students with little or no background in ecology.

622 Management of Wild Living Resources (3:3:0) Prerequisites: 8 credits of ecology including BIOL 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 hours of graduate courses in environmental science or environmental policy, or permission of instructor. Through lectures and written and orally presented case studies, and assigned reading, identify and analyze factors involved in moving from science and policy to concrete action; and provide understanding of basic principles, skills and strategies.

626 Environment and Development in South and East Asia (3:3:0) Prerequisites: course in policy process, international development, and ecology, or permission of instructor. Guest lecturers, assigned reading, class discussions, and oral and written case studies. Examines 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 what may be required to achieve more effective and sustainable results.

627 Environment 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. Examines 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 what may be required to achieve more effective and sustainable results.

628 Environment and Development in Africa (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. Examines environmental policy and relationship between environment and development, considers background and history leading up to the present, and considers what may be required 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 the 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/rural interactions, agriculture, forestry, and other areas. Hands-on development of simple ABM models and investigation of linkages between GIS and ABM.

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) Prerequisites: graduate standing or permission of instructor. Examination of human dimensions of climate change, biodiversity loss, ozone depletion, and related anthropogenic alterations of the biosphere.

638 Corporate Environmental Management and Policy (3:3:0) Provide understanding of how environmental issues interact with business strategy decisions. Emphasizes learning about proactive win-win environmental management strategies being implemented by the world’s leading firms, and shows how government policies and regulations can be designed to simultaneously promote higher environmental protection and competitiveness. Class sessions combine minilectures and participatory discussions.
641 Environmental Science and Public Policy (3:3:0)  
Prerequisite: course in ecology or permission of instructor.  
Examines the effects of human activities on the environment.  
Emphasizes hierarchical levels of organization within ecological  
systems, and management of ecosystems to conserve  
biodiversity, natural resources, and the environment.

642 Environmental Policy (3:3:0)  
In-depth examination of environmental policymaking. Examines U.S. efforts from  
1970 to present to mitigate pollution of the nation’s 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. Study of relationships  
between microorganisms and their natural environment, and methodology for observing their natural  
environment and biochemical activities in that environment.

644 Wetland Ecology and Management (4:3:3)  
Prerequisite: course in ecology, chemistry and physics,  
or permission of instructor. Structure and function of wetland ecosystems. Emphasizes biogeochemical and hydro-  
logical processes, effects of disturbance, and management implications.

645 Freshwater Ecology (3:3:0)  
Prerequisite: EVPP 550 or permission of instructor. Study of biotic and abiotic interactions that affect structure and composition of freshwater ecosystems. Emphasizes research literature and  
experimental and theoretical approaches.

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 relationships, and models of community structure.

650 Environmental Analysis and Modeling (4:3:3)  
Prerequisite: course in ecology or permission of instructor. Students learn to conceptualize ecological systems, repre-  
sent these conceptualizations mathematically, and develop and test models against field data. Multivariate models and dynamic simulation models are emphasized.

652 The Hydrosphere (3:3:0)  
Prerequisites: two semesters of calculus and partial differential equation. Compo-  
nents and transfer processes within the hydrosphere, which consists of the aqueous envelope of the Earth including the oceans, lakes, rivers, and snow; ice, glaciers, soil, moisture,  
ground water and atmospheric water vapor.

670 Environmental Law (3:3:0)  
Prerequisites: course in ecology, environmental biology, or permission of instruc-  
tor. Study of environmental laws such as the National Environmental Policy Act and regulatory issues such as the Clean Water and Clean Air Acts. Emphasis on 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 dam-  
age or deterioration in the environment; content, oversights,  
and externalities in the management decision processes that affect the environment and the effectiveness of plan imple-  
mentation; means of assessing environmental impact; and  
administrative approaches for minimizing environmental impact.

677 Applied Ecology and Ecosystem Management.  
(3:3:0) Prerequisites: EVPP 607 or equivalent. Use of  
ecological principles to manage natural resources. Empha-  
sizes hierarchical levels of organization within ecological  
systems, and management of ecosystems to conserve  
biodiversity, natural resources, and the environment.

681 Introduction to Bioinformatics (3:3:0)  
Prerequisite: course in molecular biology or permission of instructor. Overview of methods and tools in bioinformatics includ-  
ing Internet interfaces to sequence databases, methods for performing searches of biological databases, sequence  
alignment, phylogenetic analysis, other types of DNA se-  
quence analysis, web-based tools, and databases in structural biology.

692 Master’s Seminar in Environmental Science and  
Public Policy (1:1:0) Exploration of selected topics in environmental science and public policy using lectures,  
guest lectures, student presentations, and discussions of current literature. Topics vary. May be repeated for credit.

693 Directed Studies in Environmental Science and  
Public Policy (1:8:0:0) Prerequisite: permission of instruc-  
tor and chair. Study of topic not otherwise available in graduate program. May involve combination of reading assignments, tutorials, lectures, papers, presentations, or lab or field study determined in consultation with instruc-  
tor. 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 gradu-  
ate course work in environmental science and public policy or permission of instructor. Study of selected advanced topics in environmental science and public policy. Lectures, guest lectures, student presentations, laboratory exercises. Topics vary; each offering has a coherent theme. May be  
repeated for credit if topics significantly differ.

745 Environmental Toxicology (3:3:0)  
Prerequisites: course in ecology and course in physiology, or permission of instructor. Study of nature, distribution, and interaction of toxic chemicals released into the environment. Empha-  
sizes 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 the Earth systems. Invited talks by Mason faculty and primarily Earth science experts in the region. Students graded on written reports demonstrating understanding of wide topics covered.

792 Seminar in Earth Systems Science (1:1:0) Prerequi-  
tsites: 15 graduate credits and courses on the atmosphere,  
hydrosphere and lithosphere. Seminar for Earth systems science graduate students who have background in major  
systems. Capstone experience. Seminars presented by fac-  
culty 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, labora-  
tory, or field investigation under supervision of instructor.  
Short proposal required. May be repeated for a total of 6 credits.

798 Master’s Research Project in Environmental Sci-  
ence and Public Policy (1-3:0:0) Prerequisites: approved  
project proposal and permission of instructor and chair.  
Experimental, observational, literature-based, or theoreti-  
cal research project chosen and completed under the
guidance of a faculty member. Proposal is required before enrollment. Comprehensive report acceptable to student’s committee is required for completion. Students taking EVPP 798 may receive no more than 6 credits for both EVPP 793 and EVPP 798. Graded S/NC.

59 Master’s Thesis in Environmental Science and Public Policy (1-6:0:0) Prerequisite: approved thesis proposal and permission of instructor and chair. Experimental, observational, or theoretical research under an instructor’s supervision that culminates in the production of a thesis. Thesis work should be potentially publishable. No more than 6 credits of EVPP 793 and EVPP 798 may be applied to the master’s degree. Graded S/NC.

894 Supervised Internship (3-12:0:0) Prerequisite: permission of program director and student’s doctoral committee. Training and application of ecological skills to environmental management and policy under the supervision of a qualified environmental scientist at a governmental agency, consulting firm, industry, or other acceptable organization.

991 Advanced Seminar in Environmental Science (2:2:0) Prerequisite: 8 hours of ecology or permission of instructor. Topics generally address the interface between environmental science and public policy. May be repeated for credit.

998 Doctoral Dissertation Proposal (1-6:0:0) Prerequisite: admission to doctoral candidacy or approval of doctoral program director. Work on a research proposal that forms the basis for a doctoral dissertation. Graded S/NC.

999 Doctoral Dissertation Research (1-12:0:0) Prerequisite: approval of dissertation proposal. Research on a basic or applied problem in environmental science and public policy. Graded S/NC.

See additional coursework under Biology (BIOL), Chemistry (CHEM), Public and International Affairs (PUAD), School of Public Policy (PUBP), Geography (GEOG), and Geology (GEOI).

Executive Master of Business Administration (EMBA)

School of Management

603 Managerial Economics and the Decisions of the Firm (3:3:0) Develops and applies tools of economic analysis in managerial decision situations. Focuses on economic analysis to understand competitive environment of a firm.

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) Focuses on firm’s planning and decision-making procedures to determine which markets are best served by the portfolio of products and services offered by the organization. Covers issues relevant to consumer behavior, product development, selection of markets, pricing, promotion, and distribution.

633 Statistics for Business Decision Making (3:3:0) Applies statistical methods in the analysis of problems in business decision-making. Topics include descriptive statistics, probability distributions, estimation and hypothesis testing, and linear regression.

638 Operations Management in a Digital World (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 Information Technology Management (3:3:0) Examines computer-based information technologies and their interrelation with management processes, especially problem-solving and decision-making at the individual, work group, and organization levels. Topics include the 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 interrelationships among organizations, external environment, and regulatory process. Emphasizes legal and ethical issues and managerial implications.

678 Strategic Management (3:3:0) Integrates business strategy and policy with functional knowledge developed in other courses and business practice. Issues include formulation of strategy, industry analysis, building core competencies, and strategy implementation.

708 Taxation and Business Strategy (1-3:1:3:0) Examines influences of taxation on the decisions of firms, and effects of taxes on performance in a competitive setting. Emphasizes specific coverage of international issues, and role of non-tax costs in tax planning.

709 Global Capital Markets (1-3:1:3:0) Considers emerging topics in finance, with focus on links between global markets and strategic firm decisions. Emphasizes understanding the valuation of strategic investment opportunities, and identification of financing alternatives.

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 the development of the system.

713 Human Resource Management (1-3:1-3:0) Surveys human resource management from general manager’s perspective. Focuses on role of human resource management,
and techniques for developing and effectively using human resources in organizations.

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 the forces that make change necessary, developing a vision of an appropriate course, aligning the 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 the governance process, with emphasis on rights and responsibilities of participants.

724 Integrated Marketing Communication (1-3:1-3:0) Examines integrative role of marketing in an organization. Investigates coordination among marketing and other business functions, organization of the marketing function, and management of the marketing process.

725 Leadership and the Role of the General Manager (1-3:1-3:0) Focuses on role of executive leadership within organizations. Takes integrative perspective in focusing on the responsibilities and performance of general managers in creating and communicating a vision, identifying and pursuing goals, responding to adverse developments, and accomplishing change.

727 Applied Macroeconomics (1-3:1-3:0) Examines how firm environment is shaped by the economy and macroeconomic policy. Topics include business cycle, determinants of economic growth, influence of fiscal and monetary policies, and use of economic forecasts.

734 Electronic Commerce (1-3:1-3:0) Explores ongoing transformation of business activities and markets by computer and telecommunications technologies. Examines technology and its application in a variety of functional areas and industry settings.

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 (3:3:0) 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 university professors and high-level managers; briefings by officials of government and other policy-making organizations; and site visits to production and distribution facilities, research centers, IT units, and other corporate offices.

Exercise, Fitness, and Health Promotion (EFHP) School of Recreation, Health, and Tourism

Prerequisite to all courses: graduate standing or permission of instructor.

500 Workshop in Exercise, Fitness, and Health Promotion (1-3:0:0) 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 their equivalents) and permission of instructor. Promotes familiarity with the anatomy of the neuromuscular and musculoskeletal systems of the body, 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 their equivalents) and permission of instructor. Promotes familiarity with and proficiency in the 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 their equivalents) and permission of instructor. It is recommended that this course be taken concurrently with EFHP 522. Promotes familiarity and proficiency with the assessment and physical examination of sports-related injuries.

528 Advanced Athletic Training (3:2:1) Prerequisites: BIOL 124 and 125 (or their equivalents); EFHP 526; and permission of instructor. Promotes familiarity and proficiency with the assessment and intervention of the neuromusculoskeletal system and other systems of the 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 a 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 the 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 the application of research findings to the understanding of physiological function and the 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 a 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 three to six 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, market- ing, 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 the physical education setting and for engaging the teacher as researcher. Teaching strategies are revisited, action research projects are developed, and current education reform movements are examined.

680 Ethical Issues in Exercise, Fitness, and Health Promotion (3:3:0) Covers formulation of a coherent framework for ascertaining the 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) Explores an exercise, fitness, and health promotion problem using appropriate research methodology and under supervision of graduate faculty member.

802 Readings for the Doctor of Arts in Community College Education (3-9:0:0) Prerequisite: admission to the doctor of arts program in the National Center for Community College Education with a physical education specialty. Intensive reading in recent scholarship in physical education and related fields. Students must propose a reading list, which must be approved by their faculty advisor, and use the list to prepare a literature review that is potentially publishable.

Finance (FNAN)

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 of Management (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 DESC 210, and sophomore standing. Introduction to managing a firm’s financial resources given a wealth maximization decision criterion. Includes working capital management, fixed-asset investment, cost of capital, capital structure, and dividend decision analysis. Lecture, problems, and discussion.

302 Financial Analysis and Forecasting (3:3:0) Prerequisites: 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.

311 Principles of Investment (3:3:0) Prerequisites: 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 the valuation of securities. Lecture, discussion, and computer-assisted research.

321 Financial Institutions (3:3:0) Prerequisites: FNAN 301; degree status. Discusses basic objectives of financial institutions in light of industry structure and regulatory environment, and the decision variables that management should concentrate on in achieving its objectives. Includes the role that financial institutions play in the allocation of funds within the financial markets. Lecture, discussion, and computer-assisted research.

351 Principles of Real Estate (3:3:0) Prerequisites: FNAN 301; degree status. Studies dimensions and specialties involved in the 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: FNAN 301; degree status. Analyzes decision-making within the firm, emphasizing conceptual structure of problems and using advanced analytic techniques. Topics include current asset management, capital budgeting, capital 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: 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: 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: FNAN 321; degree status. Discussion of how financial markets are organized, their role in the allocation of funds to various market segments, and the interaction between markets. Topics include aggregate flow of funds analysis as well as money markets, government markets, corporate markets, and mortgage markets. Lecture, discussion, and computer-assisted research.

440 International Financial Management (3:3:0) Prerequisites: FNAN 301; degree status. Introduces management of the 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: FNAN 301 and 331; 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; 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 finance credits; 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 a maximum of 6 credits if topics vary.

Foreign Languages (FRLN)

Modern and Classical Languages

330 Topics in World Literature (3:3:0) Prerequisites: ENGL 101 and 45 credits, or permission of the 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 fulfillment of literature requirement of baccalaureate degrees. May be repeated twice when course content is substantially different, with permission of department.

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 the intellectual history of the Middle Ages. Emphasis is literary or historical, depending on the discipline of the 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 necessary to do scholarly research in French, German, and Spanish. Taught in cooperation with the university library staff. Conducted in English.

525 Literary Translation (3:3:0) Prerequisite: graduate standing or permission of instructor. Advanced work in literary translation. The critical approach to and analysis of diverse literary texts ranging from poetry, drama, and essay to excerpts from novels.

550, 551 Special Topics (3:3:0) Themes, periods, or genres vary from semester to semester. Focus is on topics that incorporate one or more of the languages taught in the department, but instruction is in English. May be repeated for credit with permission of department.

565 Theory of Translation (3:3:0) Lectures on the nature and function of the translating process. Evaluation of theories of translation with respect to text typology. Critiques of selected translations from the target languages to English and vice versa.

572 Integrating Technology into Language Learning (3:3:0) Prerequisites: graduate standing or permission of department; a language teaching methods course, language teaching experience, or permission of instructor. Explores the pedagogical and theoretical basis for integrating interactive technologies into language learning programs, and examines their potential for learning, teaching, testing, and research. Includes hands-on analysis and evaluation of materials. Prior experience with technology is not required.

573 Basic Issues in Language Pedagogy (3:3:0) Prerequisites: graduate standing or permission of department; a language teaching methods course, language teaching experience, or permission of instructor. Explores a number of major issues controversial in language pedagogy. Topics include communicative competence as a pedagogical goal, the role of explicit grammar teaching, the proficiency movement, cultural authenticity, student-centered learning, and the use of technology.

590 Internship and Seminar in Translation (3:3:0) Prerequisite: admission to the translation certificate program. Internships are nonpaying, work-study positions that focus on the practice of translation. Qualified students are 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 dealing with selected topics in literature, language, bilingualism, culture, methodology. May not normally be applied toward the MA in modern and classical languages.

620 Literary Theory and Criticism (3:3:0) Study of the nature of literary work and analysis of 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 the 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 (570) 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) Designed for students with no knowledge of French. Introduction to French, including 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 10.

109 Intensive Elementary French (6:6:2) Equivalent to FREN 101 and 102 taught in a single semester. Recommended for students who desire an intensive introduction to French. May not be taken for credit in combination with 101, 102, or 105. Lab work required.

201 Intermediate French I (3:3:1) Prerequisite: FREN 102, 105, 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. Application of language skills to reading, composition, and class discussion. Lab work required.

209 Intensive Intermediate French (6:6:2) Prerequisite: FREN 102, 105, 109, appropriate placement score, or permission of department. Equivalent to FREN 201 and 202 taught in a 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 a reading selection are given before the trip. All papers and exams required for credit are due by the end of the summer session.

325 Major French Writers (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Study of the works of major French writers. Writers to be 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 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 the literature of major French writers. 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.

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 the 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. Development of writing skills through written reports on current events and on literary topics. Specifically designed for students concentrating in French who need practice in the written language beyond the intermediate level.

355 Phonetics and Oral Expression (3:3:2) Prerequisite: FREN 202 or permission of instructor. Intensive study of French pronunciation and diction. Practice in discriminating French phonemes and allophones and in 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.

375 French Civilization: From Ancient Gaul to the French Revolution (3:3:0) Prerequisite: 15 credits of French or permission of instructor. Study of 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 the 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 375.

381 Introduction to Literary Analysis (3:3:0) Prerequisite: 15 credits of French. Structured approach to the 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. Study of styles in commercial, private, and official formats for correspondence and various common business documents. Emphasis on 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 this course in preparation for the 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 the humanistic tradition in France during the 16th century, especially as reflected in the 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. Study of the dramatic literature of the 17th century.

414 French Literature of the Seventeenth Century: Prose and Poetry (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Reading and analysis of representative texts of major authors. May be taken toward fulfillment of the general requirement in literature for baccalaureate degrees.

421 French Literature of the Eighteenth Century: Montesquieu and Voltaire (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Study of Montesquieu, Voltaire, and other writers of the first half of the century.

422 French Literature of the Eighteenth Century: Diderot and Rousseau (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Study of Diderot, Rousseau, and other writers of the second half of the century.

431 French Literature: 1800–1850 (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Poetry, theater, and novels of the 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 the 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. Emphasis on evolution of the novel from Proust and Gide to Beckett and the "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 the "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. Study of Francophone literature of North Africa (the Maghreb) with emphasis on contemporary works.

452 French-Canadian Literature (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Study of the 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. Study of the 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. Study of selected writers expressing the culture and civilization of French-speaking countries of the Caribbean.

460 Advanced Oral and Written Expression (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Intensive course designed to help students obtain fluency in oral and written French. Development of 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. Descriptive analysis of the 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. Analysis of the more complex aspects of the French language and various stylistic processes. Development of writing skills through readings, discussion, and composition.

470 Topics in French Cinema (3:3:0) Prerequisites: English 352 or permission of instructor for Film and Media Studies, 18 credits in French or permission of instructor for French students. Topics in French cinema (such as the early days of French cinema, La Nouvelle Vague, women film directors, Quebecois, African and Caribbean films), selected by type, period, or director, with emphasis varying from year to year. Required viewing, student discussion, and written critiques. May be repeated once with permission of the department or film studies advisor.

480 Special Topics (3:3:0) Prerequisite: 18 credits of French or permission of instructor. Study of a 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: Enrollment in French or linguistics in consultation with a member of the department. Only six credits of independent study may be applied to fulfillment of requirement in the concentration.

497, 498 Senior Honors Tutorial (3:0:0), (3:0:0) Prerequisites: French majors with 90 credits and permission of chair. Research and analysis of a selected problem in literature or linguistics in consultation with a member of the department. 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 French faculty. Second semester requires independent research and completion of an honors essay under the supervision of a member of the French faculty.

515 Medieval French Literature (3:3:0) Intensive study of the outstanding literary works of the 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 the 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 the 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 the modern era. Content varies. May be repeated for credit with permission of department. Maximum of six 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 the French language from Latin to present-day French.

575 Grammatical Analysis (3:3:0) Study of characteristic features of contemporary French. Examines spoken and written French, including syntactic analysis, distributional analysis, and generative-transformational grammar. Emphasis on problem areas for American learner.

576 Advanced Translation (3:3:0) Advanced work in translation of topics selected from the social and political sciences and the humanities. Comparative terminology, sight translation, and precis writing. Importance, function, and techniques of documentation in translation are stressed. Translations from French to English and English to French.

580 Contemporary French Society and Culture (3:3:0) Study of structure and evolution of the society and culture of contemporary France.

798 Directed Reading and Research (3:0:0) Prerequisite: open only to degree students who have completed at least 18 credits. Reading and research on a specific project under the direction of a department member. Oral or written report required.

799 Thesis (1-6:0:0) Students who take FREN 798 and then elect the thesis option receive three credits for FREN 799 on completion of the thesis. Students who do not take FREN 798 receive six credits for FREN 799 on completion of the thesis. Graded S/NC.

See also FRLN course listings.

Geography (GEOG)

101 Major World Regions (3:3:0) Patterns, problems, and prospects of the world’s principal human-geographic regions. Emphasis on areal differentiation and the role geographic differences play in the interpretation of the current world scene.

102 Physical Geography (3:3:0) Interrelated processes affecting global distribution and character of climate, soils, vegetation, hydrology, and landforms; 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. Survey of 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 a global perspective.

110 Maps and Mapping (3:3:0) Introduction to 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 employed in spatial analysis with emphasis on solving geographical research problems. Topics include the 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 the landscape, particularly on national and global scales.

303 Conservation of Resources and Environment (3:3:0) Prerequisite: 30 credits. Analysis of spatial aspects of world resources and problems resulting from unequal distribution or unwise use. Population growth, its implications for resource use, and pollution problems are stressed.

304 Geography of Population (3:3:0) Prerequisite: 30 credits. Spatial distribution of populations, its causes and effects, and the changing patterns resulting from population mobility. Emphasis on spatial characteristics of variables such as age, sex, race, education, and income.

305 Economic Geography (3:3:0) Prerequisite: 30 credits. Analysis of the pattern of distribution of world economic activity, the spatial economics behind this pattern, and the influence of this distribution on other spatial systems.

306 Urban Geography (3:3:0) Prerequisite: 30 credits. Structure and internal differentiation of cities. Variety of perspectives on the 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
distributions of meteorological controls as the bases of regional climatic variations (natural science credit).

310 Introduction to Digital Cartography (4:3:2) Prerequisite: grade of C or better in GEOG 300 or permission of department. 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 the regional structure of Europe.

325 Geography of North Africa and the Middle East (3:3:0) Prerequisite: 6 credits of geography and/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 the 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. Analysis of geographic factors involved in the 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 a particular region or relevant regional issue. Content varies. May be repeated.

357 Structures in Urban Governance and Planning (3:3:0) Prerequisite: 30 credits. Review of the spatial, policy, and administration principles that guide planning activity in the United States. Outlines differences between theory and practice and provides a set of tools, methods, and perspectives that are commonly incorporated into the practice of urban and regional policy analysis. Provides an orientation to the public-sector economy in general and to urban administration, planning, and policy in particular.

380 Geography of Virginia (3:3:0) Prerequisite: 30 credits. Natural and cultural forces of Virginia. Study of 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.

406 Suburban Geography (3:3:0) Prerequisite: 60 credits. Analyzes spatial aspects of social, economic, and political activities in suburbia. Suburbanization viewed as independent force and component of larger urbanization process. Northern Virginia is used as a 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 the physical and cultural landscape.

415 Seminar in Geography (3:3:0) Prerequisites: GEOG 300 and 310. Capstone seminar for geography majors, integrating previous coursework into a disciplinary framework. Students produce and present original research papers.

416 Satellite Image Analysis (3:3:0) Prerequisites: 60 credits and GEOG 412, or permission of instructor. Examination of the 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 the North American continent, their spatial distribution, and their influence on the cultural, demographic, and economic development of the 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 the object-oriented approach, advanced spatial analytical techniques including raster modeling and network analysis, programming, and algorithm development in GIS. Major purpose of this course is to extend the fundamental theories and concepts in GIS so students are able to conduct research with GIS and on GIS.

480 Internship in Geography (1-3:0:0) Prerequisite: open only to majors with 90 credits and GPAs of 2.50 in geography course work. Approved study programs with specific employers. Credit is determined by department. Contact department one semester before enrollment.

490 Practicum in Geographical Applications (1-6:0:0) Prerequisite: open only to authorized majors with 90 credits. Application of geographical research tools and techniques in conjunction with faculty instruction and research. Individualized sections taught by arrangement with full-time faculty.

499 Independent Study in Geography (1-3:0:0) Prerequisite: open only to geography majors with 90 credits and permission of department and instructor. Individual study of a selected area of geography. Directed research paper is required.

503 Problems in Environmental Management (3:3:0) Prerequisite: 6 credits of geography, including GEOG 102. Case studies of the effects of human activities on atmospheric, hydrologic, geomorphic, and biotic processes.

505 Transportation Geography (3:3:0) Prerequisite: 6 credits of geography. Structure, principles, location,
and development of world transportation. Critical role of transportation in moving people, goods, and ideas at the international, national, regional, and urban levels.

520 Geography for Teachers (3:3:0) Prerequisite: graduate standing or permission of department. Emphasizes problems and techniques in teaching geography and current developments in research, methodology, and philosophy in the discipline.

525 Economics of Human/Environment Interactions (3:3:0) Prerequisite: EVPP 524/GEOG 524 or equivalent. Advanced topics in environmental, natural resource, and ecological economics for the non-economist. Emphasis on sustainability, intergenerational equity, and economic-ecological feedbacks. Lecture/discussion format with substantial student participation. Problem sets, class presentations, and term paper.

531 Land-use Modeling Techniques and Applications (3:3:0) Prerequisite: GEOG 550 or permission of instructor. Survey of literature on spatially explicit empirical models of land-use change. Hands-on experience developing and running simple models. Techniques covered include statistical models, mathematical programming models, cellular automata, agent-based models, and integrated models.

533 Issues in Regional Geography (1-6:0:0) Geographical study of a particular region or relevant regional issue. Content varies. May be repeated.

540 Medical Geography (3:3:0) Prerequisite: course in statistics. Spatial approaches to study of health and disease. Topics include disease ecology, and diffusion, and geographic perspectives on improving health care delivery.

550 Geospatial Science Fundamentals (3:3:0) Introduces students to the geospatial sciences, emphasizing concepts and theories of cartography, remote sensing, especially air photo interpretation, Global Positioning Systems, spatial data structures, and geographic information systems. Lectures accompanied by hands-on exercises. Only available for students without previous course work in cartography.

551 Thematic Cartography (3:3:0) Prerequisite: GEOG 310 or 550. Analysis of the nature of perceptual organization and visual systems in thematic map communication portrayal, graphic handling, and data analysis.

553 Geographic Information Systems (3:3:0) Prerequisite: GEOG 550 or course in cartography. Sources of digital geospatial data, and methods of input, storage, display, and processing of spatial data for geographic analysis using Geographic Information Systems. Lectures accompanied by hands-on exercises to familiarize students with current technology.

554 History of Cartography (3:3:0) Prerequisite: graduate standing. History of cartographic portrayal of the Earth from ancient times through the 19th century, with emphasis on interrelation of human culture, technological development, and geographical knowledge as reflected in maps.

562 Photogrammetry (3:3:0) Prerequisite: GEOG 412 or permission of instructor. Treatment of photogrammetric problems, including least squares adjustments, image coordination refinements, collinearity equation, resection, relative orientation, and analytic aerotriangulation.

563 Advanced Geographic Information Systems (3:3:0) Prerequisites: GEOG 533 or equivalent. Discussion of advanced GIS concepts including spatial data structure, spatial analysis, programming data fusion, internet components, and spatial database management. Hands-on activities demonstrate these 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 the instructor. The components and transfer processes within the hydrosphere. The hydrosphere consists of the aqueous envelope of the Earth included the oceans, lakes, rivers, and snow, ice, and soil moisture, ground water, and atmospheric water vapor.

575 Reconstructing Past Environments: Seminar in Geoarchaeology (3:3:0) Prerequisites: permission of instructor and course work in geography, biology, geology, or archaeology. Research seminar examining the intersection of geoarchaeology and paleocology with cultural ecology. Addresses methods common to these research areas, and the ranges of scales and reliability of evidence used to reconstruct past environments, both natural and cultural. Applied examples cover selected geoarchaeological and paleocological projects from a 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. Examination of the theory and techniques of using digital remotely sensed data for obtaining geographic information of the Earth’s surface, including both image enhancement methods and classification strategies for a variety of physical and cultural features.

581 World Food and Population (3:3:0) Prerequisite: graduate standing. Topics include malnutrition, regional disparities in growth rates and income distribution, food production, and world hunger. Discussion of population policies with emphasis on Third World countries.

585 Quantitative Methods (3:3:0) Prerequisite: previous course work in statistics, GEOG 310 or 550. Survey of quantitative methods commonly used in geographic research. Emphasis on spatial analysis techniques.

590 Selected Topics in Geography and Cartography (3:3:0) Prerequisite: permission of department. Students analyze topics of immediate interest. Content varies. Graduate standing is prerequisite to all 600-level courses.

603 Geographic Perspectives of Complex Natural Resource Management Topics (3:3:0) Managing and restoring large and complex natural resource systems have become popular. Students will develop a better understanding of the strengths and limitations of this approach by examining critical aspects of one such effort.

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/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) Prerequisite: GEOG 579 or EOS 753, or other basic course in remote sensing. Provides understanding of components, functionality, and use of radar remote sensing for the acquisition of spatial information. Concentrates on operational systems. Includes hands-on assignments.

653 Geographic Information Analysis (3:3:0) Prerequisites: GEOG 553 and 585. Exploration of existing and potential capabilities of geographic information systems in conducting spatial analysis and spatial 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 the 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. Development of various map projections and coordinate systems; analysis of their properties, distortions, and applications.

664 Spatial Data Structures (3:3:0) Prerequisite: GEOG 310 or 550. Study of spatial data structures and their application in digital cartography, geographic information systems, and image-processing systems. Raster and vector data structures are examined, as well as attribution schemes and topological models. Data transformation, information loss, data quality, and the role of metadata are included.

670 Applied Climatology (3:3:0) Prerequisite: course in weather and climate or permission of instructor. Application of climatic concepts to natural and human-modified environments. Analysis of climatic change.

671 The Lithosphere (3:3:0) Prerequisite: graduate standing. A global-scale overview of the lithosphere, the solid non-living earth, its materials, cycles, plate tectonic and geomorphic processes, and history, including interactions with and history of the 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.


690 Advanced Practicum in Geographical Applications (1-6:0:0) Prerequisite: permission of department. Application of 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 and department. Reading and research on a specific topic under the direction of a faculty member. Written report is required; oral exam and report may be required. May be repeated.

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.

785 Geographic Field Work (3:3:0) Introduction to the 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) Introduction to a colloquium format covering the various parts of the Earth systems. Invited talks by Mason faculty and primarily Earth Science experts in the Washington, D.C. area. Students will be graded on written reports demonstrating an understanding of the wide topics covered.

792 Seminar in Earth Systems Science (2:2:0) Prerequisites: 15 graduate credits and courses on the atmosphere, hydrosphere and lithosphere. For graduate students who have 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) Analysis and synthesis of physical and cultural elements of geography in a selected region. Should be taken near the end of the master’s degree program and should provide an opportunity for the student to apply selective knowledge gained in previous systematic courses to a specific region.

799 Thesis (1-6:0:0) Prerequisites: Degree candidacy and departmental approval of thesis proposal. Graded S/NC.

Geology (GEOG)

Environmental Science and Policy

101 Introductory Geology I (4:3:3) The Earth, processes that operate within the Earth and on its surface, and human interaction with the 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) Prerequisite: GEOG 101. Earth processes in a 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) Discussion of a 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 103 or equivalent and GEOG 102 or GEOL 101. Basic techniques for collecting, recording, and plotting spatial field data including the 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. Introduction to sedimentation, sedimentary petrology, facies analysis, and stratigraphy. May include field trips.

305 Environmental Geology (3:3:0) Prerequisites: GEOL 101 and one of the following GEOL 102, GEO 109/BIOL 309 or GEOG 309. Investigation of 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, 102, a 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, BIOL 103 or 213. Introduction to physical, chemical, biological, and geological aspects of the 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 the common invertebrate fossils. May include field trips.

313 Hydrogeology (3:3:0) Prerequisites: GEOL 101 or GEOG 102, MATH 113, and CHEM 211. Geological and hydrologic factors controlling the occurrence, distribution, movement, quality, and development of groundwater.

315 Topics in Geology II (1-3:1-3:0) Prerequisites: GEOL 101 and 102. Discussions of a particular topic in geology. May include field trips.

316 Computers in Geology (3:3:0) Prerequisite: GEOL 101, 102, 302, 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 a grade of C or better, or six credits in GEOG, including GEOG 102; GEOG 412 is strongly recommended. Analysis of processes that occur at the Earth’s surface and the resulting landforms. Labs stress the recognition and evaluation of landforms using maps and aerial photographs and the methods of data collection used in the study of surficial geology. May include field trips.

363 Coastal Morphology and Processes (4:3:3) Prerequisite: GEOL 309 or BIOL 309 or GEOL 317 or 9 credit hours in geography, including GEOG 309. Study of 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. Stable isotope geochemistry, crystal geochemistry, geochronology, water geochemistry, organic geochemistry, and the 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 the collection of 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 and discuss research literature and produce and present original papers.

408, 409 Practicum for Geology Laboratories (1:1:3) Prerequisites: geology major with 80 credits and permission of department chair. Study of the techniques used to make the geology lab an effective component in geological education. Discussions of the development of testing materials, supplemented by experience in the operation of a lab section of a geology course.

410 Research Proposal Preparation (1:1:0) Prerequisites: geology or earth science major with 80 credits and permission of department chair. Preparation for research in GEOL 411, to include literature research, initial data collection, and preparation of a 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, 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 the class schedule.
503 Special Topics in Earth Science (1-6 credits)
Prerequisite: admission to PhD in education program to study geology. Program of studies designed by student’s discipline director and approved by student’s doctoral committee that allows the student to participate in the current research of the discipline director and results in a paper reporting the original contributions of the student. Enrolment may be repeated.

601 The Lithosphere (3 credits)
Prerequisites: graduation standing. Global-scale overview of the lithosphere, solid non-living Earth, its materials, cycles, plate tectonic and geomorphologic processes, and history, including interactions with and history of the hydrosphere, atmosphere and biosphere, and methods of analysis.

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 student’s discipline director and approved by student’s doctoral committee that allows the student to participate in the current research of the discipline director and results in a paper reporting the original contributions of the student. Enrolment may be repeated.

German (GERM)

Modern and Classical Languages

Placement: See the Academic Testing section in the Admission chapter.

101 Elementary German I (3 credits)
Prerequisite: for students with no knowledge of German. Introduction to German, including elements of grammar, vocabulary, oral skills, listening, comprehension, and reading. Lab work required.

102 Elementary German II (3 credits)
Prerequisite: GER 101 or permission of department. Continuation of GER 101. Lab work required.

105 Review of Elementary German (3 credits)
Prerequisite: appropriate placement score or permission of department. Review of elements of German for students who have studied German previously. May not be taken for credit in combination with GER 102. Lab work required.

201 Intermediate German I (3 credits)
Prerequisite: GER 102, 105, appropriate placement score, or permission of department. Further development of skills in listening, speaking, reading, and writing. GER 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate German II (3 credits)
Prerequisite: GER 201, appropriate placement score, or permission of department. Application of skills to reading, composition, and discussion. Lab work required.

301 Culture and Civilization (3 credits)
Prerequisite: 60 credits or permission of instructor. Development of German civilization from 18th century to present. German cultural contributions to world civilization. Taught in English.

310 Conversation and Composition (3 credits)
Prerequisite: GER 202 or equivalent, or permission of instructor. Development of 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 credits)
Prerequisite: GER 202 or equivalent, or permission of instructor. Introduction to the terminology and structural features of business German. Emphasis on acquiring vocabulary and on developing facility in reading German business articles and correspondence.

318 Translation of Texts (3 credits)
Prerequisite: 12 credits of German or permission of instructor. Introduction to 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 credits)
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 credits)
Prerequisite: GER 202 or equivalent, or permission of instructor. Overview of history of German literature to 1880.

355 Readings in Poetry (3 credits)
Prerequisite: GER 202 or equivalent, or permission of instructor. Intensive reading of German poetry in its historical context. Study of 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 credits)
Prerequisite: GER 202 or equivalent, or permission of instructor. Intensive reading of German narrative prose, such as autobiographical fiction, fairy tales, and film. Study of genre characteristics and development. Topics vary. May be repeated for credit when subtitle is different, with permission of department.

375 Readings in Drama (3 credits)
Prerequisite: GER 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. Type studied (historical drama, radio play, epic theater) varies. May be repeated for credit with permission of department when subtitle is different.

415 Advanced Grammar and Style (3 credits)
Prerequisite: 15 credits of German or permission of instructor. Study of syntax, idiomatic features, and levels of style. Extensive practice in different types of written expression.

418 Advanced Composition (3 credits)
Prerequisite: 15 credits of German or permission of instructor. Development of proficiency in writing German through intensive practice in preparing guided and original compositions.

442 The Age of Goethe (3 credits)
Prerequisite: 15 credits of German or permission of instructor. Major works of Enlightenment, Sturm und Drang, Classicism, and early Romanticism. Emphasis on drama and poetry by Goethe and Schiller with additional works by Lessing, Kcleist, and other important writers of the era.

444 The Literature of Romanticism (3 credits)
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 credits)
Prerequisite: 15 credits of German or permission of instructor. Literature of Naturalism, Impressionism, and Expressionism, in Germany, Austria, and Switzerland.
Courses

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)

101 Introduction to Global Affairs (3:3:0) Surveys a wide range of global topics: previous periods of globalization, international organizations and law, transnational corporations and the global economy, immigration and refugees, world environmental concerns, world culture, war and peace, the paradoxical presence of nationalism and fundamentalism in a global world, and the anti-globalization movement.

495 Global Experiential Learning (1-18:0:0) On-the-job training in transnational or international fields through approved internship programs. Enrollment and credits are controlled by the Global Affairs Program. Contact the Global Affairs Program one semester before planned enrollment.

Government and International Politics (GOVT)

Public and International Affairs

101 Democratic Theory and Practice (3:3:0) Comparative exploration of contemporary theory and practice of modern democratic states. Topics include contemporary analysis of the meanings of liberty, equality, representation, property rights, voting rights, and civil responsibilities.


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) Introduction to the methods and subject matter of comparative political analysis are discussed. Major issues of political systems, politics, participation in politics, government structures, policy-making process, and evaluation of political performance.

149 Global Awareness (3:3:0) Introduction to the study of global systems, with emphasis on basic concepts and ways of thinking about global affairs.


300 Research Methods and Analysis (4:3:1) Required for all majors in government and international politics and in public administration. Students are strongly recommended to take 300 before or during the first semester of enrolling in 300-level courses. Emphasis is on asking clear, researchable questions and using appropriate evidence to answer them. Introduces broad range of evidence including quantitative and qualitative information. Design and analysis of surveys, government archives, case studies, and interpretations of events in journals are studied. Ethical implications of information technologies examined.

301 Public Law and the Judicial Process (3:3:0) Prerequisite: GOVT 103. American judicial organization and operation, role of the Supreme Court in policy formation, and selected constitutional principles.

305 Contemporary American Federalism (3:3:0) Prerequisite: GOVT 103. Legal, administrative, fiscal, and political dimensions of evolving American federalism.

307 Legislative Behavior (3:3:0) Prerequisite: GOVT 103. Organization, processes, functions, and roles of the legislature and its members in the U.S. Congress. 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 the modern presidency, including constitutional origins of the office, growth and influence of White House staff, Cabinet, presidential appointees and control of the executive branch, relations with Congress, and domestic and national security policy making.

309 Government and Politics of Metropolitan Areas (3:3:0) Prerequisite: GOVT 103. Government, politics, and problems of metropolitan centers and surrounding areas.

311 Public Opinion and Electoral Behavior (3:3:0) Prerequisites: GOVT 103 and 300. Studies actions of voters, candidates, and political parties in relation to the expression of relevant public opinion in a democratic system.

312 Political Parties and Campaigns (3:3:0) Prerequisite: GOVT 103. Characteristics and functions of political parties, influence of parties and other political forces on electoral decisions, and emphasis on parties’ inability or ability to hold government accountable to citizens.

318 Interest Groups, Lobbying, and the Political Process (3:3:0) Prerequisite: GOVT 103. Role, internal operations, strategies, and activities of interest groups. Evaluates ability of these groups to influence or control government and enhance the democratic process. Conditions under which social movements become, or fail to become, effective interest groups are considered.

319 Issues in Government and Politics (1-3:3:0) Prerequisite: GOVT 103. Study of special issues relevant to government and politics. Topics are 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. Theories and concepts of international relations as well as major forces and issues in international politics are studied.
323 Classical Western Political Theory (3:3:0) 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 the 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) 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.

327 Contemporary Western Political Theory (3:3:0) Exploration through lecture and discussion of recent developments in Western tradition of political thought from the middle of 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) Prerequisites: 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 the Islamic World; their relations to the Western tradition; methodology of studying other cultures; postcolonial theories and the cultural politics on contemporary globalization.

329 Issues in Political Theories and Values (1-3:3:0) Study of special issues relevant to theoretical and value aspects of government and politics. Topics are 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.

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. Case studies of several key Latin American polities presented. Problems of political development in Latin America discussed.

332 Government and Politics of the Middle East and North Africa (3:3:0) Prerequisite: GOVT 132, 133, or 149. Societies of the Middle East and North Africa and their response to the impact of internal sociocultural-political determinants and external forces. Focus is on their 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. Patterns of conflict and cooperation, and issues of economic development and political reform in a rapidly changing world are examined.

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. Case studies of key European policies are presented. Problems of multiparty systems, coalition governments, Eurocommunism, and stability and change in postindustrial societies are discussed.

335 Government and Politics of Canada (3:3:0) Prerequisite: GOVT 132, 133, or 149. Survey of governmental and political systems of Canada, including political parties, the parliamentary system, the federal system, and specific policy issues of importance to Canadian politics.

336 Political Development and Change (3:3:0) Prerequisite: GOVT 132, 133, or 149. Process of political development and change in the context of modernization and industrialization. Patterns of political development, with emphasis on the developing world, are examined.

337 Ethnic Politics in Western Europe and North America (3:3:0) Prerequisite: GOVT 132, 133, or 149. Study of the resurgence of ethnic nationalism in the industrial democracies of Western Europe and North America, and the comparative analysis of policy issues related to ethnonationalism. Case studies are drawn from the industrial democracies.

338 Government and Politics of Russia and Central Eurasia (3:3:0) Prerequisite: GOVT 132, 133, or 149. Survey of Soviet domestic politics and foreign policy before the breakup of the Soviet Union and an examination of the evolving political systems in the newly independent states as well as their international relations.

339 Issues in the Politics of Advanced Industrial Societies (1-3:3:0) Prerequisite: GOVT 103 or 133, or permission of instructor. Study of selected current political issues in the industrial democracies of Western Europe and North America. Specific topics are chosen each semester to reflect contemporary political concerns in these countries, but the political process in advanced industrial countries is the organizing principle throughout the course.

342 Diplomacy (3:3:0) Prerequisite: GOVT 132, 133, or 149. Origins of organized diplomacy: tasks, procedures, instruments, and problems of diplomacy. Emphasis is on the current and future role of diplomacy.

343 International Political Economy (3:3:0) Prerequisite: GOVT 132, 133, or 149, or permission of instructor. Introduction to international political economy (IPE). Examines interplay of economics and politics, and applies these to different issues included in IPE. Focus is on issues that have 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 the conduct of foreign policy in a democracy.

345 Political Islam (3:3:0) Covers the 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 the Muslim World; nature of democracy in Islam and the Islamic state.
347 International Security (3:3:0) Prerequisite: GOVT 132. Explores both enduring security problems and new developments in the field of international security. Examines the effects of the international system on defense policies of states, and especially the tensions of a world caught between emerging interdependence and national demands. Course asks students to draw policy implications because it encourages development of critical-thinking and group and oral presentation skills.

348 Competencies for the Global Arena (1-3:0:0) Prerequisites: GOVT 149 and 60 credits, or permission of instructor. Proficiency-based course that engages students in acquiring skills and competencies that are important for a professional operating in a global society. Consists of a series of self-paced exercises conducted under the supervision of departmental faculty.

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 the political subsystem and its interactions with other global systems.

351 Administration in the Political System (3:3:0) Prerequisite: GOVT 103. Administrative structures and processes in the political setting of public management. Presents organization and administrative theory, critiques current practices, and examines the impact of changes in the social, political, and economic environment on these concepts and models.

355 Public Personnel Administration (3:3:0) Prerequisite: GOVT 351. Analysis of techniques and tools used in human resource management including the merit system, classification, compensation, evaluation, recruitment, and labor relations. Emphasis is placed on current legal and policy issues in personnel administration, such as diversity and privatization.

356 Public Budgeting and Finance (3:3:0) Prerequisite: GOVT 351. Tools and techniques used in budgeting and financial management in governments in the United States, including the management of public financial institutions, the budgetary process, budgetary reform, and the 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. Emphasis is on setting goals, defining objectives, and choosing between program alternatives. Political and bureaucratic constraints and problems of implementation are discussed. Illustrations of planning may be drawn from various levels of government.

358 Nonprofit Financial Planning (4:3:1) Prerequisite: 60 credits or permission of instructor. Provides an understanding of the social mission and entrepreneurial cross pressures underlying financial planning and accounting in the nonprofit sector. Topic include revenue sources, revenue projections, entrepreneurial techniques, and cost analysis for nonprofit and nongovernmental entities. Lecture and student case studies.

359 Computers in Public Management (3:3:0) Prerequisite: GOVT 300. Application of computers and computer-based analytical techniques to management information needs in the public sector. Focus is on both 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. Examination of policy strategies and outcomes, ethical and economic debates, political controversies, lawmaking and enforcement, and the 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 public policy in the United States.

365 State and Regional Public Policy (3:3:0) Examines public policy decisions that affect local and state jurisdictions in the context of a federal system of government. Context, substance, and impact of such policies as housing, transportation, land use, crime prevention, service delivery, and health care are examined.

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.

376 Collective Bargaining in the Public Sector (3:3:0) Collective bargaining and the broad concept of labor relations as involved in selection and hiring, seniority, promotions, and training. Examines labor relations and bargaining process, from initial hiring to retirement.

399 Research Practicum in Public and International Affairs (1-3:1-3:0) Prerequisites: GOVT 300 and permission of instructor. Application of research methods in the 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. Exploration of the relationship between law and society, including the concept of law, the origin, development, and role of law in society, and the relationship between law and social change. Different approaches to the study of law and society are considered and different methodologies assessed.

409 Virginia Government and Politics (3:3:0) Prerequisite: GOVT 103. History of politics in Virginia and examination of current political issues. Particular attention to changing dynamics of the political parties, key legislative issues, and the policies of recent administrations.

412 COMM 412 Politics and the Mass Media (3:3:0) Prerequisite: GOVT 103. Responsibilities and freedoms of the mass media in a democracy. Influence of media on citizens’ opinions, elections, and decisions of public officials is explored.
414 Politics of Race, Gender, and Age (3:3:0) Prerequisite: GOVT 103. Examination of political, economic, and social impact of public policies and implications for race, gender, and age.

416 Political Persuasion and Propaganda (3:3:0) Prerequisite: GOVT 103 Techniques and processes of political argument and persuasion as used in campaigns, public education, and political debate. Topics include propaganda in both domestic and international arenas, and political persuasion, myths, and symbols used to induce conformity and form unified polity. Films and tapes supplement examples of classic political speeches.

420 American Political Thought (3:3:0) Prerequisite: GOVT 103. Major political values and theories in America from the formation of the American republic to the 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) Study of political ideologies that shape the 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. Examination of the Supreme Court’s interpretation of the constitutional powers of the Congress, the presidency, and the judiciary. Includes an examination of major decisions concerning state regulation, taxation, and interstate relations.

423 Constitutional Law: Civil Rights and Liberties (3:3:0) Prerequisite: GOVT 103. Study of the First Amendment freedoms of speech, press, assembly, association, and religion; the right to privacy; and Fourteenth Amendment equal protection.

424 Constitutional Law: Criminal Process and Rights (3:3:0) Prerequisite: GOVT 103. Study of constitutional law pertaining to rights of criminally accused from the stages of investigations and evidence through attorney, trial, and punishment stages at federal and state levels.

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. Examination of the relationship between culture, history, ethnicity, and religion and contemporary political and socioeconomic developments in Africa. Special attention is given to the implications of ethnic conflict for nation-building in the post-Cold War period and to strategies for resolving conflicts.

433 Political Economy of East Asia (3:3:0) Prerequisites: GOVT 133 and 60 credits, or permission of instructor. Political economy of East Asia is commonly referred to as a miracle. Analysis and critique of this description by focusing on the historical background, social structure, role of the state, way of politics, and ever-changing realities in the political and economic life of China and Japan.

434 Democracy in Global Perspective (3:3:0) Prerequisite: GOVT 133. Comparative study of the structures and performance of democracies around the world since 1975. Examination of growing influence of global forces (economy, media, culture) in the process of democratization. Examination of select current elections.

444 Issues in International Studies (1-3:3:0) Prerequisite: GOVT 132, 133, or 149. Major issues in the international system, including international political economy and security. May be repeated for credit when topic is different, with permission of department.

446 International Law and Organization (3:3:0) Prerequisite: GOVT 132, 133, or 149. Nature, sources, and subject of the law of nations; the law and the individual; territorial questions; nature, sources, and functions of international organizations; international transactions and organizations; war and the present and future status of international law.

447 Comparative Revolutions (3:3:0) Prerequisite: GOVT 133. Historical overview of modern revolutions as well as the different theories about the causes and consequences of revolutions. Special attention is paid 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 the use of force are two overarching themes. Students also develop, apply, and justify their own perspectives on an ethical problem using philosophical theory, history, and social science research.

449 Senior Seminar in International Studies (3:3:0) Prerequisite: Open only to senior majors. Integrative seminar providing in-depth study of a current international issue. Format varies, but involves the student in the current literature, research techniques, and major issues of the field.

452 Administrative Law and Procedures (3:3:0) Prerequisite: GOVT 351. Law of public office. Studies the procedures followed by and the legal limits on the administrative agencies and their officers and employees.

459 Information Decisions and Management in Government (3:3:0) Prerequisite: GOVT 390. Information and knowledge systems in government. Information applications, decision-modeling under risk and uncertainty; high-technology development, management, and use; and sociotechnical systems are discussed.

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 the 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. Analysis of selected policy issues in administering public policies. Topics are 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.

480 Internship (3-6:0:0) Contact the department one semester before enrollment. Approved work-study programs with specific employers. Students develop individual contracts defining the 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) Prerequisites: open to majors in public and international affairs with 90 credits and permission of instructor and department. Reading and research on a specific topic, under direction of faculty member. Written report required; oral examination over the research and report may be required.

500 Research Methods in Political Science (3:3:0) Introduction to 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 the 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) Analysis of 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 globalized economy and information technology revolution, enhanced role of global corporations and nongovernmental organizations, and rise of nonsecurity issues in the emerging international agenda.

603 Seminar in the Courts and Constitutional Law (3:3:0) Analyzes role, influence, and effects of the 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, the 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. Theories of comparative analysis and research reflecting alternative analytic perspectives are brought to bear on the institutions and political processes of nations and regions.

641 Seminar in Global Systems (3:3:0) Prerequisites: completion of all core courses. Application of the 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, international levels affected by global systems. Examines role of nongovernmental organizations in global affairs.

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) Prerequisites: GOVT 510. Examines broad trends in governance, including theory and practice of key governance choices, with a particular focus on intergovernmental relations and the 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 instructor’s permission. 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 the power of law to order social behavior.

708 Law and Social Control (3:3:0) Prerequisite JLCP 720/GOVT 728 or instructor’s permission. 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) Prerequisites: JLCP 760/GOVT 792 or instructor’s permission. 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) Prerequisites: JLCP 720/GOVT 728 or instructor’s permission. Understanding legal doctrines that form the basis of U.S. constitutional procedural rights and understanding how these doctrines develop, why the courts rule as they do, and evaluating strengths and 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.

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 not only on the United States, but also on a 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 the justice system and other social and political institutions.

727 Restorative Justice (3:3:0) Prerequisite: JLCP 700 or instructor's permission. 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) Prerequisites: GOVT 540. Addresses theoretical and methodological issues central to comparative politics by focusing on specific topic (international development, race and ethnicity, social movements) or region (Latin America, Asia, Middle East, Europe, European Union, Africa, Russia). Assumes basic proficiency in comparative analysis (as provided in GOVT 540) and focuses on advanced modes of inquiry through in-depth analysis and discussion. May be repeated for credit when the topic is different and with permission of department.

732 Comparative Justice (3:3:0) Prerequisite: JLCP 700/GOVT 726 or instructor's permission. 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. Examination of significant current issues in comparative and international politics. Explores issue of contemporary and emerging concern in comparative and international politics.

741 Advanced Seminar in International Politics (3:3:0) Prerequisites: GOVT 540. Examines theoretical and methodological issues central to study of international relations by focusing on a 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 the topic is different and with permission of department.

743 International Political Economy (3:3:0) Prerequisite: GOVT 540. Examines issues of international security, including nuclear strategy, arms control, U.S. defense policy, ethics and international security, and international terrorism.

745 Issues in International Security (3:3:0) Prerequisites: GOVT 540. Examines issues of international security, including nuclear strategy, arms control, U.S. defense policy, ethics and international security, and international terrorism.

755 Seminar in Politics and Bureaucracy (3:3:0) Prerequisite: GOVT 510. Explores research and theory on political causes and effects of actions of bureaucratic agencies of government. 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.

792 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.

794 Internship (1-6:0:0) Prerequisites: 12 credits in the MAIS-political science concentration. Open only to students admitted to the 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 instructor’s permission. 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 the 500 level and above, and permission of the instructor. Reading and research on specific topic under the direction of a faculty member. Written paper required.

798 Political Science Research Project (3:3:0) Prerequisites: 24 credits. Research project related to the student’s concentration under the supervision of a faculty advisor. Student produces a substantial and original contribution to political science knowledge on the model of an article in a scholarly journal. Students take either GOVT 798 or 799.
Political Science Thesis (1-6:0) Prerequisite: 24 credits and approval of thesis proposal. Substantial and original research paper with the guidance of a faculty advisor. Thesis proposal must be approved in advance by an advisor and two faculty, who comprise the thesis committee. Completed research must be approved by the committee and defended publicly in an oral presentation. Students take either GOVT 798 or 799. Graded S/NC.

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.

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.

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.

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 and student presentations. May be repeated for up to 9 credits on different topics.

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. Debate over economic growth and development from a broad and rigorous analytical base.

European Union and Political Integration (3:3:0) Prerequisite: GOVT 540, GOVT 631. Advanced graduate-level seminar on European integration and theories of international organizations. Detailed examination of evolution of European Union and other international organizations, such as NATO, which have brought most European states together since the end of World War II.

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.

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 power (American, Russia, China, France, and Japan) as well as of small and revolutionary powers. Also examines diplomacy and the media, and day-to-day diplomacy.

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 is encouraged.

Health Education (HEAL)

School of Recreation, Health, and Tourism

Personal Health (3:3:0) Focuses on individual and family well-being through the integration of fitness, nutrition, human sexuality, consumer health, drug education, and mental health.

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.

Dimensions of Mental Health (3:3:0) Focuses on the integration of behavioral and sociocultural factors in the study of mental health.

Drugs and Health (3:3:0) Analyses drug use, with an emphasis on its positive aspects, and presents alternatives to drug misuse and abuse.

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 the life span. Consistent with Healthy People 2000 goals for the nation. Emphasizes lifestyle activity and fitness, behavioral change, and maintenance.

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 a range of community settings, including schools and colleges, the workplace, social services, health care providers, citizen groups, and related services.

Program Leadership and Evaluation (3:3:0) Prerequisite: PRLS 310 or permission of instructor. Covers leadership and evaluation of health, fitness, and recreation programs. Students use computer technology to study the evaluative aspects of program planning and administration.


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.

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 the development of innovative programs and the role of HFRR interventions.

370 Health Determinants and Status (3:3:0) Focuses on the determination of a 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 within the 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 the 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 the multisystem agency environment, which includes a focus on population and subpopulation health.

480 Special Topics (1-3:3:0) Presents selected health issues or problems. Focuses on the application of information to education programs.

490 Internship (12:0:12) Prerequisite: 90 credits or permission of instructor. See internship manual for specific concentration requirements. Provides directed experience in observing and participating in health promotion and exercise science programs at community agencies, health care centers, and private sector organizations. Minimum period of 10–12 consecutive weeks. Graded Pass/Fail.

499 Independent Study in Health Education (1-3:0:0) Prerequisites: 90 credits or permission of instructor. Provides study of a 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.

Health Science (HSCI)

College of Nursing and Health Science

150 Global Issues in Health, Nutrition, and Culture (3:3:0) Examines crosscultural 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 a variety of cultures around the world. Also considers population dynamics, vital statistics, global disease patterns, and cultural variations. Includes lectures, discussion, video presentations, oral presentations, web research.

250 Holistic Health Perspectives (3:3:0) Students survey health and wellness issues related to their personal profile, defining their health in context of family, environment, culture, society, and life span. Stresses motivational strategies for improving and maintaining health, and considers individual health in relation to larger community and national health goals.

270, 271 Overview of Human Anatomy and Physiology I (3:3:0), (3:3:0) Prerequisite: permission of college. Must be taken in sequence. Fast-paced, condensed course covering basics of human anatomy and principles of physiology. Some knowledge of basic biology, and chemistry and cell structure and function, necessary. (Students who lack this background will be assigned reading during the first class to catch up.) Successful students will be capable of independent work, and will have many hours to devote to the study of anatomy and physiology outside the classroom.

275 Overview of Microbiology (3:3:0) Prerequisite: permission of college. Fast-paced, condensed lecture course covering basics of microbiology. Examines morphology, genetics, physiology, ecology, and control of microorganisms. Successful students will be capable of independent work, and will have many hours to devote to the study of microbiology outside the classroom.

295 Nutrition for Health Professionals (3:3:0) Prerequisite: one semester of science or permission of instructor. Introduction to nutrition science, emphasizing macro- and micro-nutrients in the body, digestion, energy metabolism, weight loss, fitness and nutrition, prevention of chronic diseases, nutrition therapy, and nutritional assessment. Problem solving and critical thinking methodologies are utilized 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.

302 Healthcare Finance (3:3:0) Introduces finance in healthcare organizations. Reviews issues in reimbursement structures, regulatory mechanisms, cost control, and related factors affecting the financial management of health service organizations (including financial decision support skills).

363 Strategic Health Management and Planning (3:3:0) Introduces past and present interventions that affect supply and demand for healthcare at community, state, regional, and national levels. Presents health planning and regulatory entities, and discusses strategic and program planning in the 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 the healthcare continuum, current or proposed regulatory environments, and differences between assisted living and other forms of senior healthcare 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 the future of the industry, including cutting-edge programs and technologies, and approaches to creating the next generation of assisted living services.

332/NURS 332 Concepts of Health Promotion and Disease Prevention Throughout the Life Span (3:3:0) Introduces epidemiology, health promotion, disease prevention, and their impact on health of culturally diverse and vulnerable individuals, families, small groups, and communities. Focuses on health problems and potential interventions throughout the life span, and incorporates teaching, learning, and critical thinking as they apply to health professionals.

334 Role Development for Health Science Majors (3:3:0) Exploration of career opportunities that build on basic education in a health science field. Includes historical perspectives on ethical, legal, political, social, and cultural issues related to healthcare policy and research. Explores multidisciplinary collaboration among healthcare providers.

343/NURS 343 Pharmacology (3:3:0) Study of the principles of pharmacokinetics, the pharmacodynamics of selected drug classifications, and nursing responsibilities related to drug administration to individuals throughout the life span.

344 Health and Risk Appraisal (3:2:2) Exposure to a number of models of health appraisal and risk assessment through multiple technological means. Students implement a model of their choice in their practicum site.

378 Healthcare Delivery in the United States (3:3:0) Introduces history and current structure and function of U.S. healthcare delivery. Explores components and subsystems of healthcare and the sociopolitical (public and private) context that shapes the system and impacts access to healthcare and delivery of health services.

402/HSCI 505/NURS 505 Case Management (3:3:0) Prerequisite: bachelor's degree or permission of instructor. Open to seniors. Survey course on the state of case management programs and practice for health and human service professionals. Special emphasis on comparing nature, process, and outcomes for baccalaureate and graduate students guided by the objectives.

420 Strategies for Nutrition Education (3:3:0) Prerequisite: HSCI 295 or permission of instructor. Examines methods and techniques for educating individuals about nutrition. Addresses nutrition education issues from a variety of populations with respect to culture, age, religion, and specific disease states.

421 Community Nutrition (3:2:1) Prerequisite: HSCI 295 or permission of instructor. Focuses on nutrition and health problems of specific community settings, and examines the practices of nutrition services in various communities.

422 Nutrition Throughout the Life Cycle (3:3:0) Prerequisite: HSCI 295 or permission of instructor. Focuses on the nutrient needs and food habits throughout the life cycle. Emphasizes nutrient needs prior, during and after pregnancy, and nutritional requirements of infants, children, adolescents, adults, and the elderly.

423/NURS 423 Nutrition and Chronic Illnesses (3:3:0) Prerequisite: HSCI 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.

436/NURS 436 Leadership and Management of Healthcare (3:3:0) Prerequisite: completion of HSCI 300-level requirements. Introduces leadership and management of health-related organizations. Reviews administrative issues in health-related services, emphasizing developing organizational strategies for effective interfacing of medical, nursing, allied health, and administrative staff.

440/NURS 440 Community Health and Epidemiology (3:3:0) Prerequisite: completion of HSCI 300-level requirements. Addresses population-focused healthcare. Emphasizes primary, secondary, and tertiary prevention of health problems. Examines concepts of community, public health, and health policy affecting culturally diverse and vulnerable populations.

453/NURS 453 Research in Nursing and Health Science (3:3:0) Prerequisite: completion of HSCI 300-level requirements. Introductory research course to present basic concepts and methods of research. Research process examined as a foundation for scholarship. Emphasizes critique and use of current nursing and health science research in clinical practice.

465/NURS 465 Examination and Integration of Professional and Healthcare Issues (3:3:0) Meets Mason requirement as synthesis course. Additional corequisite for nursing majors: satisfactory completion of NCL Review Testing and Study Plan for LPN and traditional and second-degree pathway; completion of all general education requirements and English 102. Capstone seminar course synthesizing varied dimensions of health professional’s role in global society. Examines issues in healthcare through reflection on natural and behavioral sciences, humanities, and other prerequisite coursework. Selected topics examined through reading, writing, and discussion. Content builds on knowledge and skills acquired through course work and field experience in the major and general education, as well as through life experience. Application of literature in professional practice and related disciplines expected in formal and informal writings on issues. Student writings and presentations receive written self-evaluation and formal review by peers and multiple faculty members involved in teaching the course. Writing-intensive.

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 in the aging. Examines nutrition, nature of health problems, and methods of assessing physical and psychological needs.

492 Death, Dying and Decision Making (3:3:0) Interdisciplinary examination and analysis of clinical care of the dying, and psychosocial issues related to the processes of death and dying. Special emphasis on applying ethical prin-
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 related to dying. Questions of futility examined with associated care issues. Current professional and lay literature discussed in the context of socially changing norms and mores surrounding end-of-life decisions. Hospice and alternative palliative care models are explored for terminally ill patients. Policies, laws, and regulations that impact caregivers and health service providers are reviewed, including advance directives, do-not-resuscitate orders, and assisted suicide. Bereavement as a part of the death, dying, and grieving process for family members is presented. Lecture-discussion.

496/NURS 496 Violence in Society (3:3:0) Interdisciplinary lecture, discussion course examines magnitude of the problem of violence globally and more specifically within the United States. Discussion and reflective activities engage students in the learning process.

498 Health Science Internship (9:2:14) Prerequisite: open to HSCI majors only. Taken in last semester of studies after completing all course requirements. Capstone course involves two-hour weekly seminar, and 14-16 hour internship in a health related organization. Provides variety of applied experiences in the chosen area of concentration under direction of CNHS faculty member and preceptor in the field agency. Integrates critical thinking, project planning and management, communication, and analytic skills in internship and development of project product.

501 Introduction to Biostatistics (3:3:0) Applies selected biostatistics techniques to public health and health system management issues. Includes univariate, bivariate statistics and regression analysis.

505/HSCI 402/NURS 505 Case Management (3:3:0) Prerequisite: bachelor’s degree or permission of instructor. Open to seniors. Surveys 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/NURS 508 Psychopharmacology (3:3:0) Surveys therapeutic effects and side effects of psychopharmacological drugs, including psychotropic and recreational drugs. Emphasizes understanding mechanisms of actions, drug interactions, and subject variables that influence drug effects.

520/NURS 520 Rehabilitation Theory and Practice (3:3:0) Explores rehabilitation theory and research and application to the practice of today’s healthcare professional and care of specific client populations. Rehabilitation theory evaluated as new paradigm for healthcare delivery.

525 Risk Analysis in Health and Biosciences (3:3:0) Explores assessing risk at the time of increased threats, and driving the information security program of healthcare organization. Includes qualitative and quantitative risk analysis models, risk analysis life cycle, and methods of evaluating validity and reliability of existing indices. Covers existing tools for risk assessment, and procedures for constructing new risk indices.

530/NURS 534 Nutrition: A Global Perspective (3:3:0) Directed at students from a variety of disciplines. Examines malnutrition and how it occurs by looking at several situations from around the world. Covers impact of how nutrition can affect a society and community, and examines benefits of a well-nourished population.


543/NURS 543 Global Health: Trends and Policies (3:3:0) Covers today’s health challenges; their various social, economic, and epidemiological causes; role and likely success of information and technology transfer, primary preventive healthcare, social awareness, and intervention in alleviating the problems. Lecture and discussion.

544/NURS 544 Washington Internship in Health Policy (1:0:2) Prerequisite: annual Health Policy Institute. Undergraduates require permission of instructor. One-week (40 hours) exposure to organization with public policy agenda in health. Placements may be in a Capitol Hill office, federal health agency, national association, or other policy organization. Interns engage in field experiences related to the legislative process, including network development of policy-interested contacts, and skill development to expand ability to impact the health policymaking process.

546/NURS 546 Leadership Strategies in Health Policy (3:3:0) Examines leadership process from policy, personal, and organizational perspectives to expand ability to impact the health policy-making process.

547 Regulatory Requirements for Healthcare Systems (3:3:0) Helps healthcare professionals understand the linkage between infrastructures of organization and regulatory and accreditation processes for healthcare organizations. Covers major accrediting agencies, their roles, accreditation principles, and survey process. Focuses on hospitals, with reference to ambulatory care, managed care organizations, rehabilitation centers, laboratories, home health and long-term care facilities. Emphasizes requirements of the Joint Commission on Accreditation of Healthcare Organization (JCAHO) and regulations mandated by the Healthcare Finance Administration (HCFA).

550/NURS 550 Entrepreneurship in Healthcare (3:3:0) Overview of models of entrepreneurship in healthcare. Provides opportunities for collaborative problem-solving to support business development, entrepreneurial behavior, and leadership. Explores innovative approaches to and alternatives for nursing practice and healthcare delivery.

557/NURS 557 Introduction to Clinical Genetics in Healthcare (3:3:0) Focuses on human clinical genetics including basic Mendel genetics, cytogenetics, molecular genetics, genetic disease, diagnosis, testing and screening. Discusses central principles of DNA, RNA, and protein, and the impact of Human Genome Project on healthcare practice in terms of ethical and legal issues, including genetic testing and counseling.

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 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, as well as issues of increasing dilemma for healthcare professionals.

578/NURS 578 Cultural Competence and Diversity in Healthcare (3:3:0) Examines cultural competence and diversity in healthcare, and explores theories and models. Topics include culture as a system, health and illness beliefs, and practices of various cultures.

580 Alternative Healthcare Practices (3:3:0) Explores proliferation of alternative healthcare therapies in society, and role of professions in collaboration and participation. Evaluates cultural traditions and scientific study of these therapies. Lecture, discussion, seminar, observation.

583/NURS 583 Food and Culture: Biocultural Perspectives on Food and Nutrition (3:3:0) Prerequisite: HSCI 295 or permission of instructor. Examines food and eating behaviors, diet, and nutrition from crosscultural perspective. Focuses on how and why people choose what to eat, range and significance of crosscultural variability in diet, how diets have changed, and health and social implications of those changes. Lecture, discussion, video presentations, audiovisual aids, student presentations, 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.

586/NURS 588 Process Improvement for 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 healthcare managers.

594/NURS 594 Special Topic in Healthcare (3:0:0) Selected topics analyzing specialized areas in healthcare. Content varies. Lecture, seminar, laboratory, workshops.

597/NURS 597 Approaches to Quantitative Data Analysis in Healthcare Research (3:3:0) Examines univariate and bivariate statistical procedures appropriate for analyzing quantitative healthcare research data. Selecting, applying, and interpreting data analysis procedures.

601 Electronic Commerce and Outline Market 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 IPO process. Explores creating and maintaining web pages and online databases. Reviews literature on impact of computer services on patient care and healthcare organizations, and examples of successful and bankrupt technology firms in healthcare. Students, in groups, draft business plan and develop early version of service they propose.

603 Advanced Clinical Nutrition (3:3:0) Explores advanced principles of sound nutrition, and application of principles in clinical settings. Nutritional assessments are explored for adult patients with chronic conditions.

610 Maintaining Business Community for Healthcare (3:3:0) Considers potential types of catastrophes, their likely impact, and how the organization could continue to serve its mission and community in aftermath. Explores interdependencies among various components of healthcare delivery system, regional health services, disaster planning, business record protection, patient information and information systems protection, manpower planning, professional credentialing, access to supplies and drugs, and financial implication and resources.

615 Molecular and Clinical Genetics in Healthcare and Research (12:0:36) Prerequisites: graduate nursing student, advanced practice nurse, or nursing faculty. Provides foundation in molecular and clinical genetics, supporting clinical practice and laboratory research. Covers basic concepts and principles of genetics (molecular, clinical and biochemical, and cytogenetics). Uses case-based approach and published research to integrate concepts and principles of genetics. Provides understanding of genetic testing, detection of genetic disease, and how this information can be used for counseling individuals and families.

626 Healthcare Informatics and Computer Systems (3:3:0) Studies information and data management in nursing and the application of computer systems to solve problems in nursing practice, education, administration, and research. Focuses on generic concepts of information science, and use of computers to manage nursing healthcare data, incorporating computing skills for using specific software packages.

635/CONF 738 Research Seminar in Health and Conflict Analysis (3:0:0) 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.

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 on interventions and promotion of the elderly’s capacity for self-care.

640/NURS 640 Dimensions of Communications in a Technologically Enhanced Health System (3:3:0) Examines effects of technological innovation on the communication and interdisciplinary collaboration of stakeholders in the healthcare systems of the new millennium.

650 Assisted Living Management and Operations (3:3:0) Issues, trends, and practices related to administration of assisted living and senior housing communities. Emphasis on budgeting, staffing, hospitality services, resident care and risk management indicators. Evaluation of demographic, cultural, and regulatory environments affecting industry.

651 Assisted Living Sales and Marketing (3:3:0) Practice and application of selling and marketing techniques in assisted living and senior housing industry. Evaluation of issues and ethics relative to the senior consumer, with emphasis on lead generation, closing, and move-in coordination.

659 Healthcare of Aging Persons with Chronic Illnesses (3:3:0) Prerequisite: HSCI 637. Focuses on biological, psychological, and sociocultural aspects of aging and chronic...
illness. Examines functional capacity of persons and the capacity for self-care.

670 Quality Management in Healthcare (3:3:0) Explores issues, trends, and methodologies in healthcare quality management within a systems framework with emphasis on law, ethics, principles, tools and techniques, cost, strategic directions, and evaluation. Roles and responsibilities of the various levels of healthcare managers are addressed.

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. healthcare system and recent working experience. Explores the structure, function, and financing of U.S. healthcare delivery systems. Familiarizes students with the development of the various subsystems of care and the ways in which public, private, and social forces influence the politics of healthcare, shape the system, and impact public health. Includes analysis of systems infrastructure and the socio-political context of the U.S. healthcare system.

690 Independent Study in Health Science (1-3:0) Prerequisite: admission to graduate program, and permission of associate dean for academic programs. In-depth studies of a selected area of health science theory, research, or practice under the direction of faculty. May be repeated for maximum 3 credits.

699 Practicum in International Healthcare (3:1:8) Prerequisite or corequisite: HSCI 698. Practicum in international health in a selected international health agency. Healthcare programs analyzed using a healthcare systems framework.

702 Managerial Accounting in Healthcare Organizations (3:3:0) Practical examination of the controllership function in healthcare organizations and systems (profit and not for profit), 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 of Health Systems (3:3:0) Prerequisites: HSCI 553 or admittance to a graduate nursing degree program (MSN or PhD) or health systems management MS degree program, and working knowledge of the healthcare industry. Examines tools and methods of financial management in healthcare organizations and systems, with emphasis on allocation and use of funds. Analysis of costs and constraints of alternative source of funds, and application of financial decision instruments and their effect on operational management and market value of the 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 healthcare systems. Applied leadership strategy to effectively manage a 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 Healthcare (3:3:0) Develops executive skills for strategic decision making through the 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 healthcare services in managed care and nonmanaged care environments.

706 Integrated Health Systems Management (3:3:0) Explores emerging structures for financing and delivery of comprehensive health services in integrated health systems. 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.

707 Healthcare Management Policy, Law, and Ethics (3:3:0) Survey course that prepares healthcare executives to understand selected legal and ethical principles as applied to complex decision making and policy analysis in the management of healthcare organizations and systems. Legal relationships (torts and contracts) and ethical references are used for selective managerial application in the analysis and management of organizational and clinical dilemmas, statutory and regulatory trends, and management of scarce resources and interdisciplinary teams in health systems.

709 Healthcare Databases (3:3:0) Introduces design and use of health and medical databases, providing hands-on experience. Explores uses of medical record systems. Includes review and analysis of databases and database management systems. Examines application of databases to clinical and managerial transaction.

710 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 a healthcare or service organization. Learning teams define a complex problem in the assigned facility, and analyze problem with recommendations for management decision action. Analysis provides the context in which theoretical concepts and management skills are applied to conduct the project. Practicum seminar uses case study analyses to explore problem-solving approaches in a variety of situations and healthcare or service organizations.

712 Epidemiology and Health Service Research (3:3:0) Introduction to epidemiology and health services research as a body of knowledge and a method for analyzing health problems. Students learn the role of health services research and epidemiology in policy and evidence-based management and clinical practice. Students design experiments, analyze secondary data, and evaluate impact of programs on health outcomes.

714 Telehealth Applications (3:3:0) Prerequisites: HSCI 678 or recent work experience in the U.S. health system. Overview of current and emerging telehealth applications. Focuses on uses and evaluation of telemedicine in rural and urban settings. Addresses telehealth programming; staffing; funding; reimbursement; and challenges of managing regulatory, ethical and international policy.

715 Health Economics (3:3:0) Emphasizes understanding of economic efficiency in the U.S. health system. Microeconomic methods examine markets and resources in healthcare. Healthcare is examined as a commodity, and
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 analysis of large databases including Bayesian belief networks and machine learning in the healthcare context. Features semester-long data integration group project.

726 Advanced Seminar in Epidemiology (3:3:0) Prerequisite: HSCI 712 or equivalent, at discretion of advisor. Explores use of Causal Networks and Bayesian Probability Models in making causal inferences from nonrandomized studies in healthcare domain. Defines and measures statistical concepts such as confounding, selection bias, overall effects, direct effects, and intermediate variables in context of counterfactual causal model. Focuses on applying causal diagrams to epidemiological studies, and not on the mathematical derivation of the models. Students reanalyze data sets using software available for causal diagrams, and apply appropriate descriptive and analytic epidemiologic methodology to the data.

727 (3:3:0) Program Evaluation in Healthcare Prerequisite: HSCI 501, or introductory graduate-level course in statistics. Students learn methods of evaluating health and social programs, including anthropological case studies, decision analytic, and quasi-experimental approaches. Emphasizes methods of continuous quality improvement, and benchmarking exchanges in evaluating multisite programs. Students learn how to assess cost effectiveness of programs, including assessment of patient census, employee activities, and program outcomes. Discusses evaluation of healthcare interventions, rate settings, and managed care.

730 Healthcare Decision Analysis (3:3:0) Prerequisite: HSCI 701 or college-level algebra. Students analyze practice patterns and find optimal methods of improving them. Decision analysis and failure mode analysis are used in healthcare 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.


746 Advanced Seminar on Security (3:3:0) Describes new methods to manage and verify identity of patients and providers. Includes issues related to identity management in electronic and physical domains. Includes discussion of continuity of care, referral process, patient recruitment, and follow-up of community clinic visits. Includes emerging topics in healthcare security and new role of compliance officers.

750/NURS 750 Legal Issues Relevant to Healthcare Administration (3:3:0) Provides general understanding of U.S. legal system and sources of law, with emphasis on laws that govern or are applicable to healthcare industry and general administration. Students examine the changing healthcare models and delivery systems and laws affecting them.

762 Aging and Healthcare Policy (3:3:0) Prerequisite or corequisite: HSCI 637, SOCI 599, or NURS 659; or permission of instructor. Focuses on policy perspective in relation to older adults in the community and in long-term care facilities. Students analyze policy issues and healthcare delivery systems as they affect the older adult through lecture, discussion, field trips, projects, and policy analysis papers.

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 application of gerontological knowledge in designated facility, and developing skills to function in service organization for the aging. 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 a variety of situations and healthcare or service organizations.

771 Gerontology Practicum II (3:2:3) Prerequisite: HSCI 770. Continuation of field practicum in gerontology. Students receive practical experience under supervision of qualified professional. Emphasis on implementation of approved project. Gerontological theoretical concepts applied in implementation and evaluation. Uses case study analyses to explore problem-solving approaches.

799/NURS 799 Advanced Quantitative Analysis for Healthcare Research I (3:3:0) Prerequisite: HSCI 701 or equivalent statistics course. Examines factorial ANOVA, factor analysis, and causal analysis (path models and structural equation modeling). Students analyze and interpret SPSS outputs using healthcare research data.

800/NURS 800 Advanced Quantitative Data Analysis for Healthcare Research II (3:3:0) Prerequisite: 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 interpret SPSS outputs using healthcare research data.

801/NURS 801 Advanced Multivariate Statistics and Data Analysis in Healthcare 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.
802/NURS 802 Measurement Theories and Applications in Healthcare 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 development and evaluation of instruments in healthcare 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 healthcare research.

830 The Scholarship of Writing (3:3:0) Boyer’s framework for scholarship shapes the presentation of theory related to writing for scholarship. Students apply research in composition to inform writing for a variety of scholarly purposes, including overall conceptualization of research papers and proposals, writing for publication, and writing for scientific, creative, quantitative, and qualitative research. Seminar and intensive writing.

855 Ethics in Healthcare Administration (3:3:0) Prerequisite: admission to PhD program; for non-PhD students, permission of instructor. Philosophical foundations of healthcare ethics. Students analyze specific ethical dilemmas faced by administrators in healthcare settings.

866/NURS 866 Healthcare Public Policy (3:2:1) Focuses on process of formulating healthcare policy and analyzing its implications for nursing, administration in nursing, and education and nursing service. Examines current and impending health issues, the legislative process, and program implementation evaluation.

920/NURS 920 Qualitative Research in Nursing and Healthcare Qualitative Research (3:3:0) Prerequisite: corequisites: NURS 955/HSCI 960 and a multivariate statistics course (HSCI 800 or equivalent). Familiarity with e-mail and computers. Analysis of the philosophical foundations and approaches to qualitative research in nursing and healthcare administration, healthcare policy, and healthcare ethics within scholarship of discovery, integration, application, and teaching. Computer analysis required.

925/NURS 925 Methodological Issues in Nursing and Healthcare Qualitative Research (3:3:0) Prerequisite: 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/NURS 930 Quantitative Methods in Nursing and Healthcare (3:3:0) Prerequisites: NURS 955/HSCI 960 and multivariate statistics course (HSCI 800 or equivalent) Examines advanced principles and special problems in quantitative research methodology. Emphasizes measurement as it relates to nursing and healthcare administration, healthcare ethics, and health policy research. Computer analysis required.

960/NURS 955 Philosophical Bases of Inquiry (3:3:0) Prerequisite: admission to nursing doctoral program or permission of instructor. Examines philosophical bases of the discipline and practice of health-related disciplines within the scholarship of discovery, integration, application, and teaching. Compares nursing and health science philosophy with relevant related discipline philosophies.

Hebrew (HEBR)
Modern and Classical Languages

150 Introduction to Biblical Hebrew (3:0:0) Introduction to Biblical Hebrew, basic vocabulary, grammar, and development of reading skills with an introduction to the religion and culture of ancient Israel that produced the Hebrew Bible/Old Testament.

History (HIST)
History and Art History

100 History of Western Civilization (3:3:0) History of Western civilization from ancient Mediterranean origins through medieval and modern development of Europe to contemporary world. Students may not receive credit for HIST 100 if they have taken HIST 101 or 102.

101 Foundations of Western Civilization (3:3:0) Evolution of Western culture from the ancient Mediterranean world to the formation of modern Europe in the 17th century. Students may not receive credit for HIST 101 if they have taken HIST 100.

102 Development of Western Civilization (3:3:0) History of Western institutions and ideas from the 17th century to the present. Students may not receive credit for HIST 102 if they have taken HIST 100.

120 U.S. History (3:3:0) Examination of American society from its founding documents, values, institutions, and peoples to the present. Experience in historical analysis is required. Students cannot receive credit for HIST 120 if they have taken either HIST 121 or HIST 122.

121 Formation of the American Republic (3:3:0) Social, political, economic, and intellectual growth of American institutions from colonization through Reconstruction. Students may not receive credit for HIST 121 if they have taken HIST 120.

122 Development of Modern America (3:3:0) History of the United States since 1877. Students may not receive credit for HIST 122 if they have taken HIST 120.

125 Introduction to World History (3:3:0) Analytical approach to a world history overview that surveys major features of the principal existing civilizations of the world, as they were originally formed and as they have been altered during the past two to four centuries by key global processes including the “forces of modernity.”

130 History of the Modern Global System (3:3:0) Provides understanding of the processes that have shaped the modern world. Beginning in 1500, it traces developments that reorganized peoples, reshaped cultures, and generated new economies in the interaction between Western and non-Western societies. Focus of the course will be on Western and non-Western regions of the world, and their participation in the global networks resulting from mercantile expansion, the industrial revolution, imperialism, nationalism, and their legacies in the postcolonial period.

200 Freshman/Sophomore Seminar in U.S. History (3:3:0) Prerequisite: freshman or sophomore standing. Focuses on the skills and methods of learning, as well as subject matter, as a way of introducing the discipline of history. Topics vary.
201 Freshman/Sophomore Seminar in European History (3:3:0) Prerequisite: freshman or sophomore standing. Focuses on the skills and methods of learning, as well as subject matter, as a way of introducing the discipline of history. Topics vary.

202 Freshman/Sophomore Seminar in Global History (3:3:0) Prerequisite: freshman or sophomore standing. Focuses on the skills and methods of learning, as well as subject matter, as a way of introducing the discipline of history. Topics vary.

251, 252 Survey of East Asian History (3:3:0) HIST 251 surveys the history of China and Japan from prehistoric times to ca. 1600. HIST 252 surveys the history of China and Japan from early modern times (ca. 1600) to the 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 the 16th century. HIST 262 surveys African history from the beginnings of interaction with Europe in the 15th century to the recent emergence of new states.

271, 272 Survey of Latin-American History (3:3:0) HIST 271 surveys the colonial era to 1825. HIST 272 surveys the development of an independent Latin America since 1825. Emphasis on interactions between the United States and Latin America.

281, 282 Survey of Middle Eastern Civilization (3:3:0) Survey of Middle Eastern history from the rise of Islam to the present, with an emphasis on processes that led to the emergence of the economic, cultural, social, and political institutions that characterize the region today. HIST 281 surveys the period from the rise of Islam in 570 to the medieval period (ca. 1258) HIST 282 surveys the medieval period (ca. 1258 to present).

298 History and the Web (1:1:0) Introduction to techni- ques and methods of creating historical web sites. Overview of historical resources on the web, including Internet archives, hypertext scholarly articles, and online exhibits. Examines new narrative and interpretive possibilities for view of historical resources on the web, including Internet techniques and methods of creating historical databases. Over-

299 Databases for Historians (1:1:0) Introduction to techni- ques and methods of creating historical databases. Overview of web, CD-ROM, and personal databases helpful for historical research. Examines a database both as an electronic archive and an interpretive and analytical tool. Combination of lecture and lab.

300 Introduction to Historical Method (3:3:0) Prereq uisite: ENGL 302; COMM 100, 101 or 104; or permission of the instructor. Introduction to research skills and methods, as well as historical interpretation, culminating in written and oral presentations. Topics vary according to instructor. History majors are strongly urged to take HIST 300 early in their program of upper-level courses. A grade of C or better is required to graduate with a 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 the 5th century.

302 Classical Rome (3:3:0) Political, social, economic, and cultural history of classical Rome from the founding of the city through the fall of the Roman republic.

304 Western Europe in the Middle Ages (3:3:0) Survey of development of European society from the collapse of Roman rule in the 5th century to the advent of the Black Death in the 14th century. Emphasis is on the political, social, cultural, and intellectual growth of a society that developed from Roman, Catholic, and Germanic roots.

305 The Renaissance (3:3:0) Survey considering Renaissance as a phenomenon rather than a chronological period. Emphasis on growth of humanism in Italy in the 14th and 15th centuries, development of new political concepts, and laicization of society. Includes transmission of these developments to transalpine Europe in the late 15th and 16th centuries.

306 The Reformation (3:3:0) Late medieval ecclesiasti- cal conditions and reform movements; late scholasticism; Protestant Reformation, Catholic Reformation, dynastic rivalries, and religious wars. Concludes with the Peace of Westphalia.

308 Nineteenth-Century Europe (3:3:0) History of Eu- rope 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 the causes and consequences of these tumultuous events and concludes with a consideration of the reconstruction that caps the period.

312 Nationalism in Eastern Europe (3:3:0) Examines history of modern Eastern Europe from the middle of the 19th century through the collapse of the communist re- gimes in 1989 and includes a focus on the Yugoslav wars of the 1990s. Nationalism provides the organizing theme and this topic is 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 the dissolution of the Holy Roman Empire to the present.

321 Early Modern England (3:3:0) History of England from late 15th to the mid-18th century, focusing on the social, political, economic, and cultural changes of the period with particular attention to English Reformation and the causes and consequences of the English Civil War.

322 Modern Britain (3:3:0) History of Britain from mid-18th century to the present. Focus on the social, political, and economic transformations of industrialization, the culture of 19th-century industrial society, the problems of late 19th-century economic competition and imperialism, the creation of the welfare state, and the 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 the appearance of the Kievan state to the mid-19th century.

329 Modern Russia and the Soviet Union (3:3:0) Analy- sis of Russian civilization from mid-19th through the 20th century. Focus on tsarist society, the revolution, and Soviet politics and the contemporary challenge.

330 The United States since World War II (3:3:0) Ex- amination of major domestic and foreign policy factors that
shaped the American experience from World War II to the present. Political, social, and economic forces as they affected the nation’s history.

335 The African American Experience in the United States: African Background to 1885 (3:3:0) Prerequisite: 6 credits of history or permission of instructor. History of the African American experience in the United States including African origins; the trans-Atlantic slave trade; the development of slavery in the colonial, revolutionary, and antebellum periods; abolitionist movements; and African American participation in the Civil War and during Reconstruction.

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 the rise and consequences of racial segregation in the 19th and 20th centuries. Examines the African American response to continued racial inequality and repression. The great migration, urbanization, black nationalism, and the civil rights era, as well as contemporary debates about race, are covered.

340 History of American Racial Thought (3:3:0) Introduction to the history of African American racial thought, with particular emphasis on the relationship between the social theory and the social practices of racism in American life. Examines the origins

345 History of American Foreign Relations (3:3:0) Survey of American diplomacy from the Revolutionary War to the 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 the colonial period through the “second wave” of feminism in the 1970s. Explores the 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 the South to the outbreak of the Civil War, with particular emphasis on the rise of sectionalism. Development of a distinct Southern culture through emergence of economic, political, social, agricultural, and intellectual institutions.

352 The South since 1865 (3:3:0) History of the South during Reconstruction, the Redeemer era, and the New South, with particular emphasis on race relations. Political, economic, cultural, and intellectual development from the 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 the 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. Emphasis on the coming of the West and the 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 the changing meanings of womanhood over the 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 the Meiji Restoration to World War II. Emphasis on Japan’s modernization in the face of challenge.

357 Postwar Japan (3:3:0) Prerequisite: 45 credits or permission of instructor. History of Japan from World War II to the present. Examines the Japanese experience of several key moments in this era: Japan’s defeat in the Pacific War, its reconstruction during the U.S. occupation, its rise to economic prominence during the 1960s and 1970s, and its cultural and international identity crisis during the 1980s and 1990s.

364 Revolution and Radical Politics in Latin America (3:3:0) Prerequisite: 6 credits of history or permission of instructor. During the 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: the Mexican Revolution, the Arbenz government in Guatemala, the Allende regime in Chile, the Cuban and Nicaraguan revolutions, and the Brazilian Worker’s Party.

365 Conquest and Colonization in Latin America (3:3:0) Prerequisites: 45 credits or permission of the instructor. Examination in the forms of conquest and colonization practiced by the Aztec, Inca, Spanish, and Portuguese in what is now Latin America. Themes to be discussed include the role of ideology and religion in imperial rule, the use of warfare to create empires and colonies, and the implementation of political and economic systems to rule subject people.

366 Comparative Slavery (3:3:0) Prerequisites: 45 credits or permission of the instructor. Examination of systems of slavery from the ancient world to the modern world with special emphasis on the Atlantic slave trade and on slave societies in Latin America and Anglo America. Considers the impact of slaves and slavery on cultural, economic, and political systems in Africa and the Americas from the sixteenth century to the nineteenth century.

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, the “golden age” of the Virginia dynasty, and coming of the Civil War.
460 History (HIST)

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 of 6 credits may be applied toward the history major.

398 Historical Study Abroad (1-3:0:0) Intended for participation in a formally organized course offered by the 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 its European origins through the Revolutionary War.

403 Revolutionary Era in American History, 1763–1812 (3:3:0) Study of formative years of the new republic from the Treaty of Paris of 1783 to the election of 1820.

404 Jacksonian America, 1812–1854 (3:3:0) Study of the age of Andrew Jackson. Emphasis on 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 the American Civil War. Emphasis on 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 the 1920s and the 1930s.

416 U.S. Urban History (3:3:0) Examination of the process of urbanization in the United States, and the growth of American cities and suburbs from colonial times to the present.

417 History of Metropolitan Washington (3:3:0) Examination of urban and suburban growth in Washington, D.C., and its suburbs in Maryland and Virginia since 1790, in the context of U.S. urban history.

418 Ethnic Groups in America (3:3:0) Exploration of ethnicity and race in American urban society by comparing the experiences of different ethnic groups as migrants to American cities.

426 The Russian Revolution (3:3:0) Prerequisite: 45 credits or permission of instructor. The era of revolutionary activity from the late 19th century to the end of the 1920s, with emphasis on the Russian Revolutions of 1917. Explores why a revolutionary situation developed; the political, social, and cultural issues at stake; why it took the forms that it did; and the revolution’s contribution to the nature of the Soviet state and post-Soviet problems.

431/ENGL 431/FREN 431 Medieval Intellectual Topics (3:3:0) Selected topics in the intellectual history of the 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) Examination of the cultural and social lives of Europeans from the end of the Middle Ages to the Industrial Revolution. Popular, as well as elite, culture is emphasized, as are the bridges and interrelationships between them. Focus on religious, artistic, literary, and recreational behavior. Political activity and riots, strikes, royal receptions, and rituals are also covered.

436 European Society and Culture: 19th and 20th Centuries (3:3:0) Examination of major cultural trends in Europe since the French Revolution. Major themes include romanticism, socialism, Marxism, and the social effect of modernization, science, and societies.

455/COMM 455 History of Print Journalism (3:3:0) Prerequisite: 4 credits in COMM or HIST courses. Development of print journalism from its inception to the present, with emphasis on the interaction of technology, audience, and government intervention. Topics include birth of the press; development of modern newspaper and American development, including the Revolutionary and Civil wars; rise of independent press; and Yellow Journalism period.

459 Pre-Modern South Asia (3:3:0) Prerequisite: 45 credits or permission of instructor: History of South Asia (present-day India, Pakistan, and Bangladesh) from earliest civilizations along the Indus River to the advent of colonialism. Special attention is given to significant historical events and their effect on the development of political, religious, and economic ideas.

460 Modern Iran (3:3:0) Prerequisite: 45 credits or permission of instructor. Modern Iran, from 1800 to the present, in the context of a number of broad themes: the institutional structure of the state; the role of the great powers in Iran and the Iranian response to the economic, military, technological, and ideological challenge posed by the West; the interaction of religion (and other ideologies) and politics; economic development and its impact on politics and society; and ways in which 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 the history of the Middle East since World War I strongly advised. Overview of the history of the Arab-Israeli conflict, examining the conflict from various perspectives: as a conflict over land and between competing nationalisms and identities; in terms of the national interests of various states, including both Israelis and Palestinians, as well as other Arab governments and the 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. Survey of the history of women in Islamic society from the rise of Islam to the present day. Examines the historical processes that affected the role and status of women in society, as well as specific topics around which issues of gender status and identity coalesced, especially in the 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 the Middle East.
since World War I. Emergence of Israel, Arab nationalism, and political and economic influence of the Middle East in world affairs.

466 Origins of Conflict in Southern Africa (3:3:0) Exploration of the historical origins of conflict in South Africa, focusing on themes of economic change, cultural interaction, and political consolidation over the 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, Alexander the Great and his conquest of Persian empire.

490, 491 Honors Directed Readings, Honors Directed Research (3:0:0), (3:0:0) Prerequisite: admission to history honors program and permission of instructor. Linked, individualized courses, normally given by the same instructor. HIST 490 involves directed readings; HIST 491 culminates in a research paper related to the subject of the readings. Students must have completed at least one course in the field (or with the professor) chosen for these honors courses. The three credits of readings should normally be taken before the three credits of research, though they may be taken concurrently. Either may be taken concurrently with HIST 499.

498 Directed Readings/Research in History (1-3:0:0) Prerequisites: history majors with 90 credits and permission of instructor. Readings, research conducted on an individual basis in consultation with instructor. Student may not present more than three 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 a specialized historical topic culminating in a seminar paper and oral presentation. As a synthesis course, students will be expected to integrate their knowledge and skills acquired in their general education courses.

500 Approaches to Modern World History (3:3:0) Introduction to historical study of the world beyond Europe and the United States. Students read major theoretical works as well as case studies of particular regions. In addition to examining such topics as imperialism, national identity, and various forms of popular resistance, students become familiar with a range of scholarly approaches, including world-systems theory and subaltern studies.

502 Issues in American History (3:3:0) Discussion of readings and analysis of selected problems in American history, open to advanced undergraduates and graduates. Topic determined by instructor. Course may be repeated when content differs.

504 Issues in European History (3:3:0) Discussion of readings and analysis of selected problems in European history, open to advanced undergraduates and graduates. Topic determined by instructor. Course may be repeated when content differs.

525 Problems in Latin American History (3:3:0) Analysis of selected problems in Latin American history. Emphasis on 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) Investigation of selected problems in global and comparative history, covering multiple countries or world regions. Course may be repeated when content differs.

555 Probems 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. Analysis of selected problems in Middle Eastern history. Emphasis on 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 a 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 their preparation in this area or who seek to enhance their knowledge of the latest interpretations in the field.

602 Themes in U.S. History II (3:3:0) Continuation of HIST 601.

605 Themes in European History I (3:3:0) Survey of European history from 1500 to 1815. Designed for individuals entering the graduate program who need to strengthen their preparation in this area or who seek to enhance their knowledge of the latest interpretations in the field. Factual knowledge and its interpretation are stressed.

606 Themes in European History II (3:3:0) Survey of European history from 1815 to present. Designed for individuals entering the graduate program who need to strengthen their preparation in this area or who seek to enhance their knowledge of the latest interpretations in the field. Factual knowledge and its interpretation are stressed.

610 The Study and Writing of History (3:3:0) Methodology of the historian including techniques of research, use of documentation and other sources, development of bibliography, and synthesis of material.


615 Problems in American History (1-6:1-6:0) Readings and discussion of bibliographies, interpretations, and research trends in topics selected by instructor. Course may be repeated when content differs.
616 U.S. Westward Movement (3:3:0) Investigation of continuity and change in the American West, focusing on such topics as economic development, ethnicity, rural and urban life, and the role of the federal government.

617 Topics in the American Civil War Era (3:3:0) Joint project of instructor and students into the various aspects of a common topic in the 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 the United States during a period of rapid growth and expansion. Among the topics studied are the second-party system; the growth of sectionalism, nationalism, and expansionism; industrialization and the spread of the market economy; the rise of romantic reform and evangelical religion; and the growth of abolitionist and proslavery movements.

619 The Constitution, Civil Liberties, and the Supreme Court (3:3:0) Investigation of evolution of civil liberties in American history and interaction of the three branches of government in applying the 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) Investigation of the breakdown of the Confederation, the Constitutional Convention, and the role of the revolutionary ideology of republicanism. Leadership and policies of the republic in a hostile international context are discussed. Students read extensively in the monographic literature and prepare a research paper.

621 Virginia and the American Revolution (3:3:0) Detailed examination of Virginia society on the eve of the American Revolution and its role in the events from 1750 to 1789. Combines lectures on and discussion of major themes, ideas, and personalities.

622 American Minds (3:3:0) Advanced introduction to major approaches to and themes in American intellectual history, rather than a survey of the subject. Avoids positing an American mind in the beginning and explores instead the diversity of American thinkers. Focusses on several pivotal decades in American thought and sees American thinkers in their social contexts. Explores how nonelites have shaped American thought. Provides a diverse and multifarious look at who were the important American minds.

623 Recent U.S. History, 1945 to Present (3:3:0) Selected political, social, economic, diplomatic, and cultural forces that shaped the post-World War II American experience.

624 U.S. Diplomatic History (3:3:0) Study of selected issues in American foreign relations and changing historical interpretations of American diplomacy.

626 Approaches to American Culture (3:3:0) Focuses on the various approaches historians for the United States have taken to the history of American culture, the questions they have asked, the assumptions they have made, the disciplinary tools they have used, and the types of materials they have analyzed. Concentration on the patterns of culture these studies have uncovered and what they tell us about the American past and present.

627 Urban Development of the United States (3:3:0) Examination of the growth of cities in the United States, the process of urbanization, and the significance of cities in American history. Students become familiar with major issues and bibliography of American urban history.

628 Immigration and Ethnicity in the United States (3:3:0) Examination of immigration and ethnicity in America since 1840. Consideration of why immigrants came, from where, under what circumstances, and the ways in which they adapted to America. Examination of immigration policy and American attitudes toward immigration and ethnicity. Conducted as a readings colloquium.

629 The Gilded Age and Progressive Era (3:3:0) Examines the history of the United States from 1877 to 1918, with attention to history of reform movements and politics, and social history of the period. Students become familiar with major issues and historical literature of the period.

630 U.S. Women’s History (3:3:0) Wide-ranging survey of the burgeoning field of women’s history, emphasizing critical evaluation of sources and interpretation. Readings are selected to represent a variety of approaches to the history of women, 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 the history and historiography of the revolutionary era, with a special emphasis on the social and ideological interpretations of the period. Includes the events leading up to the War for Independence, the war itself, and the social and political effects of the war on American society.

632 American History (3:3:0) Examination of the rise of the “new imperialism” in Great Britain from 1870 to the end of the empire and gradual formation of the Commonwealth of Nations.

633 Reconstruction (3:3:0) Examines the panoply of political, social, economic, and constitutional concerns during the period 1863 to 1880, as the North and South struggled over the outcome of the Civil War. Among the many important questions to be addressed are those of political institutions and power in the postwar North and South, and the place of the former slaves in society, politics, and the economy.

634 Interwar America: 1918-1939 (3:3:0) Considers the history of the United States between the two world wars. The remainder of 19th-century issues and the beginnings of 20th-century concerns are found in the period between the wars. Explores the various ways in which these issues complemented and contradicted each other in a rich and complex historical era.

635 Problems in European History (1-6:1-6:0) Investigation of selected problems in the history of Europe. Readings, discussions, development of bibliographies. Where possible, primary sources are used. 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 the 20th century. Asks if there were fundamental continuities in the structure of German and Austrian society that can be observed throughout the period under review.

637 Great Britain: Empire to Commonwealth, 1870–1970 (3:3:0) Examination of the rise of the “new imperialism” in Great Britain from 1870 to the end of the empire and gradual formation of the Commonwealth of Nations.
and integration in Western Europe in the 20 years after the Second World War. Conducted as a readings colloquium.

639 Society and Politics in Western Europe, 1750–1914 (3:3:0) Focus on changes in social conditions and their ramifications in political life. Attention to urbanization of workers, changes in the peasantry, growth of middle classes, decline of nobility, as well as major political developments and expansion of liberal reforms.

640 Metropolitan Cities of Europe in the Nineteenth and Twentieth Centuries (3:3:0) Studies individual European cities in the 19th and 20th centuries, as well as investigation of particular cities in depth. The economic, social, cultural, and political features of urban life will be considered.

642 Humanism and the Renaissance (3:3:0) The Renaissance as a unique period in European cultural history from ca. 1550 to 1520. Concentration on the Italian situation as the standard for the Renaissance, with consideration given to the manifestations of the Renaissance in northern Europe, especially Germany, until the Reformation. Focus on recent studies of political, social, intellectual, and religious changes of the period. Students write class reports and a larger bibliographic paper.

643 Religion and Society in the Reformation Era (3:3:0) The Reformation, from approximately 1500 to 1650, was a time of major religious, intellectual, social, and political upheavals in European history. Investigates the reasons for these changes and the effects they had on European society. First half of course focuses on Germany, but major events throughout Europe are studied.

644 Society and Culture in Early Modern Europe (3:3:0) Overview of the most recent historical work on social and cultural history of the pre-modern West, ca. 1400 to 1800. Making full use of theoretical approaches and empirical methodologies of other disciplines—especially social anthropology, sociology, and literary theory—this research sheds new light on topics as diverse as popular culture, class, manners, taste, rituals, religion, language, gender, and the state. This “new” cultural history not only formulates new topics of research and poses new questions about them, but also suggests an entirely new approach to more traditional historical 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 the sources of Bolshevism, problems of the old regime as they led up to the revolutions of 1905 and 1917, and establishment of the new regime and its survival in an environment of foreign and civil war.

690 The Administration of Archives and Manuscripts (3:3:0) Prerequisite: 6 credits of U.S. history or permission of department. Introduction to the principles and practices of managing records and administering archival and manuscript collections, public and private. Designed for graduate students with a 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 the interested citizen as well as for assistance to students in course and career choices. Explores the development, present state, and future possibilities of museums in the United States, with some reference to international developments.

692 Historical Editing (3:3:0) Introduction to the fundamentals of historical editing of documents, including the use of microform, word processing, and computer techniques. Designed for persons seeking an introduction to various areas of applied history and for persons 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 the interested citizen and to assist students in course and career choices. Explores the 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) Prerequisites: students with limited computer competency should consult department before enrolling. Introduction to the 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. A seminar in which 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 of 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 of 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 a significant topic or theme in the field of world history. Topics vary from year to year. Maximum of 6 credits may be earned.

790 Comprehensive Readings in U.S. History (3:0:0) To be taken in the final semester of the program. Designed to integrate the student’s past work in the major field and to fill gaps in this area before the comprehensive exam. After a review of graduate experience, student and instructor design a reading list to round out preparation for the exam.

791 Comprehensive Readings in Comparative World History (3:0:0) To be taken in the final semester of the program. Designed to integrate the student’s past work in the major field and to fill gaps in this area before the comprehensive exam. After a review of graduate course work, student and instructor design a reading list to round out preparation for the exam.
792 Comprehensive Readings in European History since 1500 (3:0:0) To be taken in the final semester of the program. Designed to integrate the student’s past work in the major field and to fill gaps in this area before the comprehensive exam. After review of graduate experience, student and instructor design a reading list to round out preparation for the exam.

794 Internship in Applied History (3-6:0:0) Prerequisites: 3 credits of applied history in an appropriate area and 12 credits in major field or permission of internship director. All internship placements must be approved by the department to ensure their suitability to the student’s program. Introduction to applied history through work and study at a historical museum, site, library archive, editing project, or other approved agency.

796 Directed Readings (1-6:0:0) Independent reading on a topic agreed to by student and faculty member. Maximum of 6 credits may be earned.

798 Directed Research and Writing in History (3:0:0) Intended for students in department’s predoctoral track who are not writing a master’s thesis. Goal is to produce a substantial and original contribution to historical knowledge on the model of an article in a scholarly journal.

799 Thesis (1-6:0:0) May not be taken prior to successful completion of comprehensive exam. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study history. Program of studies designed by student’s discipline director and approved by student’s doctoral committee, which brings the student to participate in research of discipline director and results in a paper reporting the original contributions of the student. Enrollment may be repeated.

801 New Developments in History (3:3:0) Prerequisites: doctoral standing or permission of instructor and HIST 610 or equivalent. Survey of current developments in historical analysis and methodology.

802 Readings for Doctor of Arts in Community College Education (variable credit) Prerequisite: admission to doctor of arts in community college education program to study history. Intensive reading of the recent scholarship in broad areas of historical study. With their advisors, students develop the readings list and define at least three areas in which to prepare readings courses. May be repeated.

803 Doctoral Readings for Major Field (3:0:0) Independent readings for PhD students on a topic agreed on by student and instructor, taken in preparation for completing major field exam. Should be broadly comprehensive of the field and cover major historical themes and historiographical debates.

804 Doctoral Readings for Minor Field (3:0:0) Prerequisite: doctoral standing. Independent readings for PhD students on a topic agreed on by student and instructor, taken in preparation for completing the minor field examination. Should help the student master the literature of the subfield that is the subject of the field statement.

810 History Doctoral Colloquium (1:1:0) Prerequisite: doctoral standing. Introduction to an array of scholars and scholarship through discussions of innovative historical events, important theories, and significant methodological breakthroughs in history. May be taken for credit six times. Graded S/NC.

811 Doctoral Research Seminar (3:0:0) Prerequisite: doctoral standing. Students pursue research projects in their areas of specialization.

998 Doctoral Dissertation Proposal (1-6:0:0) Prerequisite: advancement to candidacy. Work on a research proposal that forms the basis for the doctoral dissertation. May be taken for a maximum of 6 credits. Graded S/NC.

999 Doctoral Dissertation Research (1-12:0:0) Prerequisite: completion of HIST 998. Doctoral dissertation research and writing under direction of student’s dissertation committee. Graded S/NC.

Honors Program in General Education (HNRS)

College of Arts and 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 the courses in 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 students to basic research and writing skills that will be required in every course in the curriculum: how to select a suitable problem or question, how to formulate an argument or thesis, how to find and select evidence to support the argument, how to organize ideas into a coherent essay, and how to write clearly and elegantly.

121 Reading Cultural Signs (3:3:0) Uses methods introduced from cultural studies and communication as well as sociology, economics, and psychology. Explores ways in which contemporary arts, mass media (including advertising), and cultural events, as well as social institutions, reflect and shape personal and social values.

122 Reading the Arts (3:3:0) Prerequisite: HNRS 110. 121 Uses methods developed in HNRS 121 and introduced from literary study and fine arts. Explores the relationship of the parts to the whole in a work of art, connections among different art forms, and links between art and its historical context.

125 A Liberal Arts Approach to Calculus (3:3:0) Assumes an understanding of basic algebra and functions. The important mathematics of infinity is developed, and the principal transcendental functions are introduced.

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.

225 An Introduction to Chaos Theory and Nonlinear Dynamics (3:3:0) Prerequisite: HNRS 125. Builds on understanding of calculus to analyze topics in the dynamics
of systems and how they change over time mathematically and functionally. Topics include many that have an impact on current scientific thinking and our culture: chaos theory, fractals, climate change, and neural networks. Uses computer simulations and illustrates ideas with biological examples.

227, 228 Scientific Thought and Processes I, II (4:3:3) Prerequisite: HNRS 227 is a prerequisite for HNRS 228. Explores and integrates the principles of classical and modern science through the 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 a 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 their origins to the 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 the United States. Explores such technologies as television, the automobile, newspapers, and the Internet from historical, scientific, political, economic, and global perspectives.

Information Security and Assurance (ISA) School of Information Technology and Engineering

662 Information Systems Security (3:3:0) Prerequisite: INF5 601 or permission of instructor. Study of security policies, models, and mechanisms for secrecy, integrity, and availability. Topics include operating system models and mechanisms for mandatory and discretionary controls, data models, concepts and mechanisms for database security, basic cryptography and applications, security in computer networks and distributed systems, control and prevention of viruses and other rogue programs.

666 Internet Security Protocols (3:3:0) Prerequisites: INF5 612 or equivalent. Study of network and distributed system security. Review of basic cryptography and threats and vulnerabilities in distributed systems. Security services: confidentiality, authentication, integrity, access control, nonrepudiation; and their integration in network protocols. Key management, cryptographic protocols and their analysis. Access control, delegation and revocation in distributed systems. Security architectures, multilevel systems, security management and monitoring.

697 Topics in Information Security (3:3:0) Prerequisites: permission of instructor. Special topics in information security and assurance not occurring in the regular ISA sequence are presented. May be repeated for credit when distinct offerings of the course differ in subject.

765 Database and Distributed Systems Security (3:3:0) Prerequisite: INF5 614 and ISA 662 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. Security models for relational and object-oriented databases. Security of databases in a distributed environment. Statistical database security. Survey of commercial systems and research prototypes.

767 Secure Electronic Commerce (3:3:0) Prerequisites: ISA 662 and 666, 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.

774 Intrusion Detection (3:3:0) Prerequisites: ISA 662 and 666, or permission of instructor. The study of methodologies, techniques and tools for the monitoring of events in a computer system or a network, with the objective of preventing and detecting unwanted process activity and of 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, designing recovery solutions.

780 Theoretical Foundations of System Security (3:3:0) Prerequisites: ISA 662 and 666, or permission of instructor. Discussion of the formal theories supporting information security. The required background in logic and formal calculi, formal languages, automata, computability and complexity is provided. Topics include: decidability and complexity results for access control and safety models, delegation and release control models, formal analysis of security protocols, language-based security, models of information flow and verification of security properties.

796 Directed Readings in Information Security (3:3:0) Prerequisites: graduate standing in information security and assurance with at least 12 prior credits in MS. Research and analysis of a contemporary problem in information security. Prior approval is required by a faculty sponsor who supervises the student’s work. A written report is also required. A maximum of 6 credits may be earned. To register, students must complete independent study form, available in the department office. It must be initialed by faculty sponsor and approved by department chair.

797 Advanced Topics in Information Security (3:3:0) Prerequisites: permission of Instructor. Special advanced topics not occurring in the regular ISA sequence. May be repeated for credit when distinct offerings of the course differ in subject.

798 Research Project (3:3:0) Prerequisites: 18 credits applicable toward MS. Research project chosen under the guidance of a full-time graduate faculty member, resulting in a written technical report. Prior approval required by a faculty sponsor who supervises the student’s work. To register, students must complete independent study form, available in the department office. It must be initialed by faculty sponsor and approved by department chair.

799 Thesis (6:3:0) Prerequisites: 18 credits applicable toward MS or permission of instructor. Original or expositional work chosen and completed under the supervision of a graduate faculty member, which results in a technical report accepted by a three-member faculty committee. The
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 a high-level language. Focus is on program design, coding, debugging, and documentation.

311/IT 316 Database Management (3:3:0) Prerequisite: computer programming course in high school or college. Study of logical and physical characteristics of data and their organization in computer processing. Course emphasizes data as a resource in computer applications, and 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. Introduction to 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. Study of the structure and application of high-level languages by stressing the design and implementation of data types, data structures, and algorithms. Computing lab is included. Credit for this course does not count toward the requirements for a major in computer science.

316 Software Systems Engineering (3:3:0) Prerequisite: INFS 310 or CS 211. Study of 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: INFS 312 or equivalent. Study of 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; legal and social issues.

466/IT 466: Network Security (3:3:0) Prerequisite: INFS 312 or equivalent. Symmetric and asymmetric cryptography; encryption, message authentication codes and digital signatures; cryptographic authentication; digital certificates and public key infrastructure; standards process; cryptographic protocols; SSL, IPSEC and related protocols; secure e-mail; intrusion detection.

498 Independent Study in Information Systems Engineering (1-3:0:0) Prerequisite: 60 credits; must be arranged with an instructor and approved by the department chair before registering. Directed self-study of special topics of current interest in INFS. May be repeated for a maximum of six credits if the topics are substantially different.

499 Special Topics in Information Systems Engineering (3:3:0) Prerequisite: 60 credits and permission of instructor. Topics of special interest to undergraduates. May be repeated for a maximum of 6 credits if the topics are substantially different.

501 Discrete and Logical Structures for Information Systems (3:3:0) Prerequisites: 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. Commercial systems are examined. Computing lab.

515 Computer Organization (3:3:0) Prerequisites: 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. Symbolic assembly language and interrupts and input/output organization, are also covered. 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. An introduction to 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 a high-level language. Study of the fundamentals of data structures and algorithms applied in programming solutions to application problems. The course stresses programming in a 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, and 590 or equivalent. Fundamental concepts including process synchronization and scheduling, interprocess communication, memory management, virtual memory, deadlocks, security and access-control, file and disk management, performance analysis, and distributed systems. The impact of computer architecture on operating systems is examined. Case studies and comparative analysis of operating systems are presented. No substitution can be made for this class.

612: Principles and Practices of Communication Networks (3:3:0) Prerequisites: INFS 501, 515, and 590 (or
604 Introduction to Electronic Commerce (3:3:0) Prerequisites: INFS 501, 515, and 590; or equivalent. Electronic Commerce in its broadest sense; information technology support; business support (financial, marketing, resource planning, etc.); ethical, cultural, and policy issues; national and international legal issues; telemedicine, medical and industrial applications; evaluation of quality of service.

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 a high-level framework. Tools for system construction are considered, along with a variety of programming languages, component integration, and design methods. Applications are investigated through program construction in varied settings, such as database systems, graphical user interfaces, and prototyping. Programming projects are required.

697 Topics in Information Systems (1-6:1-6:0) Prerequisite: permission of instructor. Special topics in information systems not occurring in the regular INFS sequence are presented. May be repeated for credit when distinct offerings of the course differ in subject.

740 Database Programming for the World Wide Web (3:3:0) Prerequisite: INFS 614. Information systems accessible through the World Wide Web and the Internet are becoming prevalent. This class will focus on technologies and industry standards for accessing and manipulation of persistent data that are suitable for WWW applications.

750 Application Frameworks for Windowed Information Systems (3:3:0) Prerequisites: INFS 601 and 650. Studies the 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 the encapsulation of windowed architectures by object-oriented frameworks; and analysis and design of windowed applications. The various features of visual application frameworks will be illustrated using a variety of information systems applications. Programming projects.

755 Data Warehousing and Mining (3:3:0) Prerequisite: INFS 614 or equivalent. The course covers techniques for designing and maintaining large data warehouses. Topics covered are OLAP, star schemas, data integration, data cleaning, maintenance of views in the presence of updates to the sources, and query processing of warehouses. The second part of the course focuses on mining data from the warehouses. Topics include data mining techniques such as classification, clustering, association rules, mining of time-series and complex data. The emphasis is on scalability over large data sets.

760 Advanced Database Management (3:3:0) Prerequisite: INFS 614. Study of advanced database models and languages, database design theory, transaction processing, recovery, concurrency, distributed database, security and integrity. Recent developments and research directions are discussed.

764 Object-Oriented Database Systems (3:3:0) Prerequisite: INFS 614 or CS 650, or permission of instructor. The knowledge of an object-oriented programming language such as C++ is highly desirable. Study of concepts and systems of object-oriented (OO) databases. Topics include OO design, data models, query languages, new data types, and implementation. Also included are a detailed case study and a project performed on OO-DBMS. Various prototypes, commercially available systems, and emerging standards are surveyed.

770 Knowledge Management for E-Business (3:3:0) Prerequisite: INFS 622 or permission of instructor. Knowledge management within the context of large organizations, particularly those that conduct business on the web and over the Internet. Topics include knowledge management (KM) process model and lifecycle; case studies of effective KM in organizations; e-business frameworks and models, including business-to-consumer, business-to-business, and net marketplaces; the extensible markup language (XML) and its use in e-business transactions and services; the role of standards in effecting inter-enterprise process models and workflows; the intelligent integration and interchange of information among business partners; web service architectures and standards; and security and digital rights management in e-business environments.

785 Data Mining for Homeland Security (3:3:0) Prerequisites: INFS 755. Covers analytic techniques that can be used for investigative analysis. Topics include small world graphs and as a 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) Prerequisites: completion of all core courses, and preferably taken in final semester prior to graduation.
795 Special Topics in Data Mining Applications (3:3:0) 
Prerequisite: INFS 755. Focuses in the interdisciplinary applications of data mining. Topics are selected from the following: web and text data mining, e-commerce, bioinformatics, security and intelligence analysis, data mining of economical data. Each topic will be analyzed in depth and the state-of-the-art techniques in the application of data mining to the field will be extensively covered.

796 Directed Readings in Information Technology (3:3:0) 
Prerequisite: graduate standing in information systems with at least 12 prior credit hours in MS. Research and analysis of a contemporary problem in information system development. Prior approval is required by a faculty sponsor who supervises the student’s work. Written report is required. A maximum of 6 credits may be earned. To register, students must complete an independent study form, which is available in the department office. It must be initialed by faculty sponsor and approved by department chairman.

797 Advanced Topics in Information Systems (3:3:0) 
Prerequisite: permission of instructor. Special advanced topics not occurring in the regular INFS sequence. May be repeated for credit when distinct offerings of the course differ in subject.

798 Research Project (3:3:0) 
Prerequisite: 18 credits applicable toward MS. Research project chosen under the guidance of a full-time graduate faculty member, resulting in a written technical report. Prior approval required by a faculty sponsor who supervises the student’s work. To register, students must complete an independent study form, which is available in the department office. It must be initialed by faculty sponsor and approved by department chairman.

799 Thesis (1-6:0:0) 
Prerequisite: 18 credits applicable toward MS. Original or compilatory work evaluated by a committee of three faculty members. To register, students must complete an independent study form, which is available in the department office. It must be initialed by faculty sponsor and approved by department chairman.

Information Technology (IT) 
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.

100 Information Technology in Action (1:1:0) 
Prerequisite: permission of instructor. Designed for students pursuing IT minor. Introduces current issues as well as career-related opportunities in the IT field. Establishes appreciation of the manifold implications of technological change, and motivation for continued, enthusiastic learning in IT.

101 Introduction to Information Technology (3:3:0) 
Introduces fundamental concepts in information technology 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 part of course.

103 Introduction to Computing (3:1:2) 
Prerequisite: Knowledge of high school algebra. Through lecture and laboratory practice, introduces nature and uses of computers. Studies widely used applications including word processing, spreadsheets, databases, and presentation software; laboratory projects required in these areas. Additional lectures address computer systems organization, computer communications and networking, legal and ethical considerations (including privacy, intellectual property, and appropriate uses of technology), effective presentation of information, computer security, artificial intelligence, and future of computing and the Internet.

203 Electronic Documents and Presentation (1:0:0) 
Prerequisites: basic word processing skills, 45 credits, or permission of instructor. Not available to IT&E majors. Presents hardware, software, and information storage concepts; intermediate-level word processing concepts; web page construction, including tables and frames; and effective presentation principles and presentation software. Covers basic networking tools for web publishing such as (secure-)ftp and (secure-)telnet. Discusses e-mail “netiquette,” free speech, and intellectual property rights.

204 Spreadsheets and Visualization of Information (1:0:0) 
Prerequisites: basic word processing skills, 45 credits, or permission of instructor. Not available to IT&E majors. Presents the basics of information representation and media. Students learn to use Excel to create worksheets and workbooks. Covers cell addressing and formulas, goal seeking, what-if analysis, importing and exporting data, and publishing spreadsheets to dynamic web pages. Different types of charts and graphs introduced and compared. Students learn how to use charts to display information effectively and incorporate charts into documents and presentations. Ethical issues include discussions of computer crime and fraud.

205 Database Management and Security (1:0:0) 
Prerequisites: basic word processing skills, 45 credits, or permission of instructor. Not available to IT&E majors. Basics of information security, Internet search engines, and different types of database management systems. Students use MS Access to create and link tables, sort and search (query) tables, use forms and create reports. Presents data integrity tools such as combo boxes and validation rules. E-R diagrams used to model relations. Ethical discussions include information privacy, appropriate use and destruction of data, and data integrity.

207 Advanced Topics (2:2:0) 
Prerequisite: IT 108 or CS 112, or permission of instructor. Intermediate Java programming, socket programming, and CGI scripting, POSIX concepts and tools needed to support web-based applications.
208 Program Design and Data Structures (3:3:0) Prerequisite: IT 108 or permission of instructor. Fundamentals of data structures and analysis of algorithms. Large programs are written in a modern, high-level programming language. Stresses abstraction, modular design, code reuse, and correctness.

212 How Computers Work (3:3:0) A look inside today's personal computers. Covers in nontechnical manner what makes computers “tick” from transistor basics up to accessing the Internet. Describes all the essential components within a PC and how they interact. Also addresses the latest aspects of computer technology and how they affect computer use and operation. Presentations of actual hardware included so that students can visually appreciate the complexity of the circuitry involved.

213 Multimedia and Computer Graphics (3:2:1) Prerequisites: IT 103, 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 a practical business perspective. Technological, aesthetic, and human factors introduced and discussed.

214 Database Fundamentals (3:3:0) Prerequisite: IT 108. Introduction to 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 a modern database application to create tables, queries, forms, and reports.


222 Introduction to Information Security Policy and Management (3:3:0) Prerequisite: IT 103. Covers principles of security auditing, intrusion-detection tools, and computer forensics. Authentication, documentation of computer crimes, and chain-of-evidence procedures are presented. Discusses laws and law enforcement authorities, civil cyberdefense, and applications of computer security in the information warfare age.

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. labs, sum

300 Modern Telecommunications (3:3:0) Prerequisite: IT 101, MATH 108, 111. Comprehensive overview of telecommunications, including current status and future directions. Topics include a 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. Examples of real-life networks provided 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 305 or 306. Explores how IT has changed the nature of society and contributed to evolution of global economy. Examines changing nature of work, education, and communication, as well as ethical issues such as intellectual property rights, computer-related crime, privacy concerns, and public policy issues.

308/INF 310 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 a high-level language. Focuses on program design, coding, debugging, and documentation.

314/INF 311 Database Management (3:3:0) Prerequisite: IT 108 or IT 308/INF 310 or CS 112. Study of logical and physical characteristics of data and their organization in computer processing. Emphasizes data as a resource in computer applications, and examines database management system (DBMS) software and design, implementation, and use.

331 Web I: Introduction to Web Development (3:3:0) Prerequisite: IT 103, 108 and 213. Introduces terms and concepts necessary for successful web design. Covers differences between 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 both with a text editor and with a 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 131 and 341, or permission of the instructor. Web server administration and web security. Property sheets related to these sites and security features. Hosting multiple web sites on the same web server and associated performance issues. Application-level password security.

341 Networking Essentials (3:3:0) Prerequisites: IT 101, 108, 212; MATH 108; or permission of instructor. Introduces basics of network security tools, administrative tools, network protocols, and fundamentals of TCP/IP using standard operating systems.

342 Operating Systems Fundamentals (3:3:0) Prerequisites: IT 101, 108, 212 and 341; junior standing; or permission of the 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.

350 Introduction to Entrepreneurship (3:3:0) Introduces concept of entrepreneurship and the skills, concepts, and information entrepreneurs use. Examines why and how entrepreneurs start companies, and how this is different from the way large companies expand operations. Introduces through readings, lectures, and exercises the concepts and methods needed for students to start their own
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company. After completing this course, students should have the skills needed to develop and write a good first draft of a business plan.

353 Information Warfare (3:3:0) Prerequisites: IT 101 and 103 (or equivalent courses) and either IT 221 or IT 222. Examines and assesses the role of information technology as a tool of warfare. Topics include physical attacks, cyberterrorism, espionage, “psychos,” biometrics, CASIR, and applications of encryption technology. Students research and write about the social, ethical, and political effects of such technology.

362/STAT 362 Introduction to Computer Statistical Packages (3:3:0) Prerequisite: IT 250/STAT 250 or equivalent. Use of computer packages in the statistical analysis of data. Topics include data entry, checking, and manipulation; and use of computer statistical packages for regression and analysis of variance.

414/INF 414 Advanced Database (3:3:0) Preerequisite: IT 214 or equivalent. Explores advanced concepts of database modeling using an enterprise-level database management system. Topics include object-oriented database processing, data integrity, transactions, locks, concurrency control, backup, recovery, optimization, data mining, Internet databases, server programming, and security.

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 their skills in both client and server-side scripting using the Document Object Model. Session/cookie management. Privacy and integrity issues discussed.

441 Network Servers and Infrastructures (3:3:0) Prerequisites: IT 341; MATH 108, 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 the Internet. Through networking lab sessions, students focus on using switches and routers connected in LANs and WANs. Term project.

443 IT Resources Planning (3:3:0) Prerequisite: junior standing in the BS in information technology program, or permission of the instructor. Provides essential strategies and procedures for planning, organizing, staffing, monitoring, and controlling the design, development, and production of a system to meet a stated IT-related need in an effective and efficient manner.

462/INF 462 Information Security Principles (3:3:0) Prerequisite: IT 212 or equivalent. Study of 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/INF 466 Network Security (3:3:0) Prerequisite: IT 212 or equivalent, and IT 221. Symmetric and asymmetric cryptography; encryption, message-authentication codes and digital signatures; cryptographic authentication; digital certificates and public key infrastructure; the standards process; cryptographic protocols; IP SSL/TLS, IPSEC and related protocols; secure e-mail; and intrusion detection designing secure networks.

468 Cyber Security Capstone (3:3:0) Prerequisites: IT 108, 221, 341, 342, 466, and 492; or permission of instructor. In-lab course on defending computer networks against attempts to harm the system and its components; hardening tools include firewalls, intrusion detection systems, network scanning devices, and protection against denial of service attacks, e-mail bombs, buffer overflow attacks, root kits. Students harden their site and protect it against attack on a real, full-featured isolated network. Discusses ethics and legal implications.

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 future 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 Processing and Transmission (3:3:0) Prerequisites: IT 108, 213, and 331; 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.

488 Fundamentals of Satellite Communications (3:3:0) Prerequisites: MATH 108, IT 300 and 341, or permission of the 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 the BS in information technology program, and completion of, 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 a practicing IT professional. Students must prepare a business plan, software and hardware requirements, schedule and organizational plan, documentation plan, quality control, and a testing strategy. Environmental impact and social implications of the project must be evaluated. Students must show that they have researched relevant laws, treaties, and ethical implications of the project. Oral and written reports evaluated during and at completion of proposal. Final presentation made before faculty panel. Fulfills writing-intensive requirement for the 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. Corequisite: IT 443. Second of two capstone courses. Students work in teams to com-
plete projects that demonstrate preparedness as a practicing IT professional. Includes ethical challenges. Status reports and engineering notebooks evaluated during the project. Required readings include case studies. Teams, with contributions by each individual student, present final written reports and final presentations before a review panel comprising at least two faculty members.

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 of 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 a review of pre-calculus, 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 a technical professional to function as an 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 357 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 a technical professional to function as an effective entry-level network engineer. Includes modules in wireless telecommunications, network security, network management, and advanced network protocols.

746/CSI 776 Calculus of Random Signals (3:3:0) Prerequisites: STAT 652, or CE 630 or 632. 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 the methods to engineering and biology. Focuses on developing necessary concepts rather than mathematica proofs. For graduate students in information technology, electrical engineering, mathematics, operations research, and statistics.

750/CS 750 Theory and Applications of Data Mining (3:3:0) Prerequisite: CS 681, 687, or 688; or permission of the 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.

776/CSI 778 Real Analysis and Statistics (3:3:0) Prerequisites: STAT 652; or ECE 620, 621, and 630. Advanced calculus and linear algebra needed for doctoral work in statistics and related fields. Topology, vector spaces, atrices, continuity, differentiation, sequences and series of real numbers and real-valued functions, Riemann and Riemann-Stieltjes integrals, and multidimensional calculus. Presents applications in probability and statistics including response surface methodology. ir

796, 797 Directed Reading and Research (1-3:0:0) Reading and research on a specific topic in information technology under the direction of a 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 an IT&E doctoral program. From quantitative point of view, discusses characteristics of the most important technologies used to support the 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 Principles of Machine Learning and Inference (3:3:0) Prerequisite: CS 680, 681, or permission of instructor. Presentation of unifying principles that underlie diverse methods, paradigms, and approaches to machine learning and inference. Reviews most known learning and inference systems, discusses their strengths and limitations, and suggests the most appropriate areas of their application. Students get a hands-on experience by experimenting with the state-of-the-art learning and inference systems and work on projects tailored to their research interests.

812/CS 812 Advanced Topics in Natural Language Processing (3:3:0) Prerequisite: CS 680. Advanced treatment of topics in syntax, semantics, and generation of linguistic output. Implementation and applications are also discussed.

814/CSI 801 Foundations of Computational Science (3:3:0) Prerequisite: CS 735 or equivalent. Investigation methods for scientific questions in the 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 IT 816 or CSI 801. Topics illustrating some of the contemporary thinking on architectures, applications, development environments, algorithms, operating system
related issues, language requirements, and performance for parallel computation.

816/CS 816 Parallel Architectures, Algorithms, and Applications (3:3:0) Prerequisite: CS 583 and computer architecture course. Familiarization for students in area of parallel architectures, algorithms, and parallel computers. Various algorithms and their applicability to certain architectures are discussed. Compares these parallel algorithms with certain tools, and explores applications to artificial intelligence, image processing, and database machines.

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 their analytical characteristics and applications. Neural networks assessed as universal approximators. Presents connections to the fuzzy approach established through the Radial Basis Function approach. Applications to perception, knowledge-based systems, and robotics are presented.


819 Computational Models for Probabilistic Inference (3:3:0) Prerequisite: SIST 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 the model. Algorithms for finding the most probable instantiation of the network. Applications in expert systems and decision analysis.

821 Software Engineering Seminar (3:3:0) Prerequisite: SWE 621. Study of the application of software engineering principles, design methods, and support tools through real-life problems extracted from faculty and industry projects. May be repeated with a change in topic.

822 Software Maintenance and Reuse (3:3:0) Prerequisite: CS/SWE 621 (or equivalent), data structures, principles of modern programming, 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 334. Study of software for systems in which failure can be catastrophic. Techniques to construct and analyze software for critical applications and examination of inherent limitations of such techniques are presented, as well as 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 analyzeability, and design for testability.

824 Program Analysis for Software Testing (3:3:0) Prerequisite: CS 540 or CS/SWE 657 or permission of instructor. Different methods for analyzing software, primarily for the purpose of testing. Analysis techniques, specific algorithms, tools, and applications. Goals are to explore the 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. Analysis techniques for software-related activities such as maintenance, reuse, object-oriented development, metrics, and optimization are also considered.

830/ECE 734 Detection and Estimation Theory (3:3:0) Prerequisites: ECE 528 or permission of instructor. Introduction to detection and estimation theory with communication applications. Topics include M-hypotheses, Bayes, minimax, Neyman-Pearson criterion, detection of signals in AWGN and ACGN, Bayes estimation, ML estimation of signal parameters in AWGN and ACGN, estimation of Gaussian waveforms in Gaussian noise, linear MSE estimation, and Kalman and Wiener filters.

832/ECE 735 Data Compression (3:3:0) Prerequisite: ECE 528 or permission of instructor. In-depth study of lossy data compression techniques based on vector quantization with application to speech, image, and video signals. Vector quantization of both signal’s waveform and commonly used parametric statistical models such as the autoregressive model are covered. 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. Introduction to the theory and applications of modern satellite communications. Topics include satellite channel characterization, channel impairment and transmission degradation, link calculations, modulation, coding, multiple access, broadcasting, random access schemes, demand assignment, synchronization, satellite switching and onboard processing, integrated service digital satellite networks, and satellite transponder, ground stations, packet switching, and optical satellite communications.

834/ECE 742 Telecommunications Networks (3:3:0) Prerequisites: ECE 528 and 642, or permission of instructor. Open Systems Interconnection Reference Model, analysis and modeling of layered network architectures including transport and higher layers, performance evaluation of System Network Architecture, DEC Network Architecture, and other telecommunication architectures. Protocols and standards for local, metropolitan, and wide area networks are also discussed. Topics include high-speed packet switching, broadband multimedia protocols, and congestion control in broadband integrated networks.

835/CS 835 Computational Vision (3:3:0) Prerequisites: CS 682 and 686, or permission of instructor. Study of recent advances in development of machine vision algorithms and knowledge-based vision systems. Topics include 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. Emphasis is on system integration in terms of perception, control, action, and adaptation. Applications to robotics, intelligent highways, inspection, forensic, and data compression are presented.

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 the 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) Prerequisite: SYST 611, ECE 650, CS 580, SYST 555, or equivalent. Review recent developments in the area of 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 the environment.

841/ECE 722 Kalman Filtering with Applications (3:3:0) Prerequisite: 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.

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/ECE 749/CS 844 Pattern Recognition (3:3:0) Prerequisite: ECE 549 or CS 580 or permission of instructor. Covers Bayesian and Statistical Pattern Recognition, Neural Network, and Statistical Learning Theory approaches for Pattern Recognition. Topics include Bayes’ theorem, density approximation, multiplexer networks and back propagation learning, pre-processing and feature extraction, data and dimensionality reduction, function approximation and adaptive kernel methods, clustering and self-selection, support vector machines, support vector regression and support vector clustering, evolutionary computation and genetic algorithms, and fuzzy systems. Emphasizes experimental design, performance evaluation, and applications.

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 the 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. Course also covers computational simulation techniques, stability theory, including Lyapunov’s direct method, nonlinear control systems: input-output stability, 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 are also included.

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 opto-electronic 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 ranging from HDTV/TV over ATM, digital HDTV for terrestrial broadcast, to videoconferencing/desktop multimedia over LAN/WAN.

850 Systems Integration Engineering (3:3:0) Prerequisite: SYST 510 or 520. Lifecycles in systems engineering. Large systems comprised of heterogeneous components.

851 Seminar: Topics in Software Requirements (3:3:0) Prerequisite: SWE 620 or 624, or CS 624. Emphasis on the latest research ideas in the requirements engineering domain. Discusses the current state-of-the-art and state-of-the-practice in requirements engineering. Focuses on the most critical problems and discusses how their resolutions might further the requirements research knowledge base and enhance the quality and productivity of real software and system developments in industry. May be repeated when the topic is different.

852/CS 852 Graphical Real-Time Simulation (3:3:0) Prerequisite: CS 652 or IT 875. Current research in advanced computer graphics and its applications in realistic real-time simulations. Topics include physically based modeling, real-time simulation, distributed interactive simulation (DIS), network virtual environments (NVE), and virtual reality (VR).

858/CS 858 Logic Models in Artificial Intelligence (3:3:0) Prerequisite: CS 580. Examination of the relevance of logic theory to artificial intelligence. Familiarizes students with a variety of formal logics that are used in artificial intelligence, as well as ongoing research in new logics. Topics include first-order predicate calculus, resolution and non-resolution theorem proving, nonmonotonic logic, assumption-based reasoning, the relationship between symbolic and quantitative theories of uncertainty, temporal logics, and their application to planning and metareasoning.

860 Software Analysis and Design of Real-Time Systems (3:3:0) Prerequisite: SWE 623. Background for students who want to conduct research in the software engineering of real-time systems. Students gain understanding of key real-time software system analysis, design concepts and methods, and how they are used in the development of large-scale, real-time software systems. Students also gain an understanding of the potential impact of emerging technologies in this field. Term project in the design and analysis of a complex real-time software system is undertaken.

861 Distributed Database Management Systems (3:3:0) Prerequisite: INFS 614 or equivalent. Topics in distributed database management including transaction management, concurrency control, deadlocks, replicated database management, query processing reliability, and surveys of commercial systems and research prototypes.

862 Computer Security Models and Architectures (3:3:0) Prerequisite: INFS 767 and INFS 780. Covers modern computer security models and architectures in the context of large-scale distributed systems, including cross-enterprise systems. Models for role-based access control, lattice-based access control, and delegated administration are studied and compared with respect to formal and pragmatic criteria. Architectures to implement these models based on public-key infrastructure, trusted servers, and other components are studied.

863 Empirical Methods in Information Technology (3:3:0) Prerequisite: STAT 654. Examination of alternative paradigms of scientific research and their applicability to research in information technology. Topics include fundamental elements of scientific investigation, basic principles of experimental design and statistical induction, philosophy of science and its relation to the information technology sciences, and case studies of information technology research.

864 Scientific Databases (3:3:0) Prerequisite: INFS 614. Study of database support for scientific data management. 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 the earth orbiting satellite are covered.

865 Networks and Distributed Systems Security (3:3:0) Prerequisite: INFS 612 or equivalent. Detailed study of network and distributed systems security. Review of basic cryptography and threats and vulnerabilities in distributed systems. Security services and confidentiality, authenticity, integrity, access control, nonrepudiation, and their integration in network protocols are covered. 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: INFS 760 or permission of instructor. Study of models and techniques that empower database systems with intelligent and cooperative behavior, with emphasis on subjects such as knowledge-rich databases, logic databases, epistemological queries, intentional answering, and knowledge discovery. Topics include user interfaces cooperative query interfaces, interactive query constructors, graphical interfaces, and browsers; uncertainty representing, manipulating, and retrieving uncertain, imprecise, or incomplete information; and formulating and interpreting vague or incomplete queries.

870 Organizational Informatics (3:0:0) Prerequisite: doctoral status or permission of instructor. Examination of the 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 disciplines.

871 Statistical Data Mining (3:3:0) Prerequisite: STAT 554 or STAT 663 or permission of instructor. Data mining basic concepts, computational complexity, data preparation and compression, data bases and SQL, rule-based machine learning and probability, decision trees, neural networks, 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. Presentation of 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 study illustrates methodology. ir

875/CSI 803 Scientific and Statistical Visualization (3:3:0) Prerequisite: STAT 554 or CS 651. Presentation of visualization methods used to provide new insights and intuition concerning measurements of natural phenomena and scientific and mathematical models. Presents case study examples from a variety of disciplines. Topics include human perception and cognition, an introduction to the graphics laboratory, elements of graphing data, representation of space-time and vector variables, representation of 3D and higher dimensional data, dynamical and methods, and virtual reality. Students required to work on visualization project. Emphasizes software tools on the 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 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. as

877/CSI 877 Geometric Methods in Statistics (3:3:0) Prerequisite: STAT 751 or permission of instructor. Develops the 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

879 Topics in Stochastic System Simulation (3:3:0) Prerequisite: OR 635 or permission of instructor. Special topics and recent developments in the Monte Carlo simulation methodology for discrete-event stochastic systems. Contents vary and 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.

880 Queuing Modeling of Computer-Communication Networks (3:3:0) Prerequisite: OR 645 or 647 or ECE 542; or equivalents. Study of analytical modeling of computer and communication networks and performance evaluation. 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. Study of problems using most recent developments. Topics include cutting plane procedures based on polyhedral combinatorics, column-generation procedures for large complex problems, heuristic approaches (genetic algorithms, simulated annealing, tabu search), the study of special structures, formulation techniques and bounding approaches. Topics stress the most recent developments in the field. May be repeated for credit when topics are distinctly different.

884 Advanced Topics in Nonlinear Programming (3:3:0) Prerequisite: OR 644. Study of 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 the Periodogram and the window approaches; maximum entropy spectral estimation and its relation to autoregression modeling; signal subspace approaches for frequency estimation; and the wavelet transform and its relation to the short-time Fourier transform.

886/ECE 751 Information Theory (3:3:0) Prerequisite: ECE 630 or STAT 644 or equivalent or permission of instructor. Introduction to information theory, the mathematical theory of communication systems. Topics include entropy, relative entropy and mutual information, the Shannon-McMillan-Breiman theorem and its applications to data compression, entropy rate and the source coding theorem, Huffman, arithmetic and the Lempel-Ziv codes, the method of types, channel capacity and the channel-coding theorem, the joint source-channel coding theorem, differential entropy, the 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 STS 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) Prerequisite: CEIE 660, 560 or equivalent; or permission of instructor. Special topics and recent developments, including traffic safety analysis, simulation in transportation, intelligent transportation systems, and advanced public transportation systems. Congestion management, travel demand management, geographic information systems in transportation, innovative refinancing and public-private partnerships in transportation, information technology in transportation. May be repeated for credit when topics are distinctly different.

891 Special Topics in Applications of Information Technology to Urban Systems Engineering (3:3:0) Prerequisites: CEIE 670 or permission of the instructor. Special
topics and recent developments as applied to civil engineering. Topics include inventive engineering, design engineering, network computing, building and using intelligent agents in engineering, proactive design, etc. May be repeated for credit when topics are distinctly different.

892 Special Topics in Environmental and Water Resource Systems Engineering (3:3:0) Prerequisite: CEIE 601. Special topics and recent developments in environmental and water resources systems engineering analysis and design. Possible topics include studies in waste minimization; pollution prevention; hazardous waste management; wastewater management; air pollution control; solid waste management; environmental decision making; sustainability; water resource and environmental economics; wetlands management, design and construction; groundwater contamination modeling; stochastic hydrology; river basin planning and management and water quality modeling. May be repeated for credit when topics are distinctly different.

894 Design and Inventive Engineering (3:3:0) Prerequisite: SYST 573, CEIE 670, or OR 681 or permission of instructor. Topics include evolution of engineering, design engineering, inventive engineering, general design methodology, conceptual versus detailed design, axiomatic design theory, inferential design theory, engineering method in design, design paradigms, case-based design, proactive design, design evaluation, virtual design studio, Internet and browsers in design, creative problem solving, problem solving methods, and computer tools to support design creativity.

910/CS 910 Advanced 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. May be repeated for credit when subject matter differs.

915/CS 915 Advanced Topics in Parallel Computation (3:3:0) Prerequisite: IT 815. Discussion of current research topics in parallel computation. Topics vary according to student and faculty interest. Possible topics include formal models of concurrency, specification and design of parallel programming languages, logic programming in a parallel environment, and parallel distributed processing (neural networks).

922 Concurrent Object-Oriented Systems (3:3:0) Prerequisite: IT 822. Comparative study of existing concurrent object-oriented approaches to problem analysis and software construction. Introduces current research issues in concurrent object-oriented systems, concurrency models, and concurrent object-oriented programming languages and development tools.

932/ECE 737 Spread Spectrum Communications (3:3:0) Prerequisite: ECE 731. Fundamentals of spread spectrum communications. Major topics include pseudonoise spread spectrum systems, acquisition, synchronization, timehopping, frequency hopping, and multiple access communication.


940 Advanced Topics in Control and Robotics (3:3:0) Prerequisites: ECE 620, 621, 624, and 650. Advanced and newly developed topics in control and robotics. Content varies depending on current faculty interests and student demand. May include knowledge-based control, intelligent control, hierarchical and distributed control, robust control, and reasoning under uncertainty.

941 System Identification and Adaptive Control (3:3:0) Prerequisite: ECE 621 or permission of instructor. Advanced treatment of identification and adaptive control. 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. Study of ingredients of imaginative reasoning as it concerns the efficient discovery of new ideas and valid evidential test of them. Topics include different interpretations of Peirce’s theory of abductive reasoning, other forms of reasoning, Hintikka's analysis of the process of inquiry, and current attempts to design systems that provide assistance in discovery-related or investigatory 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; the 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. Analysis of tools, techniques, and methods that contribute to the 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 in computer security. 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. Review of measure theory concepts needed for probability. 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, stationary processes.

972/CSI 972 Mathematical Statistics I (3:3:0) Prerequisite: STAT 652 or equivalent. Focus on the theory of estimation. Principles of estimation are explored, including the method of moments, least squares, maximum likelihood, and maximum entropy methods. Details methods of minimum variance unbiased estimation. Topics include sufficiency and completeness of statistics, Fisher information, Cramer-Rao bounds, Bhattacharyya bounds, asymptotic consistency and distributions, statistical decision theory, minimax and Bayesian decision rules, and applications to engineering and scientific problems.

973/CSI 973 Mathematical Statistics II (3:3:0) Prerequisite: IT 972. Continuation of IT 972. Concentration on the theory of hypothesis testing. Topics include characterizing the decision process, simple versus simple hypothesis tests, Neyman-Pearson Lemma, uniformly most powerful tests, unbiasedness of tests, invariance of tests, randomized tests, and sequential tests. Applications of the testing principles are made to situations in the normal distribution family and other families of distributions.


978/CSI 978 Statistical Analysis of Signals (3:3:0) Prerequisites: STAT 544 and 658 or equivalent. Advanced course in the analysis of discrete- and continuous-time signals using methods of stochastic differential equations and time series. Presumes familiarity with the 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. Study of statistical science and the body of methods and techniques that convert raw data into information. Contents vary. Such topics as high-interaction statistical graphics, stochastic methods for parallel computing, cryptography and covert communications, order-restricted inference, treatments of imprecision, and the foundations of inference are covered. May be repeated when topics are distinctly different.

980 Advanced Topics in Applied Probability (3:3:0) Prerequisite: OR 645, 647, or permission of instructor depending on topics for the semester. Special topics and recent developments in the 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 when topics are distinctly different.

981 Advanced Topics in Optimization (3:3:0) Prerequisite: IT 741, 750, 881, 882, or 884. Special topics and recent developments in optimization theory and computation. 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 are 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 these problems are 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 their research proposal for critique. Covers the presentation of the research topic for the PhD in information technology, and is required of all PhD students. Students complete dissertation research proposal. May be repeated with a change in topic, although degree credit is given once.

991 Engineer Project Presentation (1:0:0) Prerequisite: completion of all course requirements for the engineer degree in information technology, or permission of instructor. Opportunity for engineer degree students to present project proposal for critique to interested faculty and students. Covers presentation of project topic for engineer degree in information technology, and is required of all engineer degree students. Students complete project proposal. May be repeated with a change in topic, although degree credit is only given once.

996 Engineer Project Proposal (1-6:0:0) Work on a project proposal that forms basis for the dissertation for the engineer degree. May be repeated. No more than 12 credit hours 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 the direction of advisory committee in information technology. May be repeated as needed.

998 Doctoral Dissertation Proposal (1-12:0:0) Work on a research proposal that forms basis for doctoral dissertation. May be repeated. No more than 24 credit hours 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 the 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 their IETT 750 work, students investigate more closely academic discourses and the ways they frame lived realities. Exploring the 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 of project is a substantial piece of work submitted together with a plan for its dissemination in the 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 the IETT school-based master’s program. Through the development of a portfolio, teachers provide evidence to demonstrate their professional growth, and provide documentation about themselves as teachers and learners in the two years of the program. As part of the documentation, teachers present their team research projects in the professional conference organized as the 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. Field experience in public schools required.

510/EDSE 510 Introduction to Assistive Technology (3:3:0) Provides understanding of assistive technology and its 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 of this course 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 the visually impaired/blind or hearing impaired/deaf populations. Heightens the awareness of participants to specific technology and resources available to enhance and improve the ability of individuals with impairments to succeed in school, daily living activities, and employment. Knowledge and awareness components of this course may be delivered via distance education.

523/EDSE 523 Accessibility/Input Modification (1-3:1-3:0) Provides overview of accessibility/input modifications and strategies. Students explore various input devices and their application and use by individuals with disabilities. Opportunities for in-depth exploration of sophisticated access technologies are made available to those students who seek expertise in specific assistive technology devices. Knowledge and awareness components of this course 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 with learning disabilities from age 3 to adult. Students develop and implement plans for assistive technology. Practicum required as part of course. 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 a software program for a person with disabilities (Credit 2) Knowledge and awareness components of this course may be delivered via distance education.

526 Web Accessibility (2:2:0) Prerequisite: HTML experience. Focuses on web accessibility issues and solutions for people with disabilities. Includes study of related laws. Provides hands-on experiences with devices and software. Includes evaluation and critique of web sites.

529 Internet as an Assistive Technology Tool (2:2:0) Prerequisite: HTML experience. 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 Scripting and Programming (2:2:0) Enables students to develop computer-based educational materials using a widely known educational scripting language. Students explore basic authoring capabilities, and learn to apply those capabilities by designing and producing materials using the commands, procedures, and functions of the scripting language.

561 Teaching with Telecommunications (1:1:0) Helps students explore and develop expertise with the various aspects of telecommunications tools, as well as model the ways these tools can be used for personal learning and for integration into the teaching/learning process. Addresses e-mail, Internet, web, and online databases.

562 Teaching with Databases (1:1:0) Explores and develops expertise with various aspects of databases, and model ways databases can be integrated into the teaching and learning process. Focuses on strategies for searching, sorting, creating, and communicating with information, much of which is structured by a variety of online and offline databases.
563 Teaching with Graphics (1:1:0) Explores and develops expertise with the 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) Explores and develops expertise with social, cognitive, and learning implications of film, video, and television. Engages students in the process of planning, storyboarding, and filming with video.

565 Teaching with Educational Software (2:2:0) Helps students explore and develop expertise with a variety of educational software, including simulations, problem-solving software, computational tools (calculators, probeware, LOGO, and spreadsheets), and drill-and-practice/integrated learning systems. Emphasizes the ways these programs support the K–12 teaching and learning process.

566 Teaching with Multimedia/Hypermedia (2:2:0) Prerequisite: EDIT 563. Explores and develops expertise with a variety of hypertext/hypermedia and multimedia tools. Emphasizes students’ ability to use these tools and then to teach others. Covers the ways the integration of these tools in the K–12 curriculum support learning, and the difference between hypermedia and multimedia.

567 Teaching with Desktop Publishing (2:2:0) Prerequisite: EDIT 563. Explores and develops expertise with a variety of publishing tools, including word processors, desktop publishers, and idea processors. Emphasizes using these tools to communicate. Covers design and layout principles, appropriate use of images to facilitate communication, and the ways K–12 teachers can design opportunities for students to learn these 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 the latest tools available for the development, integration, and management of visual and graphic display.

572 Tools for Digital Video and Audio (1-3:1-3:0) Overview of digital video and audio software programs, and explores using these tools in the instructional design process. Overview of the rationale for using select tools and developing skills to use them.

573 Project Management Tools (1:1:0) Teaches basic knowledge of the tools available for managing computer-based multimedia and hypermedia projects. Exposes students to the latest tools available for the management, planning, and tracking of large-scale projects. Covers issues related to project management of multimedia.

574 Networking Tools (1-3:1-3:0) Teaches basic knowledge of current networking and telecommunications devices used to enhance the 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 the software interface, construction of instructional sequences, importing video and audio clips, resource management, and animation. Content customized to the particular software tool presented.

575-A Authoring Tools: Authorware (1-3:1-3:0) Teaches fundamentals of the Authorware program. The program can be very complex, and only the essential functions of the program are used as a basis for this course. Students develop a basic, self-directed design module that includes the major components of the software covered. Provides the designer with the core foundations for the development of computer-based instructions. Students can apply the concepts taught in the Authorware program 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 the next level of Toolbook authoring. Students may apply the concepts taught in this course to other authoring tools.

590 Educational Research in Technology (3:3:0) Focuses on the development of 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.

611 Innovations in Distance Learning (3:3:0) Explores educational opportunities distance learning affords through electronic networks and telecommunications. Hands-on activities with these technologies focus on planning, implementation, and evaluation. Students discuss emerging applications in distance learning, and how new approaches to learning can be integrated into today’s classrooms.

704 Instructional Technology Foundations and Theories of Learning (3:3:0) Reviews the practical and pedagogical issues related to the design and development of technological instruction. Emphasizes investigating instructional design as a field and community of practice, as well as reviewing core learning theory constructs applicable to the design of instructional technology.

705/EDCI 705 Instructional Design (3:3:0) Prerequisite: Teaching experience. Helps students analyze, apply, and evaluate principles of instructional design to develop education and training materials spanning a wide range of knowledge domains and instructional technologies. Focuses on a variety of instructional design models, with emphasis on recent contributions from cognitive science and related fields.

711 Teaching with Technology I: Telecommunications and Databases (3:3:0) Corequisite: EDCI 710. Explores and develops expertise with the various aspects of telecommunications and databases, as well as models the ways these tools can be used for personal learning and integration into the teaching and learning process. Addresses e-mail, the Internet and web, and online and multimedia
713 Teaching with Technology II: Graphics, TV and Video, and Simulations (3:3:0) Corequisite: EDCI 712. Explores and develops expertise with the various graphic programs available for constructing visual images, interpretation and creation of video, and structure and use of simulations for learning. Addresses draw and paint programs, scanning and editing of images, and use of visual communication to support K–12 learning. Explores the social, cognitive, and learning implications of film, video, and television, and engages students in the process of planning, storyboard, and filming with video. Also focuses on the various categories of simulation, the relationship between simulations and ways of knowing, and strategies for using simulations to promote K–12 learning.

715 Teaching with Technology III: Publishing and Computational Tools (3:3:0) Corequisite: EDCI 714. Explores and develops expertise with a variety of publishing tools, including word processors, desktop publishers, and idea processors. Emphasizes using these tools to communicate. Covers design and layout principles, appropriate use of images to facilitate communication, and the ways K–12 teachers can design opportunities for students to learn these concepts. Also helps students explore and develop expertise with tools commonly used as part of "computational science" and mathematical modeling. These tools include programming languages such as LOGO, calculators, spreadsheets, probeware, and graphing calculators.

717 Teaching with Technology IV: Hypermedia and Emerging Technologies (3:3:0) Corequisite: EDCI 716. Develops expertise with a variety of hypertext/hypermedia and multimedia tools. Emphasizes students’ ability to use these tools and then to teach others how. Focuses on understanding the difference between hypermedia and multimedia. Also examines a range of educational technologies expected to become important applications within the next three to eight years, such as virtual reality and distributed learning.

720 Leadership Issues in Educational Technology (3:3:0) Examines how educational technology can provide infrastructure for creating, managing, and evaluating innovative types of teaching and learning environments. Explores new assumptions about learning, instructional technology, and organizational development as a foundation for planning how schools can use technology to evolve beyond conventional approaches.

725 Technology and Diversity (3:3:0) Focuses on the ways technology may be used to support the learning needs of all students, including English as a Second Language (ESL) students, bilingual students, and students with special needs. Emphasizes helping teachers use technology to support learning when faced with such diverse learners in one classroom.

730 Analysis and Design of Multimedia/Hypermedia Environments (3:3:0) Prerequisites: EDIT 732, and knowledge of an authoring tool. Allows students to design, implement, and evaluate technology-based education and training materials using advanced computer-based authoring tools.

732 Advanced Instructional Design: Constructive Methods (3:3:0) Prerequisite: EDCI/EDIT 705. Capstone course of a three-course sequence on the theory and practice of instructional design. Helps students apply the ideas developed in prior courses to complete a major instructional design project. Covers leading-edge ideas in the evolution of instructional design.

741 TIP 1 Technology Innovations Project (3:3:0) Students design and create a technology enriched learning module that can be used in their specific educational setting or learning environment. Students are paired with instructional designers, providing a real world context for project development within a cognitive apprenticeship model.

742 Engineering Learning Environments (3:3:0) 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.

743 Technology and Community Partnerships (3:3:0) Explores nontraditional community partnerships in the role in learning. Emphasis on developing partnerships between these non-traditional learning environments.

745 Technology Leadership Issues (3:3:0) Explores relationship 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.

746 Educational Technology and Assessment (3:3:0) Covers fundamentals of educational assessment and measurement, and relates them to current attempts to use technology for the educational assessment. Explores use of computer technology to support traditional testing and innovative ways to assess complex learning.

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 the design and development of the 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 the last year of course work. Examines a range of educational technologies expected to become important applications in the next three to eight years. Assesses the potential of these emerging technologies to improve practice and alter the 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 730 or permission of instructor. Students to 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 the design and production of the final project.

771 Introduction to Multimedia/Hypermedia (2:2:0) Overview of issues and tools used within the field of
structional design. Focuses on the development of skills necessary to implement hypermedia/multimedia ideas into the production process.

772 Web-Based Instructional Tools (2:2:0) Overview of web page development tools. Gives students an opportunity to develop designing principles and skills for publishing documents on the web. Students interact with a variety of web publishing software programs, and work with general design principles to develop a series of web pages based on a given theme.

773 Human Computer Interface Design for Teaching and Learning (3:3:0) Provides an overview of human-computer interface issues related to the instructional design of technology-centered learning environments. Examines a 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 the knowledge and skills of the student’s chosen track through placement in an appropriate work setting.

791 Project Development Practicum (9:9:0) Corequisites: EDIT 704 and 732. Designed for full-time students in the Instructional Technology Track 1 Design and Development Immersion Program. Students join a design team focusing on the instructional design process and development of a technology-based instructional or training product. Students are expected to reflect on their involvement and process of instructional design through the submission of a portfolio at the culmination of the experience.

792 Advanced Project Development Practicum (9:9:0) Prerequisite: EDIT 791. Designed for full-time students in the Instructional Technology Track 1 Design and Development Immersion Program. Students participate in a second design project team, refining their skills in the process of instructional design. Students are expected to substantially reflect on their first design experience, and bring to the advanced project development team an enhanced understanding of instructional design.

793 Advanced Topics in Education (1-6:1-6:0) See EDUC 797.

895 Emerging Issues in Instructional Technology (3:3:0) Prerequisite: admission to the PhD program or permission of instructor. Covers selected emerging issues in instructional technology. Examines ways instructional technology provides an 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 (3-6:0:0) Prerequisites: degree candidacy in MAIS, completion of 27 credits of graduate course work, and approval of project proposal by the faculty advisor, two committee members, and MAIS program director. Individualized Section form required. Original research project related to the student’s concentration taken under supervision of the faculty advisor and project evaluation committee. Graded S/NC.

799 Individualized Studies Thesis (6:0:0) Prerequisites: degree candidacy in MAIS, completion of 27 credits of graduate course work, and approval of a thesis proposal by the faculty advisor, two committee members, and MAIS program director. Individualized Section form required. Completion of research methodology for students entering prior to fall 2004 and successful completion of MAIS 797 for students entering after summer 2004. Original research endeavor related to the student’s MAIS program concentration. Research must result in a document meeting MAIS and university standards. Graded S/NC.

International Commerce and Policy (ITRN)

School of Public Policy

500 Approaches to International Commerce and Policy (4:3:0) First foundation course in the ICP program. Introduces national economic policy and international trade, investment, and finance. Using a case-study method, students learn basic economic concepts such as national income accounting, balance of payments, and factors affecting foreign exchange rates. Students are also given practice in comparing national strategies for growth and development, and using political and economic analysis to assess the reasons for the choice of a national economic strategy and its relative effectiveness.

503 Investment and Macroeconomics for International Commerce (4:3:0) Provides overview of basic concepts in macroeconomic theory, as well as mathematical skills, with an emphasis on their application to problems of the 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 a foundation in international economics and presents the fundamentals of international trade, finance, and transactions. Focuses on alternative approaches to understanding the 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 to communicate the results concisely. Throughout, the emphasis is on 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. Aims and actions of international financial institutions in fostering trade and development are covered, 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 the U.S. role in the world economy and the evolving global trading system. Analyzes the regulatory framework for trade, and political dynamics of international trade relations. Particular attention is given 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 as well as 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 the roles of science and technology as economic drivers, and explores the strategies employed by companies and governments to link research and development to economic growth and competitiveness. Examines the research and development systems and technology-related trade policies of the 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 the international business environment and challenges facing companies in conducting operations in an increasingly interconnected global marketplace. Focuses on issues of management and organization, as well as on the resolution of conflicts that may arise between business organizations and their home and host governments. Also focuses on the role of multinational corporations in the international environment and their impact on global trade, economic development, and the political system. Trade and international investment theories and the world financial environment are also studied. Explores broad issues such as sovereignty of decision making and the 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 an opportunity for study abroad under the 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 on payment methods, including letters of credit, countertrade, and other approaches. Issues of direct concern in the financing of international business operations, such as preparing financing proposals, risk insurance, international taxation, pricing policies, and currency conversion and foreign exchange risk management, are covered. Introduces concepts of foreign direct investment, alliances and acquisitions, joint ventures, and other methods for investing overseas.

711 United States Law and Global Trade (3:3:0) Prerequisite: ITRN 603 or permission of instructor. Surveys types of regulations imposed by the United States, foreign governments, and international institutions on transnational business activities. Reviews the principal regulatory bodies in the United States and overseas, and their 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 the international legal and political regime established under the WTO, and assessing the 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 a global perspective. Emphasizes impact of the single market, and the proposed economic and monetary union of the United States and other major trading partners. Examines European economic relations with Eastern Europe, the former Soviet Union, and the Lome Pact countries.

718 Global Economic and Human Development (3:3:0) Interdisciplinary examination of economic and human development in the world economy. Introduces alternative concepts and theories of economic and human development, as well as analytical frameworks for assessing a number of important issues that arise in the development process. Topics include colonialism, economic growth, population, health, education, industrialization, and rural development.

720 Regional and Supranational Organizations (3:3:0) Assesses the role of international organizations in the international system today, and focuses on a wide range of international and regional economic and political institutions. Emphasizes the changing nature of these organizations in relation to nation states, and the 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 the emergence of computing, information, and telecommunications technologies in the mainstream of society. Aim is to provide a general understanding and facility with technologies of contemporary interest.

731 Business-to-Business Marketing in International Commerce (3:3:0) Provides understanding of the concepts of the international marketing process, and the international environment within which companies operate.

734 Pricing in International Commerce (3:3:0) Deals with theory and techniques of pricing that enable an organization to effectively pursue its marketing and business strategies.

736 Sources of Growth in East Asia (3:3:0) Examines the extraordinary economic success of the East Asian NICs and some of their problems. Focuses on understanding the proximate sources of growth, the 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. The U.S.-Japan Agreement on Semiconductors and its successor agreements are compared with those of the WTO. Also looks at the effects of the agreements on U.S. industry, their relevance to trade development, and commercial transactions.
738 Fundamentals of International Marketing (3:3:0) Offers a working knowledge of principles and practices that enable managers to effectively market organizations, products, services, and brands. Emphasizes the international dimensions of marketing where appropriate.

740 ABCs of Exporting and Importing (3:3:0) Acquaints students with legal, regulatory, and practical issues that arise in the importation and exportation of merchandise. Topics include the theoretical framework for government oversight of international movement of goods; legal issues between parties and governments; and practical guidance concerning the structuring of import and export transactions to avoid legal and tariff liability.

742 Technology Policy and International Strategies (3:3:0) Introduces the opportunities and problems created for organizations and society by the emerging Internet, and policies affecting the trajectory of Internet developments. Also covers technological factors in the planning horizon; domestic policy and international treaty factors affecting the Internet trajectory; and new horizons for Internet applications.

744 The Politics of International Competitiveness (3:3:0) Provides an inquiry into the governance problems of public managers and political leaders as they cope with global competitiveness in the post-industrial era. Focuses on the integration of public and private sectors worldwide, with special emphasis on the 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 the background of and recent developments in the political, business, and cultural environment confronting American firms seeking to do business in Eastern Europe and the former Soviet Union. Emphasizes international trade patterns and relations between these states and the United States. Examines modes of doing business in these countries, and the 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 the cultural, political, economic, and legal aspects of conducting business and trade with countries of the Western hemisphere. Focuses on the evolving pattern of inter- and intra-hemisphere trade, as well as on the region’s global trade integration. Special attention is given to NAFTA and other bilateral and regional agreements, and to the potential for and implications of a free trade area in the 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 a comparative overview of the lobbying process and practices, and explores the representation of foreign firms in the United States, the European Community and its member states, and Japan. Contemporary problems relating to lobbying by multinational corporations in a foreign political and cultural setting are examined.

756 National Security and the Global Economy (3:3:0) Examines the impact of globalization and changes in the international economic and political systems on concepts of national security. Emphasizes the nexus of economic and security concerns in the 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 the 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 a step-by-step planning methodology, students learn to integrate marketing, financial, regulatory, legal, and cultural factors into a management strategy and business plan.

758 Global Market Planning Practicum (3:3:0) Provides opportunity to develop international market plan for a specific industry or service sector. Students consult with industry experts and use key trade databases to develop a strategic plan that recommends market entry strategies. Completed market plan is submitted to industry experts for their 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 a 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 the 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 the movement for European integration since World War II, focusing on the political and institutional development of the European Community/Union. Topics include theories of European integration, Treaties of Rome, Single European Act, Maastricht Treaty, European Union (EU) policies and programs, and the 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 the United States. Assesses the impact of culture and domestic political and economic institutions within these states as well as their roles in regional institutions and in the international system.

765 Trade, Investment, and Politics in Sub-Saharan Africa (3:3:0) Examines the role and potential of sub-Saharan Africa in the international trading system. Political, historical, cultural, and development factors are
emphasized. Focuses on the perspectives of U.S. firms as well as on international institutions trading or investing in this region.

766 Trade, Investment, and Politics in the Middle East and North Africa (3:3:0) Examines the major economic, political, and cultural issues that influence trade and investment relations with the Middle East and North Africa. Focuses on the roles of international and regional institutions in economic development, and develops an understanding of the challenges facing the region and of their implications for the formulation of trade and investment strategies by U.S. firms.

767 Political Economy and Integration in Latin America (3:3:0) Examines the contemporary political, economic, and cultural dynamics of the 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 the roles of domestic interest groups and decision-making systems in individual countries, as well as the evolution of regional integration arrangements and integration with the international system.

769 International Entrepreneurship (3:3:0) Introduces a practical planning approach for small and medium-size entrepreneurial firms seeking to enter the international marketplace. Focuses on key business and financial documents related to doing business overseas, and assesses the role of language, technology, and information systems in formulating a successful business strategy. Role playing and simulated negotiations provide opportunities for students to sharpen business skills.

770 International Contract Negotiation (3:3:0) Reviews the growing role of arbitration in international transactions. Examines the roles of international, national, and government arbitration bodies, with a particular emphasis on how differing cultural characteristics affect negotiating behavior and the 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, with a focus on the 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 the business and financial aspects of the global telecommunications industry.

773 International Strategic Management (3:3:0) Presents a 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 the private sector. A written project that integrates the work experience and the student’s academic program is required.

790 Independent Study (1-3:3:0) Open to authorized graduate majors only; departmental and advisor approval required before enrolling. Provides an opportunity to pursue intensive research in an area of particular 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.

795 Final Project (1-3:3:0) Includes the writing of a 40-page capstone paper that draws together the key themes of the program.

Italian (ITAL)

Modern and Classical Languages

101 Elementary Italian I (3:3:1) Designed for students with no prior knowledge of Italian. Introduction to Italian, including 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.

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. Introduction to Japanese, including basic grammar, oral expression, listening comprehension, and reading and writing.

109 Intensive Japanese I (6:6:0) Equivalent to JAPA 101, 102 taught in a single semester. Recommended for students who desire an intensive introduction to Japanese. May not be taken for credit in combination with JAPA 101 or 02.

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.

320 Japanese Cinema (3:3:0) Comprehensive analysis of Japanese cinema based on cross-cultural perspectives and cultural criticism. Major developments and trends as viewed in selected Japanese films with emphasis on post war and
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<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
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<tbody>
<tr>
<td>330</td>
<td>Advanced Reading and Speaking I (3:3:0)</td>
<td>Prerequisite: JAPA 202, appropriate placement score or permission of instructor. Courses must be taken in sequence.</td>
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<tr>
<td>331</td>
<td>Advanced Reading and Speaking II (3:3:0)</td>
<td>Prerequisite: JAPA 202, 330, appropriate placement score or permission of instructor. Courses must be taken in sequence.</td>
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<tr>
<td>509</td>
<td>Justice Organizations and Processes (3:3:0)</td>
<td>Examination of the structures, practices, and performance of organizations involved in the administration of justice (law enforcement, courts and legal agencies, corrections, regulatory and related agencies, private organizations).</td>
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<tr>
<td>510</td>
<td>Policing in a Democratic Society (3:3:0)</td>
<td>Fundamentally issues in policing a democratic society: police mission, subculture, performance measurement, moral hazards, discretion, impact on crime and disorder, legitimacy, community policing, and other reforms.</td>
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<tr>
<td>691</td>
<td>Justice Program Planning and Implementation (3:3:0)</td>
<td>Prerequisite: JLC 700 or PUAD 502 or instructor’s permission. Examines challenges of adapting to, planning, and implementing change in justice organizations. Hands-on experience is provided in conducting planning and implementation project.</td>
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<tr>
<td>700</td>
<td>Theories of Justice (3:3:0)</td>
<td>Overview of ancient and modern theories of justice with application to contemporary issues involving justice system, and other social and political institutions.</td>
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<tr>
<td>702</td>
<td>Comparative Justice (3:3:0)</td>
<td>Prerequisite: JLC 700/GOVT 726 or instructor’s permission. 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.</td>
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<tr>
<td>703</td>
<td>Restorative Justice (3:3:0)</td>
<td>Prerequisite: JLC 700 or instructor’s permission. The origins of restorative justice, its principles, their implications for different justice organizations and processes, and their application to a variety of problems, such as family violence, human rights, and reconciliation following mass victimizations.</td>
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<tr>
<td>720</td>
<td>Behavior of Law (3:3:0)</td>
<td>Examines the development of law and law’s effect on human behavior. Review of theories of law’s meaning and aims. Examination of the construction of law and investigation of the consequences of law and legal decisions.</td>
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<tr>
<td>721</td>
<td>The Constitution, Criminal Procedure, and Security (3:3:0)</td>
<td>Prerequisites: JLC 720/GOVT 728 or instructor’s permission. Understanding legal doctrines that form the basis of U.S. constitutional procedural rights and understanding how these doctrines develop, why the courts rule as they do, and evaluating the strengths and weaknesses of these rights.</td>
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<tr>
<td>722</td>
<td>Civil Justice (3:3:0)</td>
<td>Prerequisite: JLC 720/GOVT 728 or instructor’s permission. Understanding civil justice system, rules that govern civil justice, their origins and effects. Strengths and weaknesses of civil law doctrines and processes to understand the power of law to order social behavior.</td>
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<tr>
<td>723</td>
<td>Law and Social Control (3:3:0)</td>
<td>Prerequisite JLC 720/GOVT 728 or instructor’s permission. 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.</td>
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<tr>
<td>730</td>
<td>Seminar in the Courts and Constitutional Law (3:3:0)</td>
<td>Role, influence, and effects of U.S. courts in creating constitutional norms and interpreting them. Special attention to First and Fourteenth Amendments, Commerce Clause. Analysis of leading court cases.</td>
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<td>740</td>
<td>Justice Organization and Administration (3:3:0)</td>
<td>Examines the organization and administration of justice and security organizations. Covers organization theory and behavior as applied to justice and security organizations.</td>
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<td>741</td>
<td>Conduct of Justice Organizations at the Street Level (3:3:0)</td>
<td>Prerequisite JLC 740/GOVT 790 or instructor’s permission. How justice organizations behave at lowest levels, where service is delivered and discretion is greatest (suspects, victims, witnesses, police officers, prison guards, parole officers, attorneys, and others who interact with the justice system).</td>
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<tr>
<td>742</td>
<td>Leadership in Justice and Security Organizations (3:3:0)</td>
<td>Prerequisite JLC 740/PUAD 790 or instructor’s permission. Examines leadership theories and explores fundamental questions about leadership in justice and security organizations today.</td>
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<tr>
<td>743</td>
<td>Changing Justice and Security Organizations (3:3:0)</td>
<td>Prerequisite: JLC 740/PUAD 790 or instructor’s permission. 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.</td>
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<tr>
<td>749</td>
<td>Issues in Justice Administration (1-3:1-3:0)</td>
<td>Prerequisites: JLC 509/PUAD 509 or JLC 700/GOVT 726 or instructor’s permission. Exploration of current and emerging issues in justice administration, taking into diverse perspectives. Emphasis on use of theory and evidence to evaluate different viewpoints on issues. Course topics vary, focusing on controversial matters.</td>
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<tr>
<td>760</td>
<td>Crime and Crime Policy (3:3:0)</td>
<td>Examines the 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.</td>
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| 761           | Politics of Crime Policy (3:3:0)                                            | Prerequisites: JLC 760/GOVT 792 or instructor’s permission. Explores the
political context of crime policy. Examination of the influence of public opinion, interest groups, the scientific community, and other political forces. In-depth, case-study comparison of several crime policies.

780 Research Methods (3:3:0) Prerequisite: undergraduate science research methods course or an undergraduate statistics course, or instructor’s permission. Introduction to the logic and methods of scientific inquiry in justice, law, and crime policy. Conceptualization of research questions, observation, measurement, research design, and principles of causality. Evaluation of extant research according to scientific principles.

781 Justice Program Evaluation (3:3:0) Prerequisites: PUAD 611/612 or JLCP 780 or 2 graduate-level statistics courses or instructor’s permission. Practical exploration of assessment techniques used in evaluating the need for and consequences of justice programs and policies. Design and measurement, interpreting and presenting results.

790 Practicum in Justice, Law, Crime, and Security (1-6:0:0) Prerequisite: JLCP 780, and either STAT 510 and 335 or STAT 554 and STAT 656, or instructor’s permission. Student-initiated research project supervised by a 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 the field or topics not covered by regularly listed courses. Course content varies and may be repeated for credit.

796 Directed Reading (1-3:0:0) Prerequisites: Successful completion of 12 JLCP credit hours. 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) Prerequisites: Submission and approval of thesis proposal. Research on approved master’s thesis under direction of a thesis committee with approval of chair. Graded S/NC.

998 Doctoral Dissertation Proposal (1-6:0:0) Prerequisites: Advancement to doctoral candidacy. Work on a research proposal forming the basis for the doctoral dissertation. Repeatable. Minimum 3, maximum 6 credits for doctorate maximum of 24 credits of JLCP 998/999 applicable to doctoral degree requirements. Graded S/NC.

999 Doctoral Dissertation Research (1-12:0:0) Prerequisites: approval of dissertation proposal. Doctoral dissertation research and writing under direction of the student’s dissertation committee. Repeatable. Minimum 12, maximum 21 credits for doctorate. Maximum of 24 credits of JLCP 998/999 applicable to doctoral degree requirements. Graded S/NC.

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 to Latin, 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 the minors of classical studies or Latin and for students who want an intensive introduction to Latin. 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 a single semester. May not be taken for credit in combination with LATN 201 or 202.

321 Latin Tutorial (1-3:0:0) Prerequisites: LATN 202 or equivalent and permission of program chair. Latin readings drawn from classical or postclassical literature. Authors or genres selected by instructor in consultation with student. Meetings on tutorial basis. May be repeated once.

351 Roman Prose Literature (3:3:0) Prerequisite: LATN 202 or equivalent. Introduction to a 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. Introduction to a major work of poetry and themes, meters, and poetic techniques. Emphasis on 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. Focus on a single Latin author or literary genre. Approaches subject from a variety of interpretive perspectives and uses secondary literature as well as primary texts. Topics and authors vary. Sequence may be repeated for credit.

Latin American Studies (LAS)
Latin American Studies


490 Internship (1:1:0) Prerequisite: Latin American studies majors with permission of director. Approved work-study programs in cooperation with specific organizations including are museums, NGOs, and local, state and federal agencies. Credit determined by LAS program.

499 Research Seminar in Latin American Studies (3:3:0) Prerequisite: 90 credits and complete or concurrent enrollment in all other required general education courses. Research on a specialized topic in Latin American Studies
culturating in a substantial paper and an oral presenta-
tion. Students will be expected to integrate the knowledge
and skills acquired in their general education courses. Must
receive a passing grade to graduate with a B.A. 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 in social or organiza-
tional change seen from economic, historical, philosophi-
cal, literary, organizational, or information technology
perspectives. Courses first appear under this heading. Con-
sult program office and class schedules for descriptions.
May be repeated for credit.

572 Taming the Electronic Frontier (3:3:0) Using the
Internet as a primary medium for interactive learning, this
innovative course is offered in a classroom as well as over
cable TV. It establishes a 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 the basis for electronically mediated organizational
learning exercises that challenge traditional power relation-
ships between producers and consumers in institutional
contexts.

583 Groupware for Organizational Learning (3:3:0)
Provides exposure to groupware systems such as Lotus
Notes, the World Wide Web, and Folio Views, and the ways
they can be incorporated to help organizations use knowl-
edge more effectively. Trains students in application de-
velopment for enhancing organizational learning, and
introduces them to the range of diverse software products
designed to facilitate coordination and collaborative work.

592 Internet Literacy (1:1:0) Five-week, 1-credit
minicourse taught via the Internet and video provides
Internet competency for distance-learning initiatives across
the Mason curriculum. Topics include concepts, skills, and
software for reading, searching, and writing hypertext for
the web and for participating in e-mail and newsgroups,
for any course in the Mason curriculum. Uses the new cam-
pus infrastructure, cable TV, and videotape, as well as the
Internet as the medium of collaborative and experiential
learning and as a demonstration of best practices in dis-
tance learning.

596 Independent Study (1-12:0:0) Covers research, analy-
ysis, and implementation within the realm of social and or-
ganizational learning. Students work with a member of
the 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 a process view of organizations that
identifies differences in interests, perspectives, and cul-
tures among groups and explains the role of management
in facilitating understanding to achieve effective coopera-
tion in a dynamic work environment. Themes include
organizational culture, decision-making, collaborative com-
unities, and teamwork, and “reading” of organizational
change. Case studies and experiential exercises reinforce
the 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, percep-
tion, motivation, leadership, and decision making.

672 Organizational Learning Laboratory (3:3:0) Focuses
on creating a learning and experimental environment to
explore questions and concerns typically faced by manag-
ers in their effort to build learning organizations. Quest-
ions are analyzed using experiential learning and action
research. Classroom group interactions and group projects
simulate real-world organizations. The 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) Cov-
ers the study of fundamental alternatives in public policy.
Explores the systemic, evolutionary patterns in overall so-
cioeconomic institutional arrangements, and examines the
manner in which knowledge is discovered, changed, and
communicated in social systems. Drawing on the field of
complex evolving systems, this course pays particular at-
tention to two traditions—Marxism and the Austrian School.
Textual material is in Folio Views software, which facili-
tates a close reading and enables collaboration in earlier
analysis and interpretation of texts.

692, 792 Special Topics in LRNG (1-3:1-3:0) Covers topics
in social or organizational change seen from economic,
historical, philosophical, literary, organizational, and in-ormation technology perspectives. New courses that first
appear under this heading include Teaching Practicum:
Instructional Technologies, Building Learning Organiza-
tions 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) Contrary
to popular usage, “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. Like all other instances
of local culture, corporate cultures must be studied by eth-
ographic methods of “thick description.” After exploring
conceptions of corporate culture, course examines exem-
plary ethnographies of various organizations, including
those of different societies, as preparation for students’ own
ethnographic field work and writing.

761 Computational Modeling of Social Learning (3:3:0)
Explores the processes of social interaction and the emer-
gent (higher-order or macro-) phenomena by modeling
social interaction on computers. Models are simulations of
“virtual worlds” populated by a variety of “virtual agents,”
and they allow processes to be observed in action through
visual representations of economic activity. The modeling
language used is Smalltalk V/Windows 2.0, from Digital-
talk Corp. Course goal is to bring together the insights of so-
cial scientists and computational scientists, using the
former’s understanding of social systems and the latter’s
modeling principles and techniques to produce models in
which the entities modeled have both the capacity of voli-
tion and varying interpretations of and strategies for deal-
ing 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 the enormous potential of information technology to enhance the way organizations work and learn. Focus includes user interface design and the organizational processes that support effective use of this technology.

764 Learning Across Cultures (3:3:0) Focuses on the 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 the relevant costs for a pricing decision, anticipating and influencing competitors’ pricing, and formulating pricing strategies appropriate for the market. Participants learn tactics required to implement strategies that enable them to price differently to different market segments, enhance the perception of their product’s value, and coordinate pricing with the other elements of marketing. Involves analysis of case and real-world problems as well as the discussion of current events showing how to apply techniques developed in class.

781 Interpretive Social Theory (3:3:0) Advanced, philosophical study of the interpretive school of economics sometimes known as the “Austrians.” Weaves together Austrian ideas, epistemology, and hermeneutics; organizing theme is the re-interpretation of the Austrian school as a radically interpretive approach to social theory. Course material is in the form of Folio Views hypertext, which lends itself to the close analysis of text and provides a practical way of demonstrating and appreciating the value of interpretive social theory.

796 Independent Study (1-12:1-12:0) Requires research, analysis, and implementation within the realm of social and organizational learning. Students work with a member of the program faculty. May be repeated for credit.

868 Business, Government, and the International Economy (3:3:0) Provides a broad overview of international development and trade since World War II. Covers the growth strategies of developed countries as well as developing countries. Course is designed to give students a broad understanding of the modern world’s system of political economy shaped by national policies, international agreements, and business activity. Almost all instruction is by case method.

Liberal Studies (LS)

Philosophy and Religious Studies

500 Religious Worlds in Transition (3:3:0) Examines selection of non-Western and pre-Western cultures and religions, ancient and modern, and examines responses to an evolving world. Each culture is viewed from two standpoints: first, from its own construction of values, its conceptions of the relationship of the sacred to the world, the human condition, and “success” in human life; second, from its responses to the inevitable crises of history and the forces of change.

502 Religions in Conflict and Dialogue (3:3:0) Examines nature and patterns of religious conflict and explores ways of engaging in dialogue. Exploration of religious pluralism for dialogue is the main theme of the course.

511 Contemporary Values (3:3:0) Identifies personal, social, political, and religious values in contemporary society; examine their foundations and interrelationships; and examine in depth at least one area of human life in which values are both important and contested.

513 Existence, Faith, and Doubt (3:3:0) Examines idea of religion, of the essential features and variations belonging to religious existence, of the challenges to religious self-understanding posed by contemporary interpretation of religious consciousness, and of the responses to those challenges through a hermeneutics of the religious symbol.

515 Time and the Human Condition (3:3:0) Explores Western culture’s changing interpretations of the meaning and value of time and an examination of the ways these changing interpretations reflect diverse understandings of the meaning of the human condition.

520 Science, Reason, and Reality (3:3:0) Advanced exploration of the interrelations between science, reason, and reality. Explores philosophical perspectives such as the logical empiricist approach, the Popperian falsifiability orientation, Kuhn’s historicism, Newton-Smith’s rationalism, a modeling approach by Van Fraasen, and Hacking’s experimental realism.

Linguistics (LING)

English Department

322/ENGL 322 English Grammar (3:3:0) Overview of the grammatical structure of English including word classes, phrases and complex sentences. English grammar is analyzed using modern syntactic theory. Students engage in language description through problem solving.

326 General Linguistics (3:3:0) Introduction to general linguistics: 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 to 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. The nature and form of a syntactic theory, and an 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 the perspectives of phonological theory. Topics include articulatory phonetics, distinctive features, the nature of phonological representations, rhythm and stress, and phonological universals and constraints.

499 Independent Study (1-3:3:0) Prerequisite: LING 326 and 3 other LING credits, and permission of the instructor. Intensive study of a particular theoretical problem in linguistics to be conducted by an individual student in close
consultation with an instructor. Student produces a substantial piece of written work during the semester on the findings of his or her research. With instructor permission, the course may be taken twice for a total of 6 credits.

507 Field Work in Applied Linguistics (3:0:0) Prerequisite: LING 326, 520, 521, or 582. Contact the English Department one semester prior to enrollment. Field work provides experience working in a language-teaching program or an educational research organization.

520 Descriptive Linguistics (3:3:0) Introduction to 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 the teaching of a second language, especially as they relate to the English language, introducing 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 the structure of modern English beginning with word classes and ending with analyses of complex sentences. Most topics are introduced as problems of language description; in solving them, principles of syntactic argumentation are demonstrated as well. Students learn to tap their own intuitions about English to analyze grammatical structure.

523 Descriptive Aspects of English Phonetics and Phonology (3:3:0) An in-depth description and analysis of the sound system processes of modern English. Segmental phonetics, syllable structure, connected speech, and prosodic phenomena are among the topics. Implications for language instruction are also addressed.

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. Second language (L2) acquisition examined from a linguistic perspective. First and second language acquisition are compared, and factors contributing to L2 variation are explored, 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 articularatory phonetics, distinctive features, the nature of phonological representations and processes, rule ordering, abstractness, the role of external evidence, and nonlinear phonology.

691 Theories of Language (3:3:0) Prerequisite: LING 520, 690, or 786, or permission of instructor. A seminar course in linguistic metatheory. A wide range of theories about language and about linguistic theory are examined, 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 a nonlinear framework. Segmental structure and underspecification are discussed.

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 is related 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) The nature and form of a syntactic theory, and an examination and analysis of the properties of several major natural language syntactic structures.

787 Syntax II (3:3:0) Prerequisite: LING 786. A theoretical treatment of syntactic phenomena that in the past few years have emerged as standard problems for syntactic analysis. Problems include binding, extraction, and quantification. Extensive reading in the primary theoretical literature.

798 Directed Reading and Research (1-3:0:0) Prerequisite: open only to students who have completed at least 18 credits of LING courses. Reading, research, and writing on a specific project under the direction of a departmental member. Prior approval by this faculty member is required. Written report required. May be repeated once for credit with permission.

799 Thesis (1-6:0:0) Prerequisite: open only to students who have completed at least 18 credits of LING courses. Students who take LING 798 to develop a thesis topic and then elect the thesis option receive 3 credits for LING 799 on completion of the thesis. Students who do not take LING 798 or who take it to work on a project unrelated to their thesis receive up to 6 credits for LING 799 on completion of the thesis. Graded S/NC.

Management (MGMT)

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 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: completion of one of COMM 100, 101, 104, 220, or 260; and sophomore standing. Explores how individuals behave in the 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 students opportunities to discuss and apply concepts throughout semester.
312 Principles and Practices of Management (3:3:0)  
Prerequisites: MGMT 301; degree status. Builds on fundamental theories and concepts learned in MGMT 301 by examining the nature of managerial work under a 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 the context of current organizational examples and scenarios.

321 Introduction to Human Resource Management (3:3:0)  
Prerequisites: MGMT 301; degree status. Human capital is the most important asset to most firms. The field of human resources examined in MGMT 321 are discussed in terms that enable students to become more productive and satisfied. Course builds on MGMT 301 by introducing key concepts and techniques that managers need to attract, retain and develop, compensate, and motivate quality talent. Also emphasizes legal and ethical considerations in human resource management.

412 Diversity in Organizations (3:3:0)  
Prerequisites: MGMT 301; degree status. Builds on MGMT 301 by emphasizing the skills to address organizational issues of visible and invisible diversities. Examines ethnicity, gender, age, ability, and thought; also covers diversity as a legal issue and lever for improved individual and organizational performance.

413 Organizational Development and Management Consulting (3:3:0)  
Prerequisites: MGMT 301; degree status. Introduces theory, concepts and practice of organizational development and behavioral science, theory of organizations. Assuming some basic knowledge of organizational behavior, addresses how to use knowledge about organizations to change organizations, to improve themselves. Initial focus is ways of understanding organizations with attention to the theoretical underpinnings of the field and diagnostic models, and on processes for entering organizations. Later sessions focus on contracting, data collection, organizational diagnosis, data feedback, and change technologies. Students consult to actual organizations to learn the process and method of organization development consultation.

421 Advanced Human Resource Management (3:3:0)  
Prerequisites: MGMT 301, 321; degree status. Builds on MGMT 321 by using case-based approach to deepen students’ understanding of HRM best practices. Students conduct projects requiring the 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 any management major, and of particular importance for management majors seeking a career in human resource management. Course helps prepare students for the Professional in Human Resources (PHR) certification exam, which is affiliated with the Society for Human Resource Management (SHRM).

431 Employee Relations (3:3:0)  
Prerequisites: MGMT 301; degree status. Focuses on employee relations issues from historical and current perspectives; intended for management majors interested in pursuing a career in HRM.

451 New Venture Creation (3:3:0)  
Prerequisites: MGMT 301; degree status. Exposes students to the process of conceptualizing and creating a new venture. Using the central concepts of innovation, strategic opportunities, and globalization, students learn to evaluate new venture opportunities and consider external environment’s impact. Students also gain a greater understanding of entrepreneurial concepts by developing business plans in which they address issues critical to starting a firm, 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: 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 regions of the world, crosscultural communication and learning, and the development of 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 a topic of interest to managers and organizations. Enrollment limited and competitive.

463 Negotiations in Organizations (3:3:0)  
Prerequisite: 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 the 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: MGMT 301; degree status. Focuses on intensive development of a 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: MGMT 301; degree status. Explores industry structures and competitive behavior of firms. Attention to how a firm uses tangible, intangible, and human resources to develop a sustainable competitive advantage, and on how competitors interact in the marketplace. Introduces tools and concepts to analyze industry dynamics and competitive interactions of firms within these industries.

493 Management of Technology (3:3:0)  
Prerequisites: MGMT 301; degree status. Uses general manager perspective to explore relationships among technology, competition, and development of competitive advantage. Readings and discussions help explain how firms can exploit technology, whether they should invest in new technologies, and how they should respond to technological threats. Includes project on advanced technologies issues of particular relevance to Mason’s business community.

491 Current Topics in Management (3:3:0)  
Prerequisites: MGMT 312; 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. Significant contemporary research findings included.
499 Independent Study (1-3:0:0) Prerequisite: management majors with at least 9 upper-level management credits. 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 a popular spreadsheet package. Business examples are used to teach fundamentals of spreadsheets and their use in business applications.

301 Introduction to Business Information Systems (3:3:0) Prerequisite: sophomore standing. Introduction to fundamentals of hardware, software, networking, the Internet and its technology components. 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 is 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 the use of a 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 the understanding of programming concepts discussed in lectures, and provide opportunities to utilize acquired skills in the context of developing a real-life business application.

310 Introduction to Database Management Systems (3:3:0) Prerequisites: MIS 301; degree status. Introduction to principles of designing, maintaining, and manipulating databases. Emphasis on relational databases. Applications are business oriented, such as accounts receivables, order entry, customer history. Requires hands-on implementation using software package. SOM majors may not receive credit for both MIS 310 and IT 214.

320 Business Data Communications (3:3:0) Prerequisites: MIS 301; degree status. Broad introduction to technology components used in modern networks. Emphasizes network tools to facilitate business processes. Includes lab work and exercises.

330 Computer Systems Analysis and Design (3:3:0) Prerequisites: MIS 301, 310; degree status; a programming course recommended. Introduction to the life cycle of a 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: MIS 301, or MIS 201 taken prior to fall 2001 and ECON 103; degree status. Economics perspective to study issues arising in the management and control of 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: MIS 301; degree status. Introduction to development of web-based information systems for E-business. Emphasis on technologies, methods, and application development tools. Requires team project and computer lab.

430 Data Warehousing and Data Mining (3:3:0) Prerequisites: MIS 301, 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: MIS 301, 310; degree status. Focuses on the new trends on how knowledge management works for organizations, best strategy for such transition, and what are knowledge management elements.


450 Internet Architecture and Industry (3:3:0) Prerequisites: MIS 301, 320; degree status. Overview of elements of Internet architecture. Analysis of economic and regulatory issues. Internet technology and industry trends. Includes lab sessions and exercises.

491 Seminar in Management Information Systems (3:3:0) Prerequisites: MIS 301, all required courses in DMIS major; degree status. Analysis of selected topics that highlight the latest developments in the information resource management field, including contemporary research findings and case studies of information systems in business and other organizations.

499 Independent Study in Management Information Systems (1-3:3:0) Prerequisite: MIS 301, all required courses in DMIS major; degree status. Research and analysis of selected problems or topics in information resource management. Must be arranged with instructor and approved in writing by associate dean for undergraduate programs before registration.
Marketing (MKTG)  
School of Management  

If a student takes noncore, upper-level business courses prior to acceptance to the School of Management, those courses will not count on an undergraduate degree application for any major in the school (except as general elective credit). A grade of C or higher must be presented on the graduation application for each upper-level course in the major. Prerequisites are strictly enforced. Degree status is defined as formal admission to SOM.  

301 Principles of Marketing (3:3:0) Prerequisite: sophomore standing, and C or better in ACCT 203 and ECON 103. Examination of marketing principles, concepts, strategies, tactics, and analytical tools used by profit and nonprofit organizations to market ideas, products, or services to selected target groups. Emphasis on how to promote, distribute, and price the firm’s offering in a dynamic economic, social, political, and international environment.  

311 Sales Management (3:3:0) Prerequisite: MKTG 301; degree status. Familiarizes students with marketing-sales interfaces including sales force role and capabilities, personal selling strategies, organizational relationships, and responsibilities of sales managers, including training, motivating, and evaluating sales force.  

312 Consumer Behavior (3:3:0) Prerequisites: MKTG 301; degree status. Marketing strategy implications of concepts and propositions that compose consumer decision processes. Emphasis on lifestyle, situation, and information processing. Lecture and case analysis.  

313 Integrated Marketing Communications (3:3:0) Prerequisites: MKTG 301; degree status. In-depth study and application of advertising and other forms of marketing communication with emphasis on role in marketing planning. Study includes identification of relevant data to analyze the marketing situation, development of product position, marketing and marketing communications objectives, creative strategy, media planning, and evaluation.  

332 Retailing and E-Commerce Management (3:3:0) Prerequisites: MKTG 301; degree status. Comprehensive view of retailing as it relates to total marketing process. Emphasizes retail decision alternatives used when formulating retail strategies, particularly the Internet.  

333 Business to Business Marketing (3:3:0) Prerequisite: MKTG 301; degree status. Examines unique challenges and opportunities of marketing systems among suppliers, manufacturers, resellers and government.  

351 Marketing Research Techniques and Applications (3:3:0) Prerequisites: DESC 210 and MKTG 301; degree status. Study of concepts, theories, and principles underlying the marketing research process. Focuses on development and evaluation of research designs for gathering marketing information.  

407 International Marketing (3:3:0) Prerequisites: MKTG 301; degree status. Multidisciplinary approach to international marketing from viewpoint of business management. Examination of major marketing issues affecting companies operating in a global environment. Students achieve understanding of the economic, political, and cultural differences among nations as they affect marketing opportunities and operations, and develop skills to identify and evaluate international marketing opportunities.  

451 Competitive Intelligence and Information Security (3:3:0) Prerequisites: MKTG 301, degree status. Develops understanding of benefits to commerce and society because of Internet-based commerce and escalating threats against Internet-based marketing initiatives of the firm, and preparation to protect knowledge-based assets of firms.  

471 Marketing Management (3:3:0) Prerequisites: senior standing, MKTG 301, 9 additional credits in 300-400 level marketing courses, degree status. Emphasizes managerial aspects of marketing, including developing marketing strategies and plans, and integrating specific elements of the marketing process. Case analysis emphasized.  

481 Marketing in the Nonprofit Sector (3:3:0) Prerequisites: MKTG 301; degree status. Discusses unique problems of marketing in nonprofit organizations, including government, and their solution through application of traditional and innovative techniques. Explains how to market commercial ventures owned by nonprofits.  

491 Special Topics in Marketing (3:3:0) Prerequisites: 9 credits of marketing; degree status. In-depth treatment within seminar format of contemporary topics in marketing. Culminates in the preparation of a substantial paper and oral presentation.  

499 Independent Study (1-3:0:0) Prerequisite: 90 credits with a minimum of 24 credits of business courses including principles of marketing, finance, and management. Primary research proposal in a marketing area required with prior approval from instructor and associate dean for undergraduate programs.  

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 how microeconomics concepts are 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.  

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 the 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 a 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. Use of statistical methods as analytical tools for understanding and solving business problems and supporting business decision making. Extensive use of both 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 needed to produce and deliver goods and services in modern organizations. Introduces a wide range of operations management decisions such as operations strategy, processes, facilities location, 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 development of relevant skills for working in groups and teams. Lectures, discussions, case analyses, and in-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 the global economy. Lectures, class discussions, cases, and projects.

678 Strategy and Organizational Leadership (3:3:0) Prerequisite: admission to MBA program. Capstone course focuses 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. Use of statistical methods as analytical tools for understanding and supporting business decision making. Extensive use of both applied business scenarios to illustrate concepts, and computer software for data analysis.

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 a series of complex case situations. Topics include capital projects as real options, cost of capital and capital structure, project valuation, firm valuation, and merger and acquisition analysis.

703 Financial Markets (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Explores relationship between financial markets ranging from global equity markets, to the market for U.S. Treasuries, to markets for numerous 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 the 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 analysis of equity securities and debt instruments given the implications of the 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 the process of new venture creation. Draws on a broad range of business disciplines including management, marketing, finance, and accounting to develop evaluation and execution skills.

712 Project and Cost Management (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Focuses on project scheduling, time-cost trade-offs, budgeting, cost control, and project monitoring. Special emphasis on cost-management aspects of projects in technology in intensive industries. Use of software and case studies.

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 a start-up company, and introduces processes and strategies required to become a significant player in an industry segment. Designed for students interested in understanding opportunities and problems in their own businesses; employment in small or entrepreneurial businesses; and exploring corporate entrepreneurship within large firms.

717 International Finance (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Advanced analysis of management of the firm’s international financial operations. Topics include currency risk,
political risk, returns and funding of international projects, international markets and accounting, and the cost of capital. Lecture, discussion, readings, and cases.

719 Entrepreneurship Laboratory (1:0:1) Prerequisite: completion of MBA core requirements, and permission of instructor. Permits MBA students to work with the 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 the use of database systems. Offers perspective on how managers can use market data to develop successful product or service strategies.

722 Consumer Behavior (3:3:0) Prerequisite: completion of MBA core requirements or permission of instructor. Examines behavioral science concepts to understand and predict marketplace behavior. Emphasizes applications of product and service strategies, with a focus 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 all sources of brand or company contacts as potential message channels in building a relationship with the customer. 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.

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, the 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 datacommunications and telecommunications technologies and their application in business, including LANs, WANs, PBXs, voice services, network operating systems, corporate internetworking, the Internet. Analyzes datacommunications industry, and business applications of datacommunications in manufacturing and service sectors, along with regulatory issues and impact of globalization.

734 Electronic Commerce (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.

735 Systems Thinking and Business Simulation (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.
for detailed course content, contact appropriate program directors.

702 The New Professional as a 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 the nature of organizational reality and the 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 the enormous potential for enhancing the way organizations can learn, notably through the development of Internet literacy, and skills in using differing Internet navigation tools. Focuses on applying technology to real-world problems in different professional worksites, and offers in-depth training in use and development of groupware applications. Customized for each track; for detailed course content, contact appropriate program directors.

704 Research Methodologies in the New Professionalism (3:3:0) Corequisite: EDUC 597. Concentrates on understanding and using research methodologies from such varied sources as Friere, McKeon, and Janowitz, with a practical team activity in which students study an 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) Prerequisites: candidates for the MNPS (organizational learning) degree only. Workshops, seminars, and reading groups involving at least 60 hours of contact time and culminating in a two-day retreat during which candidates for the MS in new professional studies (organizational learning) make presentations to class and faculty on research practice. Theme of this module is communication, collaboration, and interaction in organizations. After an 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 the 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 the ethical relationship between educators and children, ethical accountability and responsibility, the ethos of institutions, the professional’s role in sustaining ethical standards, and how each of these challenges guide our lives as citizens in a democracy.

702 The New Professional as a Reflective Practitioner (3:3:0) Examines the central problems of epistemology, what is meant by the notion of “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 the learning community. By learning and using technology (e-mail, electronic conferences, the Internet), teachers further develop their computer literacy and develop sharpened critiques regarding the possibilities and concerns brought about by the use of technology in learning environments.

704 Research Methodologies in the New Professionalism (3:3:0) Corequisite: EDUC 597. Introduces the qualitative approach to research as individual school-based projects are undertaken. Draws on “action research,” which starts with participants describing reality as they see it, reflecting on it, and deriving theories and action strategies that are 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 the instructor.

105 Precalculus Mathematics (3:3:0) Prerequisites: high school algebra I, algebra II, and geometry, and specified score on the Math Placement Test, or successful completion of self-paced algebra tutorial program offered by the Math Literacy Center. Call the Mathematical Sciences Department at 703-993-1460 for details. Review of mathematics skills essential to the study of calculus. Topics covered are equations, inequalities, absolute values, graphs, functions, exponential and logarithmic functions, and trigonometry. May not be used as credit toward the BA or BS in mathematical sciences or toward satisfying Area B of the university core requirements or the analytical reasoning requirement for the BA degree in CAS. May not be taken for credit after receiving a grade of C or better in any MATH course numbered 113 or higher.

106 Quantitative Reasoning (3:3:0) Prerequisite: specified score on the Math Placement Test or successful completion of self-paced Basic Math Program offered by the Math Literacy Center. Quantitative skills for the 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 the Math Placement Test or successful completion of self-paced algebra program offered by the Math Literacy Center. Call the Mathematical Sciences Department at 703-993-1460 for
109 Introduction to Mathematical Reasoning (3:3:0) Prerequisite: successful completion of self-paced Basic Math Program offered by the Math Literacy Center. 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 the Math Placement Test or successful completion of self-paced Basic Math Program offered by the Math Literacy Center. Elementary set theory, probability, and statistics.

111 Linear Mathematical Modeling (3:3:0) Prerequisite: specified score on the Math Placement Test or successful completion of self-paced basic math program offered by the Math Literacy Center. Matrix algebra, systems of linear equations, Markov chains, difference equations, and data fitting.

113 Analytic Geometry and Calculus I (4:4:1) Prerequisites: thorough understanding of high school algebra and trigonometry, and specified score on the Math Placement Test or a 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.

125 Discrete Mathematics I (3:3:0) Prerequisite: specified score on Math Placement Test or successful completion of the self-paced algebra program offered by the Math Literacy Center. Introduction to the 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, 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.

272 Mathematics for the Elementary School II (3:3:0) Continuation of MATH 271; MATH 271 is recommended before enrolling in MATH 272. Topics include rational and real numbers, introduction to algebra, geometry, statistics, and probability. Intended for school educators; does not count toward a major in mathematics.
352 Statistics (3:3:0) Prerequisite: MATH 351. Estimation, decision theory, testing hypotheses, 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.

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 216 or 214. Synthesis of pure mathematics and computational mathematics. Interplay between discrete and continuous mathematics is emphasized throughout. Mathematical structure is 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 a synthesis of pure mathematics and computational mathematics. Fourier analysis and its role in applied mathematics is developed (differential equations and approximations). Discrete aspects are 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. Emphasis on 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 216 or 214, 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 the 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 the 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 calculus (single and multivariable) is assumed in all math graduate courses. A double number separated by a comma (MATH 555, 556) indicates that both graduate courses normally constitute a sequence and that the first semester is prerequisite to the second. The prerequisite may be waived by permission of the department chair. See also STAT and OR courses.


554 Mathematics of Compound Interest (3:3:0) (Formerly MATH 360) 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: Mathematics of Compound Interest. Not appropriate for graduate science and engineering majors not considering actuarial or financial career.

555, 556 Actuarial Mathematics I, II (3:3:0) (Formerly MATH 460, 461) Prerequisites: MATH 554 and either MATH 351 or STAT 344. Two-semester sequence covering material for Society of Actuaries Exam: Actuarial Mathematics. Topics include survival distribution and life tables, life insurance, life annuities, net premiums, net premium reserves, multiple life 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 (3:2:2) Prerequisites: open to in-service teachers of mathematics at the middle or secondary level. Others may enroll with permission of instructor. A background in mathematics is desirable but not necessary. While some needed topics from college algebra will be reviewed in class, a thorough understanding of high school algebra and trigonometry is expected. Develops the 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 the modeling of these concepts. Graphing techniques will be supported by both the theory of calculus and graphing utilities such as the TI-83 calculator or if possible computer software such as Maple.
604 Geometry for Teachers (3:2:1) Prerequisites: 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 a discussion of non-Euclidean geometries. Emphasizes an informal and explorative approach to geometry and makes use of the geometry sketchpad. Other topics include geometric constructions and the role of proof in geometry.

605 Discrete/Finite Mathematics for Teachers (3:2:1) Prerequisites: open to in-service teachers of mathematics at the middle or secondary level. Others may enroll with permission of instructor. Background in mathematics desirable but not necessary. Thorough understanding of high school algebra is assumed. Discusses finite mathematics in juxtaposition to continuous ideas of calculus. Topics may consist of elementary counting and combinatorics including recurrence and difference equations and binomial identities as they occur in other topics. Emphasis on 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 their connection to geometry, and matrices treated as linear transformations and their connections to solutions of systems of equations.

606 Problem Solving in Mathematics (3:2:1) Prerequisites: open to in-service teachers of mathematics at the middle school level. Others may enroll with permission of instructor. Background in mathematics desirable but not necessary. Thorough understanding of high school algebra is assumed. Expands on customary operations on the integers and rationals to discuss systems that mimic these operations. Emphasis on 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 their connection to geometry, and matrices treated as linear transformations and their connections to solutions of systems of equations.

607 Algebraic Structure for Teachers (3:2:1) Prerequisites: open to in-service teachers of mathematics at the middle school level. Others may enroll with permission of instructor. Background in mathematics desirable but not necessary. Thorough understanding of high school algebra is assumed. Discusses finite mathematics in juxtaposition to continuous ideas of calculus. Topics may consist of elementary counting and combinatorics including recurrence and difference equations and binomial identities as they occur in other topics. Emphasis on 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 their connection to geometry, and matrices treated as linear transformations and their connections to solutions of systems of equations.

629 Topics in Algebra (3:3:0) Special topics in pure or applied algebra not covered in the 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, the metric space \( C(X) \) and uniform convergence, homotopy.

641 Combinatorics and Graph Theory (3:3:0) Prerequisite: MATH 321 or equivalent. Covers enumerative combinatorics, including partially ordered sets, Moebius inversion and generating functions, as well as major topics in graph theory such as graph coloring, Ramsey theory and matching.

644 Convex and Discrete Geometry (3:3:0) Prerequisite: 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.

652 Mathematical Statistics (3:3:0) Prerequisite: MATH 651. Sampling distributions, point and interval estimation (Cramer-Rao theorem), testing of hypotheses (Neyman-Pearson tests, uniformly most powerful tests, sequential tests), linear models, and distribution free methods.

653 Risk Theory (3:3:0) Prerequisite: MATH 351 or STAT 644 required. MATH 555 recommended but not required. Economics of insurance, individual risk models for short term, collective risk models for single period, collective risk models over an extended period, and applications of risk theory. Material included in this course corresponds to the Society of Actuaries Exam: Risk Theory.


655 Pension Valuation (3:3:0) Prerequisite: MATH 556, SOA exam P-360U or EA-1A, or permission of instructor. Basic mathematics used in pension actuarial work without regard to pension law. This is the material covered in the Society of Actuaries Exam P-360U (EA-1B).

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 an introduction to spectral analysis. Applications to the physical sciences, linear systems theory, and signal processing are used to motivate and integrate these topics.

673 Dynamical Systems (3:3:0) Prerequisites: elementary courses in linear algebra and differential equations. Contemporary topics in the field of nonlinear dynamical systems.
systems are illustrated in mathematical models from physics, ecology, and population dynamics. Traditional qualitative analysis of difference and differential equations provides the 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 MATH 351. Introduction to stochastic calculus and differential equations. Wiener process, Ito and Stratonovich integrals, Ito formula, martingales, diffusions, and applications. Simulations and numerical approximations of solutions.

675 Linear Analysis 1 (3:3:0) Prerequisite: MATH 315 (Advanced Calculus) or its equivalent. Metric spaces, normed linear spaces, completeness, compactness, continuous (bounded) linear transformations, Banach spaces, Hilbert spaces, and orthogonal series.


678 Partial Differential Equations (3:3:0) Prerequisite: elementary differential equations course. Physical examples, characteristics, boundary-value problems, integral transforms, and other topics, such as variational, perturbation, and asymptotic methods.

679 Topics in Analysis (3:3:0) Special topics in analysis not covered in the regular analysis sequence. May be repeated for credit.

680 Industrial Mathematics (3:3:0) Students take examples from industry and go through the complete solution process: formulation of a mathematical model of the problem; solution of the mathematical model (possibly by numerical approximation), interpretation and presentation of the results. The course emphasizes working in groups, relating mathematics to concrete situations, and communication and presentation skills.

682/OR 641 Linear Programming (3:3:0) Prerequisite: OR 541 or permission of instructor. An in-depth look at the simplex method. Computational enhancements—the revised simplex method; sparse-matrix techniques; bounded variables and generalized upper bounds; and large-scale decomposition methods—are also covered. Other topics include computational complexity of the simplex algorithm, and the Khachian and Karmarkar algorithms.

683 Modern Optimization Theory (3:3:0) Introduction to the basic mathematical ideas and methods for solving linear and nonlinear programming problems, with emphasis on the mathematical aspects of optimization theory. Along with reviewing the classical topics of linear programming, the course covers the recent developments in linear programming, including the interior point method, and 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 the solution of problems arising in science and engineering. Includes theoretical development as well as implementation, efficiency, and accuracy issues in using algorithms and interpreting the results. Specific topics include linear and nonlinear systems of equations, polynomial interpolation, numerical integration, and an introduction to numerical solution of differential equations.

686 Numerical Solutions of Differential Equations (3:3:0) Prerequisites: MATH 446 or 685 and an 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 an elementary differential equations course. Weak formulation of partial differential equations, energy principles, Galerkin approximations, and finite element methods. Review and development of the necessary analysis is included.

688 Topics in Actuarial Mathematics (3:3:0) Prerequisite: permission of instructor. Special topics in actuarial science not covered in the regular actuarial mathematics sequence. May be repeated for credit.

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 (1-3:0:0) 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 for maximum 9 credits.

721 Algebra II (3:3:0) Prerequisite: MATH 621. Rings, fields, Galois theory.

722 Algebraic Topology (3:3:0) Prerequisites: MATH 621 and MATH 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) Prerequisites: 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-Bonnet 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)
Prerequisites: 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 MATH 762, or an 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. Lebesque measure and integration. Theory of L/P spaces with p between one and infinity on the real line. Theory of linear operators on Banach spaces, including the Hahn-Banach Theorem, Open Mapping Theorem, Closed Graph Theorem and the Uniform Boundedness Principle.

795 Graduate Seminar (1:1:0)
Prerequisites: admission to PhD program in mathematical sciences. Mandatory for all PhD students. Weekly seminar graded on presentations and attendance. Faculty presentations on potential thesis topics and presentations by students.

799 Thesis (1:6:0:0)
Original or compulsory work evaluated by committee of three faculty members. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit)
Prerequisite: admission to PhD in education program to study in mathematical sciences. Program of studies designed by student’s discipline director and approved by student’s doctoral committee, which brings the student to participate in current research of discipline director and results in paper reporting the original contributions of student. Enrollment may be repeated.

998 PhD Thesis Proposal (1:1:0)
Prerequisite: passing grade on qualifying exam. Work on a research proposal that forms the basis for a 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.

401 Orientation to the Problems and Practices of the Clinical Laboratory (1-2:0:0)
Prerequisites: completion of requirements for BS with a major in medical technology except for the 30 credits of professional study; and admission to a school of medical technology approved by the National Accrediting Agency for Clinical Laboratories. 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)
Prerequisites: completion of requirements for BS with a major in medical technology except for the 30 credits of professional study; and admission to a school of medical technology approved by the National Accrediting Agency for Clinical Laboratories. Morphology of blood cells in health and disease; theories of hematopoesis 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)
Prerequisites: completion of requirements for BS with a major in medical technology except for the 30 credits of professional study; and admission to a school of medical technology approved by the National Accrediting Agency for Clinical Laboratories. 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)
Prerequisites: completion of requirements for BS with a major in medical technology except for the 30 credits of professional study; and admission to a school of medical technology approved by the National Accrediting Agency for Clinical Laboratories. Clinical lab procedures that involve antigen-antibody reactions and the theoretical bases of such procedures. Includes both diagnostic and blood bank techniques. Not offered on campus.

405 Clinical Microbiology (1-8:0:0)
Prerequisites: completion of requirements for BS with a major in medical technology except for the 30 credits of professional study; and admission to a school of medical technology approved by the National Accrediting Agency for Clinical Laboratories. 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) Prerequisites: completion of requirements for BS with a major in medical technology except for the 30 credits of professional study, and admission to a school of medical technology approved by the National Accrediting Agency for Clinical Laboratories. Chemical reactions and procedures used in clinical determinations on blood, urine, and cerebral spinal fluid. Includes manual and 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 officer/civilian; the organization, customs, and traditions of the US Army; time management; and physical well-being. Includes 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 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 a professor of military science. Covers leadership skills such as values and ethics; how to influence, how to communicate, and how when to make decisions, how to engage in creative problem solving, and how to plan and organize. Includes 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 laboratory in applied leadership, common military tasks, and physical fitness.

300 Applied Leadership I (1:2:2) Prerequisite: MLSC 100, 101, 200, and 20; credit or veteran status with a professor of military science approval. 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 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 laboratory in applied leadership, common military tasks, and physical fitness.

400 Leadership and Management (3:3:2) Prerequisites: MLSC 300 and 304. 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 laboratory in applied science, common military tasks, and physical fitness.

401 Leadership and Ethics (3:3:2) Prerequisite: MLSC 400 or MLSC 300/301. 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 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 a 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 the following areas: 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.

221 and 421 Undergraduate Private Music Instruction (1-3:0:.5-1) Prerequisite: for 1- and 2-credit levels, audition required (or portfolio of compositions for private composition); for 3-credit level, students must have 8 credits on the major instrument, and approval by appropriate concentration audition committee. To earn 1 credit per semester, students take 14 half-hour private music lessons; to earn 2 or 3 credits per semester, students take 14 one-hour private lessons. The following amount of practice (or composing) is expected each day: 1 credit, 50 minutes; 2 credits, one hour and 40 minutes; and 3 credits, two and one-half hours.

621 Graduate Private Music Instruction (2-3:0:1) Prerequisite: audition or portfolio of compositions for private
composition. To earn 2 or 3 credits per semester, students take 14 one-hour private music lessons. The 3-credit sequence is designed for students working toward the MM degree with a concentration in performance, composition, or conducting.

324. 424, and 724 Junior, Senior, and Graduate Recitals (1:0:0) Corequisite: concurrent enrollment in appropriate 3-credit private music instruction course. Public recital by student during junior or senior year, or during graduate study. Junior recital must be at least 25 minutes long; the 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 are by arrangement. Students must consult with the director of applied music studies to register and schedule dates.

323 Music Education Recital (0:0:0) Prerequisite: minimum of 8 credits in private music instruction in major instrument; corequisite: concurrent enrollment in the appropriate 2-credit private music instruction course. Recital on the 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) Can be taken by music majors as a free elective only. Introduction to art-music tradition of the 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) Can be taken by music majors as a free elective only. 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) Can be taken by music majors as a free elective only. Survey of various styles found in 20th-century music. Tonal, atonal, serial, and experimental music.

105 Music in the United States (3:3:0) Can be taken by music majors as a free elective only. 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) Can be taken by music majors as a free elective only, or as 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) Prerequisite: Students must read music. Pass fundamentals of music test administered during first week of classes. 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.

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 Undergraduate Private Music Instruction. See beginning of Music course section.

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 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, 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/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 MUSI 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 German and French.

**351 Keyboard Pedagogy (3:3:0)** Prerequisites: MUSI 114, 216, 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.

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 performing 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 music instruction: piano. Study and performance of original four-hand works for one and two pianos. Public performances.

383 Symphonic Band (1:0:3) Prerequisite: audition. Performance of works from band repertoire. Public concerts are given.

384 Symphonic Chorus (1:0:3) Prerequisite: audition. Performance of major works from the choral repertoire. Public concerts are given.

385 Chamber Singers (1:0:3) Prerequisite: audition. Discovery, interpretation, and performance of choral music for vocal chamber music ensemble from all historical periods. Emphasis on achieving a high level of artistic performance, and bringing to Mason and surrounding community musical compositions not readily accessible in regular concert repertoire.

387 Symphony Orchestra (1:0:3) Prerequisite: audition. Performance of works from symphony orchestra repertoire. Public concerts are given.

388 Fundamental Techniques of Stagecraft for Opera and Music Theater (2:2:1) Prerequisite: admission to music program or permission of instructor. Study of basic to intermediate stage movement techniques necessary to the performance of opera and music theater roles. Emphasis on acting, improvisation, theater production, musical theater, and operatic role study.

389 Jazz Ensemble (1:0:3) Prerequisite: audition. Provides practical experience in various aspects of jazz performance: section work within a large aggregation, combo work, and improvisation. Public concerts are given.

391 Conducting I (2:0:3) Prerequisites: MUSI 114, 216, and 273, or permission of instructor. Study of basic techniques of conducting a musical ensemble.

393 Music Administration and Management (2:2:0) Prerequisite: MUSI 116 or permission of instructor. Prepares students to address aspects of administration and management of music programs in public and private schools. Investigates principles and concepts of management styles and planning. Covers curriculum, budget, student recruitment and retention, external relations of the music unit, and legal issues for music educators.

395 Teaching Internship (1-4:0:0) Prerequisite: MUSI 251. Internship with a professional individual or organization in teaching. Introduction to teaching or augmentation of teaching skills. Students develop individual contracts defining the learning and competencies to be gained from the experience. Maximum of 9 internship credits (MUSI 395, 495, 496) can be applied toward a degree.

396 Conducting II (2:0:3) Prerequisite: MUSI 391 or permission of instructor. Advanced conducting course emphasizing techniques for instrumental and choral conducting. Refining gestures, full score analysis and interpretation, rehearsal techniques, and changing meters.

401 Impact of the Arts on Civilization (3:3:0) Prerequisite: 30 credits, or permission of instructor. Analyzes how genres of art impact us intellectually, emotionally, and subliminally. Broadens aesthetic and historical perspective, exposes students to major strands of contemporary thought, and develops discursive abilities through role-playing in roundtable discussions.

415 Music in Computer Technology (3:3:0) Prerequisite: MUSI 319 or permission of instructor. Overview of ways computer is used in music. Topics include principles of musical instrument digital interface (MIDI); various kinds of synthesis; acoustics and sound processing; and musical composition using the computer. Explores music resources of Internet and surveys current multimedia applications in music history, theory, ear training, improvisation, and notation.

419 Orchestration (3:3:0) Prerequisites: MUSI 114, 216, and 319; or permission of instructor. Principles of combining and balancing instruments in orchestral and chamber contexts. Attention to orchestral terminology and general notation as well as timbre, range, clefs, transposition, special effects, and scoring procedures.

421 Undergraduate Private Music Instruction See beginning of Music course section.

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.

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.

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.

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 public schools.

463 The Teaching of Vocal Music in the Secondary School (3:3:1) Prerequisites: MUSI 114, 216, 273, 391; 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.

465 Selected Topics in Music Education (1-3:1-3:0) Prerequisite: 90 credits in music degree program or permission of instructor. Topics of practical interest to prospective and practicing music educators covering pedagogy, performance, and logistics of teaching music in schools, private studios, and communities. May be repeated for credit.

466 Instrumental Music Methods II (3:3:1) Prerequisites: MUSI 114, 216, 273, 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, 391; 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) Prerequisites: 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 the BM performance concentration. Corequisite: concurrent enrollment in appropriate 3-credit private music instruction course and Music 424. Helps students 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 (3-6:0:0) 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.

511 Analytical Techniques (3:3:0) Prerequisite: baccalaureate in music or permission of instructor. Detailed formal and stylistic examination of music selected from the major style periods. Development of the analytical skills necessary for theoretical study at the graduate level.

512 Advanced Orchestration (3:3:0) Prerequisite: baccalaureate in music with a minimum of 3 credits in orchestration, or permission of instructor. Intensive study through analysis and arrangement of advanced instrumentation methods. Scoring for large forces. Twentieth-century vocal and instrumental techniques such as multophonics. Unusual instruments. New methods of notation. Late 20th century performance practices.

515 Music in Computer Technology (3:3:0) Prerequisite: baccalaureate degree in music or permission of instructor. Overview of 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.

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 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 1 (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 332 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 on an instrument or voice, and bachelor’s degree in music. Study of the relationship between musical vibrations and the natural rhythms of the body. Topics include history of music and healing, theory of sound, cymatics, toning, and performance practice as well as a survey of vibrational healing modalities and related therapies. Considers listening examples as they apply to healing with music. Students sing and play instruments in directed improvisatory performance.

561 Advanced Topics in Music Education (1-6:1-6:0) Prerequisite: baccalaureate degree in music or permission of instructor. Intensive examination of specific areas of concern to music educators engaged in teaching vocal, instrumental, and general music at all levels or as private studio teachers. Individual research, group discussions, and participation in related activities. May be repeated for credit.

562 The Psychology of Music Teaching and Learning (3:3:0) Prerequisite: baccalaureate degree in music or permission of instructor. 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.

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 pentatonic, 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 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.

580 Wind Symphony (1:0:3) Prerequisite: audition. Highly selective group of instrumentalists performing works from wind symphony repertoire. Public concerts given. May be taken four times for credit.

581 Graduate Choral Ensembles (1:0:3) Prerequisite: audition. Performance of works from choral repertoire. Public concerts given. May be taken four times for credit.

583 Symphonic Band (1:0:3) Prerequisite: audition. Performance of works from band repertoire. Public concerts given. May be taken four times for credit.

585 Chamber Ensembles (1:0:3) Prerequisite: audition. Performance of works from chamber music repertoire. Public performances given. May be taken four times for credit.

587 Symphony Orchestra (1:0:3) Prerequisite: audition. Performance of works from symphony orchestra repertoire. Public concerts given. May be taken four times for credit.

589 Jazz Ensemble (1:0:3) Prerequisite: audition. Provides practical experience in various aspects of jazz performance. Participation in section rehearsals, and small and large jazz groups. Jazz improvisation expected. Public concerts given. May be taken four times for credit.

592 Advanced Topics in Music (1-6:1-6:0) Prerequisite: baccalaureate degree in music, or permission of instructor. Intensive study of specific areas of concern to musicians engaged in performance, composition, and conducting. Individual research, group discussions, and participation in related activities. May be repeated for credit.

595 Teaching Internship (2:0:0) Prerequisite: MUSI 561 or permission of instructor. Teaching beginner, intermediate, and early advanced level students in private or group lessons under faculty supervision.

597 Advanced Topics in Conducting (3:0:0) Prerequisite: baccalaureate degree in music with minimum two semesters of study in conducting, or permission of instructor. Intensive study of advanced topic in conducting chosen according to interests of students and instructor. Topics may include choral music performance techniques and score preparation, wind ensemble performance techniques and score preparation, orchestral performance techniques and score preparation, performance practices in choral music before 1750, and rhythmic analysis as a guide to score interpretation in music of all periods. Maximum 6 credits.

612 Advanced Topics in Music Theory (3:3:0) Prerequisites: MUSI 511 or permission of instructor. Uses various music-analytical tools to examine music from a given time period or style. Students review the theoretical literature relevant to the given repertoire and make analyses of music in class and individually. May be repeated for credit as topics change.

621 Graduate Private Music Instruction. See beginning of Music course section.

662 Introduction to Research in Music (3:3:0) Prerequisites: 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.

684 Graduate Lecture-Recital (1-3:0:0) Prerequisite: baccalaureate degree in music, and permission of the department chair. Corequisite: graduate private music instruction at 3-credit level. Combination of musical performance and scholarly presentation on well-defined topic. Public presentation required. Preparation of program directed by member of full-time music faculty in consultation with student’s private music instructor. May be taken for maximum 6 credits.

688 Advanced Opera and Musical Theater Ensemble (3:2:2-6) Prerequisite: audition. Solo-vocal, performance-oriented ensemble class focusing on presentation of operatic works or excerpts from them, from Baroque to 21st century as well as works or excerpts from American musical theater. Offers advanced performance training and experience to graduate-level students in vocal performance. Experiential course focusing on practical application, synthesis, and study of all aspects of the vocal art development. Lectures, master classes, and assignments in goal-oriented practicum sessions and rehearsals. Public performances given.

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.
724 Graduate Recital (1:0:0) Prerequisite: at least 3 credits in graduate private music instruction in area of concentration at 3-credit level. Corequisite: enrollment in graduate private music instruction in concentration at 3-credit level. Public performance in area of concentration.

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 the 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 participation in research, performance, or creative activity of discipline director and results in a paper reporting original contributions. Enrollment may be repeated.

Nanotechnology (NANO)

School of Computational Sciences

500 Introduction to Nanomaterials and Interactions (3:3:0) Prerequisite: Admission to graduate certificate in nanotechnology and nanoscience. Introduction to nanotechnology. Discussion of the Feynman challenge and its relation to modern science. Applications to nanostuctures of charges, currents, diamagnetism, paramagnetism and ferromagnetism.

510 Strategies for Nanocharacterization (3:3:0) Prerequisites: NANO 500 and admission to graduate certificate in nanotechnology and nanoscience. Introduces various nanocharacterization techniques, with a discussion of which techniques are most useful in various applications. Includes gates and bridges; chemical thermodynamics; kinetics; and solid-state reactions.

520 Survey of Nanostructures (3:3:0) Prerequisites: NANO 500 and 510, and admission to graduate certificate in nanotechnology and nanoscience. Discusses nanomechanical oscillators and nanoresonators; nanofibers; conducting polymer nanowires. Nanomechanical beams for reacting ion etching. Electron-beam lithography and photolithography.

530 Nanofabrication (3:3:0) Prerequisites: NANO 500 and 510, and admission to graduate certificate in nanotechnology and nanoscience. Covers pulsed laser deposition; molecular beam epitaxy; controlled vapor deposition; reactive sputtering; and doping and implant isolation.

610 Nanoelectronics (3:3:0) Prerequisites: NANO 500, 510, 520, and 530, and admission to graduate certificate in nanotechnology and nanoscience. 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 devices physics and modeling.

620 Computational Modeling in Nanoscience (3:3:0) Prerequisites: NANO 500, 510, and 520, and admission to graduate certificate in nanotechnology and nanoscience. 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.

Neurosciences (NEUR)

School of Computational Sciences

College of Arts and Sciences

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 (3:3:0) Examination of ethical issues in scientific research. Reflects on purpose of scientific research and review of 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 the computer community, and research fraud. May present currently accepted guidelines for behavior in data ownership, manuscript preparation, and conduct of persons in authority.

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 or seminar 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.

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.

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 CSI 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) Prerequisites: 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 neuro-dynamical 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.

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 candidacy in the 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.
methods, and writing. Credit distribution: art (1), literature (3), and social sciences (4).

Learning Communities

Learning Communities: Special Topics (3-15:3-15:0)
Division II is composed of a variety of learning communities; each combining subjects usually taught in separate courses into a single course of study. Offering the equivalent of between 3 and 15 credits of undergraduate work, replaces the often fragmented classroom experience and integrates material from several perspectives. Credit is assigned for each learning community at the time it is offered.

200 Visual Thinking and the Creative Impulse (3-15:3-15:0)
Studies the creative process in the arts and sciences through demonstration and the analysis of the psychology and the arts. Visual perception, memory, classical and modern art, and performance are explored as examples. Students are presented with the opportunity to assess themselves as creative thinkers.

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 Developing 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. By looking at public speech, advertising, and television, student learns to critique persuasive messages.

204 Creative Leadership Development (4:3:1)
Examines leadership phenomenon within each person and strategies for learning, interpreting, creating, and developing leadership that is reflective and active.

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, chemical, 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 greater or with 6 or more AP credits. Considers dynamic relationship of author or artist with cultural and intellectual climate of the 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 Traditions and Modernity (3-15:3-15:0) Examines five decades from 1880 to 1930 by studying a whole series of movements as Americans struggle to balance the often contradictory tug of tradition and modernity in their lives. Examines the social movements that emerged by teaching students to read the representative textbooks, films, music, correspondence, and trial records of these movements. Students are encouraged to think about the ways in which individuals during this period learned to think of themselves as participants in overlapping and sometimes competing groups, as turn of the century Americans tried to create new identities, even when the participants believed they were reviving old ones.

302 Epic Creations (3-15:3-15:0) Integrates western European, Native American, and colonial American experiences by examining past through literature, art, and history. Traces the paths of ancient and contemporary guides by reading, writing, discussing, surfing the web, watching videos, and taking field trips as we create our own modern epics. Three credits are experiential learning on campus.

303 Modernization and Its Discontents: Conflict/Community in Modern Russia and America (3-15:3-15:0) Compares regional studies, which consider the problem of modernization and its effects on the individual from the political, social, and cultural perspectives, using the prism of literature to achieve this aim. Examines the works of fiction, both from the realm of officially recognized literature and the popular culture.

304 Social Movements and Community Activism (4:3:1) Explores community activism by looking at social movement case studies and engaging in direct social action. Students learn about grassroots movements, the rhetorical strategies used to attract group members, and how movements evolve into viable organizations and institutions. Includes 1 credit of experiential learning.

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. Includes the study of “enviro-nomics,” introductions to urban systems and planning, and studio work to actually create models of alternative growth.

307 Narratives of Nature (6:3:3) Course begins with the individual’s connection to the infinite, the cosmos, and ends in a microscopic examination of the behavior of the human animal. Looks at the fundamental questions relating to scientific thinking and writing.

308 American Landscapes in Fiction, Film, and History (6:4:2) Satisfies the requirements for English 502 and a university general education synthesis course. Waterways and roadways have always had both practical and spiritual significance for Americans. Course looks at American literary works and films in historical context to better understand the roles roads and rivers play in shaping physical and cultural landscape of United States. Students explore course themes outside the classroom as well, studying the histories of the Potomac and Anacostia rivers on weekend field trips, and conducting a self-directed road trip as one of their main learning events.

310 Violence and Gender (3-15:3-15:0) Using nonfiction, research documentaries, oral histories, case studies, literature, feature films, music, dance, and visual arts, examines the dynamics of violence through different cultural lenses. Students work in university and community settings to integrate their academic experiences with practice.

311 The Mysteries of Migration: Consequences for Conservation (3-15:3-15:0) Investigates the biology of migration and its implications for science policy. Students consider the phenomenon of migration in the context of natural history, conservation, and cultural issues. The course includes several weekend trips for field study.

312 Images and Experiences of Childhood: Social Construct, Literature and Film (3-15:3-15:0) Immerses students in the images of childhood through the media of literature, video, and poetry, with a strong emphasis on historical perspectives of childhood. The class is interactive, requires some work in groups, and requires classroom participation.

313 Strangers in a Strange Land: Immigration in 20th Century America (3-15:3-15:0) Examines the immigration experience as a historical reality and as a cultural image within the context of 20th-century America. Using Russian immigration as a microcosm, the course studies the impact of various waves of Russian refugees on American political, economic, and cultural life. Three separate emigrations are considered: the Jewish emigration of the early 20th century, the white Russian emigration of the 1920s–1950s, and the post-Jackson exodus of the 1970s–1980s.

315 Spirituality and Conflict Transformation (6:6:0) Examines dimensions of spirituality, including peace-seeking 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) Prerequisites: 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.

319 An Endangered Earth (3-15:3-15:0) Introduces issues and problems raised by science in the public policy process, especially the inherent tension between the tenets of a democratic society and scientific community. Using
environmental policy problems, course is structured to prepare students to ask intelligent and useful questions about the science and politics of particular public policy issues, understand where they might go to find information for developing options, and develop criteria by which they can evaluate these ideas.

320 Construction of Differences; Race, Class, and Gender (3-15:3-15:0) Investigates race, sex, sexual orientation, and social class in contemporary American society. Examines commonalities in the construction of these categories and experiences of those who occupy them.

321 Vision Quest: Modeling the Natural World Using Art, Computer Programs, and Science (3-15:3-15:0) Imparts concepts of science in a visual, auditory, and kinesthetic 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 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: students must have maintained an 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) Combination of lecture and electronic classroom experience, students develop skills to conduct research essential to the nonprofit profession manager of the future. Students explore types and numbers of nonprofit organizations, their finances, services, as well as the importance of this information in strategic planning, marketing, fund raising, and general management decisions. Also taught online.

333 The Nature of Mathematics (3:3:0) Prerequisites: performance on the Math Placement Exam equivalent to the requirements for entrance to math; or successful completion of the algebra program within the mathematics learning center; or mathematics course that fulfills the university’s general education requirement in quantitative reasoning and permission of instructor. May be taken even after credit for Math 106 (or its 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.

348 Information in the Digital Age (6:3:3) Prerequisites: 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 storyteller, a producer, or as a hands-on creator of multimedia presentations and narratives. Students practice creative and project-focused writing. Scripting interactively 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 Internet Literacy 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. Students 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.

361 Neighborhood, Community, and Identity (3-15:3-15:0) Examines processes of neighborhood formation and transformation in the context of urbanism, suburbanism, immigration, and transmigration. Students explore the history and meaning of neighborhoods in the Northern Virginia and the Washington, D.C., metropolitan area.

370 The Romantic Road: Literature and the Arts in 19th-Century Germany (3-15:3-15:0) Examines romantic themes and genres, including fairy tales, myths, nature, love, and exoticism in their historical context through the study of original musical compositions, art works, and literature. Required museum visits, concerts, and other cultural events supplement class sessions.

375 Special Topics (3-15:3-15:0) Studies topics of special interest to undergraduates. May be repeated for credit if subject 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) Prerequisites: 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.

380 Alternative Therapies in Health and Illness: New Age Meets Hippocrates (6:6:0) Students explore philosophical underpinnings and bio/psycho/social/spiritual rationale for use of alternative therapies in health and illness. The reflection of health care practices in literature is integrated into the course. A variety of alternative health therapies are explored, with opportunities for experiential learning with an alternative health care practitioner.

381 When Cultural Worlds Collide (3-15:3-15:0) Explores what happens when "civilization" encounters "the jungle" by reading, writing, discussing, and viewing written and filmed works dealing with contacts between cultures with colliding world views. Literature (from Conrad’s The Heart of Darkness to Shakespeare’s The Tempest to Burrough’s Tarzan), news articles, radio broadcasts, web home pages, art exhibits, and many film and video presentations provide the basis for in-and out-of-class activities.

391 Introduction to Integrative Studies (3:3:0) Prerequisite: students may not enroll in this course after completing 12 or more learning community credits, or simultaneously with or after completing NCLC 491, Senior capstone. 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 Skills for the Workplace (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 the 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. Combines theory, practice and experience across several disciplines within its teachings. The study of philanthropy includes the review of history, public policy, economics, human behavior, communication, and financial management. Students develop skills needed to generate philanthropy and leverage such with other sources of income. Through a combination of reading, lecture, discussion, and experience, students learn how to generate resources for public good.

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 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 strategies 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. 85 credits required. Graduation requirement for integrative studies students. Students complete final NCC portfolio and senior exposition. Provides information on issues of professional development (internship skills, resume development, career strategies, alumni opportunities).

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 readings, tutorials, lectures, papers, presentations, or field/laboratory study (determined in consultation with the 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 of 12 credits of experiential learning (including internships) are required for the BA/BS in integrative studies with a maximum of 24 credits used 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 se-
Nursing (NURS)
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305 Application of Basic Nursing Technologies (1:0:2)
Prerequisite: acceptance into accelerated second degree pathway. To be taken full semester of accelerated second degree program. Introduces basic nursing technologies, and provides opportunities to apply these skills in simulated technology lab.

309 Introduction to Basic Nursing Care (3:3:0) Corequisite: N310. Enrollment restricted to second-degree students only. Introduces basic fundamentals of nursing care across the life span. Emphasis on nursing process, critical thinking, and foundational technologies and skills required to practice in the healthcare setting.

310 Application of Basic Nursing Care (4:0:12) Prerequisite: acceptance into accelerated second degree program. Application of basic nursing care in acute care settings utilizing the nursing process.

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 healthcare. 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 (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 healthcare 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 426; corequisites: NURS 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. s

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 425, 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 and 310. 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 435; corequisite: NURS 326. 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 (4:4:0) 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 (4:9:12) 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/HSCI 332 Concepts of Health Promotion and Disease Prevention Throughout the Life Span (3:3:0) Introduces concepts of epidemiology, health promotion, disease prevention, and their 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 teaching, learning, and critical thinking as they apply to the health professional. Includes agency, campus labs.

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.

335 Mental Health and Maternal/Newborn Nursing (3:3:0) Focuses on the nursing care, pathophysiological and psychological, social-cultural, and risk reduction implications of health problems in mental health and obstetrics.

337 Applied Nursing Fundamentals and Health Assessment (1:0:2) Prerequisites: junior standing; corequisites: NURS 330 and 331. Opportunity to practice health assessment and fundamental nursing technologies while using communication skills with culturally diverse and vulnerable populations in a variety of settings.

340 Nursing Care of Clients with Pathological Conditions I (4:4:0) Prerequisite: successful completion of NURS 330, 331, 332, or 333; or permission of associate dean. Introduces changing health needs of culturally diverse and vulnerable populations throughout the life span. Focuses on nursing care, pathophysiological, psychological, sociocultural, and risk-reduction implications of frequently experienced health problems.
341 Applied Health Promotion and Disease Prevention to Individuals and Families (4:0:12) Prerequisites: successful completion of NURS 330, 331, 332, and 333; corequisites: NURS 342, NURS 344. Opportunity to provide collaborative nursing care to culturally diverse and vulnerable populations experiencing frequently occurring physiological, psychological, and social health problems in a variety of settings throughout the life span.

342 Case Studies in Health Promotion and Disease Prevention (1:1:0) Prerequisites: successful completion of NURS 330, 331, 332, and 333; corequisite: NURS 341. Meets every other week for two hours. Opportunity to integrate nursing care with healthcare needs of culturally diverse and vulnerable populations throughout the life span.

343/HSCI 343 Pharmacology (3:3:0) Opportunity to study the principles of pharmacokinetics, the pharmacodynamics of selected drug classifications, and nursing responsibilities related to drug administration to individuals throughout the life span.

344 Intermediate Nursing Technologies (1:0:2) Prerequisites: successful completion of NURS 330, 331, 332, and 333; corequisite: NURS 341. 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.

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.

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, 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 clinic 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.

380/NCLC 410 Contemporary Health (6:6:0) Course must be taken as NURS 380 (3 credits) and BIOL 226 (3 credits) or WMST 300 (3 credits). Looks at a variety of health and healthcare issues. Explores the biology and medical implications of diseases, and examines who is making decisions on allocation of research funds and prevention of diseases.

400 Clinical Nursing Elective (3:0:9) Prerequisite: NURS 301, 302, 314, 315, 324, 325, or equivalent. 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.

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 child-bearing women, infants, children, and adolescents experiencing acute healthcare problems.

423/HSCI 423 Nutrition and Chronic Illness (3:3:0) Examines nutrient needs related to specific chronic illnesses, including cardiovascular disease, cancer, obesity, and diabetes. Focuses on principles of nutritional therapy and prevention.

425 Comprehensive Health Assessment (3:2:2) Prerequisite: 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.

427 Advanced Technologies for the Accelerated Pathway (1:1:2) Prerequisites: NURS 310, 320, 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, 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, 436. Opportunity to deliver collaborative nursing care to culturally diverse and vulnerable populations. Concentrated clinical experiences available in selected institutional settings.

436/HSCI 436 Leadership and Management of Healthcare (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.

440/HSCI 440 Community Health and Epidemiology (3:3:0) Prerequisite: completion of junior year. Addresses population-focused healthcare. Emphasis is on primary, secondary, and tertiary prevention of health problems.
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, 453. Opportunity to provide complex, collaborative nursing care to culturally diverse and vulnerable populations. Concentrated clinicals available in selected institutional settings.

453/HSCI 453 Research in Nursing and Health Science (3:3:0) Prerequisite: Introductory research course. An introductory research course designed to present basic concepts and methods of research. The research process is examined as a foundation for scholarly work. Emphasis is on the critique and use of current nursing research. The course is designed to present basic concepts and methods of research. Emphasis on critique and use of current nursing research. The research process is examined as a foundation for scholarly work and health science research in clinical practice.


465/HSCI 465 Examination and Integration of Professional and Healthcare Issues (3:3:0) Additional corequisite for nursing majors: satisfactory completion of NCLEX review test and study plan for LPN, RN, additional, and second-degree pathways; and ENG 302. Course meets the Mason requirement as a synthesis course. Capstone seminar synthesizes the varied dimensions of health professional’s role in a global society. Opportunity to examine issues in healthcare through reflection on natural and behavioral sciences, humanities, and other prerequisites. 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 is expected in formal and informal writings. Student writings and presentations receive written self-evaluation and formal review by peers and multiple faculty members involved in teaching the course. Writing-intensive.

475 Grand Rounds Complex Case Presentations (3:3:0) Enrollment restricted to second degree students only. Prerequisites: NURS 254, 262, 318, 319, 320, 419, 426, 430, 450, and 455. Examines nursing implications of selected major health problems that significantly affect individuals throughout the life span. Focus is on complex health problems. Class meets once a week in the format of group presentations in the clinical setting.

480/HSCI 480 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 in the aging. Nutrition, the nature of health problems, and methods of assessing physical and psychological needs are examined.

481/NCLC 380/BIOL 226 Alternative Therapies in Health and Illness: New Age Meets Hippocrates (6:5:1) Explores philosophical underpinnings and rationale for the use of alternative therapies in health and illness in various cultures. A variety of alternative health therapies are explored, with opportunities for experiential and service learning with an alternative healthcare practitioner.

487 Principles, Concepts and Techniques of Operating Room Nursing (3:3:0) Prerequisites: RN licensure, one year clinical experience, and letter of acceptance into a 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.

495 Directed Reading in Nursing (1-2:0:0) Prerequisite: permission of college. Examines literature on specialized topic in nursing practice, education, or scholarship. Readings conducted in consultation with faculty. May be repeated for a maximum of 4 credits.

496/HSCI 496 Violence in 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/HSCI 402/HSCI 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/HSCI 508 Psychopharmacology (3:3:0) Surveys therapeutic effects and side effect profiles of psychopharmacological drugs including psychotropic and recreational drugs. Emphasizes understanding mechanisms of actions, drug interactions, and subject variables influencing drug effects.
509 Introduction to Emergency Nursing (3:3:0) Introduces emergency care nursing, focusing on relevant pathophysiological disease processes, diagnostics, medical therapeutics and relevant technology as applied to emergency nursing. Focuses on care of multicultural clients across the life span, as well as the patient-family unit of care. Addresses collaboration and triage, as well as legal, ethical, and psychosocial issues. Course based on core curriculum of the Emergency Nursing Association (ENA).

513 Advanced Pharmacology in Nursing (3:3:0) Does not meet requirements for nurse practitioner majors, but may be taken as an elective. Provides knowledge of physiologic responses and pharmacokinetic principles of pharmacologic agents that will undergird the student’s learning of advanced pharmacologic concepts. Topics include advanced pharmacokinetic principles, pharmacotherapeutics of single and multiple drug regimens, client education needs, special population needs, and legal requirements for prescriptive authority.

514 Application of Advanced Health Assessment Methods 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.

520/HSCI 520 Rehabilitation Theory and Practice (3:3:0) Explores rehabilitation theory and research and their application to the practice of today’s healthcare professional and care of specific client populations. Rehabilitation theory evaluated as a new paradigm for healthcare delivery.

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.

534/HSCI 530 Nutrition: A Global Perspective (3:3:0) Directed at students from a variety of disciplines. Examines malnutrition is and how it occurs by looking at several situations from around the world. Explores impact of how nutrition can affect a society and community, and examines the benefits of a well-nourished population.

542/HSCI 542 Health Policy (3:2:1) Explores issues surrounding the development of public health policy and the influence of policy of healthcare delivery, nursing, and other health professions. Classroom and field experience.

543/HSCI 543 Global Health: Trends and Policies (3:3:0) General survey course covers today’s health challenges; their various social, economic, and epidemiological causes; the role and likely success of information and technology transfer, primary preventive healthcare, social awareness, and intervention in alleviating the problems. Lecture and discussion.

544/HSCI 544 The Washington Internship in Health Policy (1:0:2) Prerequisite: annual Health Policy Institute. Undergraduate requires permission of instructor. One-week (40 hours) exposure to an organization with a public policy agenda in health. Placements may be in a Capitol Hill office, federal health agency, national association, or other policy organization. Interns engage in a variety of field experiences related to the legislative process, including network development of policy-interested contacts and skill development to expand a student’s ability to impact the health policymaking process.

546/HSCI 546 Leadership Strategies in Health Policy (3:3:0) Examines leadership process from a policy, personal, and organizational perspective to expand ability to impact the health policy-making process.

547 Pharmacology (4:4:0) 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.

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 healthcare 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 (5:4:1) Prerequisites: NURS 554 and 557. Corequisite: NURS 561. Admission to NP program or permission of instructor. 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 (1:0:3) Prerequisites: NURS 547. Admission to the 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/HSCI 557 Introduction to Clinical Genetics in Healthcare (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 healthcare practice in terms of ethical and legal issues, including genetic testing and counseling.

561 Clinical Decision Making (2:2:0) 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 healthcare and nursing are explored.

571/HSCI 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 healthcare professionals.

577/HSCI 577 Comparative Healthcare Systems in the World (3:3:0) Comprehensive review of selected national healthcare systems within the World Health Organization’s designated regions. Healthcare systems are analyzed, compared, and contrasted. Issues are discussed in relationship to national governments and global health.

578/HSCI 578 Cultural Competence and Diversity in Healthcare (3:3:0) Examines cultural competence and diversity in healthcare, 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) Prerequisite: junior nursing courses. Corequisite: NURS 451, NURS 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.

583/HSCI 583 Food and Culture: Biocultural Perspectives on Food and Nutrition (3:3:0) Examines food and eating behaviors, diet, and nutrition from crosscultural perspective. Focuses on how and why people choose what to eat, the range and significance of crosscultural variability in diet, how diets have changed, and health and social implications of those changes. Lecture, discussion, guest lecturers, video presentations, audiovisual aids, student presentations, case study analyses.

585/HSCI 550 Entrepreneurship in Healthcare (3:3:0) Overview of models of entrepreneurship in healthcare. Provides opportunities for collaborative problem solving to support business development, entrepreneurial behavior, and leadership. Explores innovative approaches to and alternatives for nursing practice and healthcare delivery.

586 Parish Nursing I (3:3:0) Prerequisite: 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) Prerequisite: 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.

588/HSCI 586 Process Improvement for Health Services (3:3:0) Examines how improved work processes lead to quality improvement. Explores operations research and quality management to improve delivery and production of health services and business processes from the perspective of healthcare managers.

594 Special Topics in Nursing (3:3:0) Presents selected topics analyzing specialized areas in nursing. Content varies. Lecture, seminar, laboratory, workshop.

597/HSCI 597 Approaches to Quantitative Data Analysis in Healthcare Research (3:3:0) Examines univariate and bivariate statistical procedures for analyzing quantitative healthcare research data. Emphasis on selecting, applying, and interpreting data analysis procedures.

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 cultural dimensions of developmental cycle and healthcare 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 (3:2:1) Prerequisite or corequisite: NURS 755. Theoretical and clinical application of community oriented primary care concepts. Focuses on health promotion and disease prevention to facilitate transition into the advanced practice nurse roles. Students work with interdisciplinary groups to improve health indicators for populations. Students assess and analyze health policy, cultural factors, community development, and empowerment for populations. Required course for NP and RN to MSN majors, and RNs with degree in another field.
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.

640/HSCI 640 Dimensions of Communication in a Technologically Enhanced Health System (3:3:0)
Examines effects of technological innovation on the communication and interdisciplinary collaboration of stakeholders in healthcare systems of the new millennium.

645 Gerontological Nursing 1 (3:3:0)
Prerequisites: NURS 660, 755, 794. Provides content related to nursing care of older adults with emphasis on advanced practice and issues relevant to improved healthcare 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 healthcare 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 the 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.

658 Practicum and Seminar in Nursing Education (3:6:2:7)
Prerequisites: 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 Healthcare (3:3:0)
Examines moral dilemmas in the healthcare profession, with special emphasis on patients’ rights, professionals’ obligations to other professionals, and issues of social justice in healthcare. Methods of moral deliberation based on ethical knowledge and justification are applied to ethical dilemmas in healthcare.

662 Oncology Nursing: Clinical Concepts in Advanced Practice (3:3:0)
Focuses on advanced nursing practice for persons diagnosed with cancer and their families. Emphasizes physical symptoms, functional capacities, psychosocial disruptions, and knowledge deficits. Lecture.

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)
Prerequisites: 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 Healthcare Delivery Systems (3:3:0)
Prerequisite: admission to graduate nursing program. Provides foundational overview of U.S. nursing and healthcare delivery systems. Surveys key concepts, frameworks, processes, and structures related to healthcare 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 healthcare concerns through clinical decision-making skills focused on childrearing and childbearing families. Seminar, lab, clinical practicum.

722 Practicum in Family Primary Care Nursing II (8:3:5)
Prerequisite: NURS 721. Students perform advanced clinical decision making in the role of family nurse practitioner. Family primary care problems throughout the life span are assessed and managed, particularly families with elderly and medically underserved members. Seminar, lab, clinical practicum.

746 Practicum in Primary Care Nursing (6:2:12)
Prerequisite: NURS 547, 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.
750/HSCI 750 Legal Issues Relevant to Healthcare Administration (3:3:0) Provides general understanding of the U.S. legal system and sources of law, with particular emphasis on laws that govern or are applicable to the healthcare industry and general administration. Students examine the changing healthcare models and delivery system, and laws affecting such systems.

751 Primary Care of the Developing Family (5:5:0) Prerequisites: national certification as an adult nurse practitioner, and graduate-level advanced health assessment, pathophysiology, and pharmacology. Taught through George Washington University Distance Learning. Post-matriculation and instructional and informative family care 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 (4:4:0) 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; 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 (1-1:1-4:3:12) Prerequisite: acceptance into nurse practitioner track. By permission of instructor only. 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 the 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) Prerequisite: 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 healthcare systems.


780 Practicum in Gerontological Nursing I (3:0:3) Prerequisite: 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-acute care (practicum of at least 100 clinical hours and case analysis conferences).
Courses

799/HSCI 799 Advanced Quantitative Analysis for Healthcare 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 multway frequency analysis. Students apply mathematical calculations and interpret SPSS outputs using healthcare research data.

800/HSCI 800 Advanced Quantitative Data Analysis for Healthcare 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 healthcare research.

801/HSCI 801 Advanced Multivariate Statistics and Data Analysis in Healthcare Research (3:3:0) Prerequisites: 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/HSCI 802 Measurement Theories and Applications in Healthcare 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 healthcare 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 healthcare research.

866 Public Health 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 Healthcare Administration I (3:3:0) Prerequisites: organization behavior course (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 healthcare systems.

871 Nursing and Healthcare 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 Healthcare Administration/Policy/ Education (4:1:3) Prerequisite: at the end of course work and before NURS 994; 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 a leader in the field of nursing, healthcare administration, policy, or education. Participatory activities require integration and application of principles, frameworks, and science related to the 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/HSCI 920 Qualitative Research in Nursing and Healthcare (3:3:0) Corequisites or prerequisites: NURS 930/HSCI 930; familiarity with e-mail and computers. Philosophical foundations and approaches to qualitative research in nursing and healthcare administration, healthcare policy, and healthcare ethics analyzed within scholarship of discovery, integration, application, and teaching. Computer analysis required. Lecture, discussion.

925/HSCI 925 Methodological Issues in Nursing and Healthcare Qualitative Research (3:3:0) Prerequisite: 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/HSCI 930 Quantitative Methods in Nursing and Healthcare (3:3:0) Prerequisite: NURS 930/HSCI 930, and a multivariate statistics course (HSCI 800 or equivalent) Examines advanced principles and special problems in quantitative research methodology. Emphasizes measurement as it relates to nursing and healthcare administration, healthcare ethics, and health policy research. Computer analysis required.

955/HSCI 960 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.

994 Nursing Research Seminar (3:3:0) Prerequisite: completion of all course work except NURS 999. Must be taken before NUR 998. Seminar for doctoral students to accompany the development of research proposal. Development of the research problem with analysis and critique of methodology is discussed.

998 Doctoral Dissertation Proposal (1-6:0:0) Prerequisite: completion of all course work except NURS 999. Provides faculty assistance on an individual basis to complete research proposal planned in NURS 999. Final research proposal forms basis for the doctoral dissertation. May be repeated up to four times.

999 Doctoral Dissertation (12:0:0) Prerequisite: NURS 994. Provides continued faculty assistance on an individual basis toward completion of approved dissertation.

George Washington University Courses:

PHARM 207 Pharmacology (4:4:0) Discusses drugs and their actions: principles of pharmacology and drugs, including their therapeutic and toxic action, and their fate in the body. Admission is by permission of instructor.

552/NURS 552 Advanced Physiology and Pathophysiology (5:4:1) 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, practicum.

HCS 206 Clinical Decision Making (2:2:0) Corequisite: NURS 552. Analyzes varied cases using student participation in decision-making formulation. Students learn to correlate pathophysiology with symptom manifestation. Emphasizes interpreting historical and physical examination data, laboratory data, and radiographic studies relevant to health problems. Discusses appropriate pharmacologic, nonpharmacologic therapies in conjunction with the theoretical basis for selecting specific therapies.

Operations Research (OR)

Systems Engineering and Operations Research

335/SYST 335 Discrete Systems Simulation Modeling (3:3:0) Corequisites: 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.

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.

442/MATH 442 Stochastic Operations Research (3:3:0) Prerequisite: STAT 344 or MATH 351, or equivalent. Survey of probabilistic methods for solving decision problems under uncertainty, probability theory, queuing theory, inventory systems, Markov chain models, and simulation. Emphasis on modeling and problem solving. Students who have taken OR 442/MATH 442 will not receive credit.

542 Operations Research: Stochastic Models (3:3:0) Prerequisite: 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.

535 Discrete System Simulation (3:3:0) Prerequisite: OR 542 or STAT 354 or 344, or equivalent, and knowledge of a 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) Prerequisite: 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, homotopy and tunneling; the traveling salesman problem, the Steiner problem, Stackelberg-Cournot-Nash mathematical games and other classical nonconvex optimization problems.

641 Linear Programming (3:3:0) Prerequisite: OR 541 or permission of instructor. In-depth look at the theory and methodology of linear programming: Computational enhancements of the revised simplex method; sparse-matrix techniques, bounded variables and the dual simplex method. Alternative interior point methods described and computational complexity of various algorithms analyzed.

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;
643 Network Modeling (3:3:0) Prerequisites: 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. 

644 Nonlinear Programming (3:3:0) Prerequisites: MATH 213 or equivalent and OR 541 or permission of instructor. Nonlinear optimization theory and techniques applicable to problems in engineering, economics, operations research, and management science. Covers convex sets and functions, optimality criteria and duality; algorithms for unconstrained minimization, including descent methods, conjugate directions, Newton-type and quasi-Newton methods; and algorithms for constrained optimization, including active set methods and penalty and barrier methods.

645/STAT 645 Stochastic Processes (3:3:0) Prerequisite: OR 542, STAT 544, or permission of instructor. Selected applied probability models including Poisson processes, discrete- and continuous-time Markov chains, renewal and regenerative processes, semi-Markov processes, queuing and inventory systems, reliability theory, and stochastic networks. Emphasis on applications in practice as well as analytical models.

647 Queuing Theory (3:3:0) Prerequisite: OR 542, STAT 544, or permission of instructor. Unified approach to queuing, organized by type of model. Single- and multiple-channel exponential queues; Erlangian models, bulk and priority queues, networks of queues; general arrival and/or service times; and statistical inference and simulation of queues are covered. Extensive use of computational software.

648 Production and Inventory Systems (3:3:0) Prerequisites: OR 541 and 542, or permission of instructor. An analysis of production and inventory systems. Use of mathematical modeling for solutions of production planning and inventory control problems is introduced. Also included are stochastic inventory systems of lot sized-reorder type; periodic review and single-period models; application of dynamic programming theory to deterministic and stochastic cases; and static and dynamic production-planning models.

649 Topics in Operations Research (3:3:0) Prerequisite: permission of instructor. Advanced topic chosen according to interests of students and the 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) Corequisites: OR 541 or 542. While drawing on other disciplines (managerial accounting, econometrics, systems analysis), cost analysis uses operations research to assist decision makers in choosing preferred future courses of action by evaluating selected alternatives on the basis of their costs, benefits, and risks. Cost analysis is distinctly different from cost estimating in that projecting future courses of action almost always requires mathematical modeling. Topics include analysis overview, economic analysis, estimating relationships (factors, simple and complex models), acquiring and verifying cost data, cost progress curves, life cycle costing, scheduling estimating, effectiveness and risk estimation, relationship of effectiveness models and measures to cost analysis.

652 Military Operations Research Modeling II: Effectiveness Analysis (3:3:0) Corequisites: OR 541 or 542. Examines issues and modeling underlying military decisions at the Military Service, Joint Staff, and Department of Defense level. Analytical methods with applications to theater campaign analysis, equipment and weapon system modernization, force structure development, strategic mobility and deployment, small scale contingency operations, logistics, and requirements determination are considered. Optimization, simulation, and statistical techniques are stressed. Realistic problems presented and solved as case studies. Display of results and presentation techniques for military decision makers emphasized.

660/SYST 660 Air Transportation Systems Modeling (3:3:0) Prerequisite: SYST 460/560 or permission of instructor. Introduces range of current issues in air transportation, including public policy toward the industry, industry economics, system capacity, current system modeling capability, human factors considerations, safety analysis and surveillance systems, and new technological developments. Students expected to develop broad understanding of contemporary and future issues. Knowledge evaluated through class discussions, a take-home midterm exam and a term project to be completed by the end of the semester.

671/SYST 671 Judgment and Choice Processing and Decision Making (3:3:0) Prerequisite: STAT 510 or equivalent, or permission of instructor. How do people make judgments and decisions? Course presents an initial review of scientific literature directed toward answering this question, and emphasizes its importance when performing decision analysis and designing systems to support judgment and decision processes.

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/SYST 677 Statistical Process Control (3:3:0) Prerequisite: STAT 544 or 554 or permission of instructor. Introduction to the 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.

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, production, inventory management, logistics, and solution implementation, emphasizing contemporary approaches to decision analytic techniques.

682/CSI 700 Computational Methods in Engineering and Statistics (3:3:0) Prerequisites: MATH 205 and 213 or equivalent, 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, and Intelligence (C3I) (3:3:0) Prerequisite: ECE 328 or OR 542 or SYS 611 or equivalent. Fundamental principles of C3I are developed from a descriptive, theoretical, and quantitative perspective. The principles and techniques are applicable to a wide range of civilian and military situations. Topics include C3I models; modeling and simulation for combat operations; detection, sensing, and tracking; data fusion and situation assessment; optimal decision making; methodologies and tools of C3I architectures; tools for modeling and evaluations of C3I systems such as queueing theory.

690 Optimization of Supply Chains (3:3:0) Prerequisites: graduate standing, mathematics through linear algebra, and STAT 344. Focuses on both supply chain optimization from an enterprise-wide perspective, and supply chain optimization from a business-to-business e-commerce concern. Concerned with optimizing the value of goods and services and assuring a reasonable return on such sales. Describes both heuristic and exact algorithms for scheduling, production, inventory management, logistics, and distribution. New software that enables such optimization is presented, as are manufacturing and service examples from the public and private sectors. New techniques to handle risk, quality of data, and robustness of solutions are presented. Students perform case studies using state-of-the-art software.

719/STAT 719/CSI 775 Computational Models of Probabilistic Reasoning (3:3:0) Prerequisites: 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.

741 Advanced Linear Programming (3:3:0) Prerequisites: OR 541 and 541. Recent developments in linear programming. Highlights advances in interior point methods and also addresses developments in the simplex method. Projective methods, affine methods, and path-following methods are examined, including Karmarkar’s original work. Discusses relationships between these methods, and relationships to methods in nonlinear programming. Also discussed are advances in data structures and other implementation issues. Students test software and solve large-scale linear programs.

750 Advanced Topics in Operations Research (3:3:0) Prerequisites: OR 541 or 542 and a 600-level course that will vary with the content of the 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 or 643 or 690. Introduction to 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)
Courses

310 Program Planning and Design (3:3:0) Emphasizes understanding of park resources, including the management of visitors to these concepts.

317 Social Psychology of Play and Recreation (3:3:0) Applies social psychological theories and research to the correlates, antecedents, and consequences of and constraints on recreation and leisure development. Emphasizes understanding of park resources, including the management of visitors to these concepts.

316 Outdoor Education and Leadership (3:3:0) Focuses on equipment and expertise for implementation; field study of local facilities.

220 Experiential Education Theory and Application (3:3:0) Focuses on equipment and expertise for implementation; field study of local facilities.

221 Challenge Course Facilitator Field Work (2:2:0) Focuses on equipment and expertise for implementation; field study of local facilities.

241 Practicum (3:0:3) Open to nonmajors.

250 Wilderness Travel and Sustainability (2:2:0) Prerequisite: PRLS 120.

253 Florida Everglades Canoe Expedition (3:2:1) Open to nonmajors.

300 People with Nature (3:3:0) Traces the development of current concepts of recreation and leisure and their implications and consequences. Covers influences of philosophy, religion, science, economics, sociology, and politics on discretionary time and its uses.

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.

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 depreciation behaviors, and attitudinal toward resource conservation, preservation, and use.

405 Planning, Design, and Maintenance of HFRR Facilities (3:3:0) Prerequisites: PRLS 310 or POI 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, 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) Prerequisites: PRLS 327. Explores the role of leisure in human development with a specific focus on needs, demands, and services for people with disabilities and illness. Presents concepts associated with leisure, aging, physical challenge, targeting leisure services, research, and public policy. Field experience required.

418 Assessment in Therapeutic Recreation (3:3:0) Prerequisite: PRLS 327 and 416. Presents methods of assessment, development of treatment program plans, and evaluation of all components. Extends program design by developing competencies in the planning approaches, individual and group assessment techniques, program evaluation, and documentation strategies for people with disabilities and illness. Field experience required.

450 Research Methods (3:3:0) Prerequisites: HEAL 323, 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.
Courses

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; PHIL 205, 233; PRLS 210, 310, 316, and 410 (pass/fail). 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.

499 Independent Study (1-3:0:0) Prerequisite: 90 credits. Individual study of topic area in leisure research, theory, or practice under direction of faculty.

501 Introduction to Natural Resources Law (3:3:0) Prerequisite: PRLS 460 and 90 credits, graduate status, or permission of instructor. Selected legal issues involving conflicting use and preservation demands on our nation’s limited natural resource base, particularly those involving public lands, open space, and recreation resources. Uses case studies of recent court decisions.

503 Disability Rights Law in Sport and Recreation (3:3:0) Prerequisite: PRLS 460 and 90 credits, or graduate status, or permission of instructor. Examines individual rights, the legitimacy of individual and society, the moral significance of nature, our duties to protect wilderness areas, the moral status of animals, the moral status of economic reasoning, and the competing demands of individual liberty, equality, and the common good.

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. Considers visitors’ expectations and perceptions, with emphasis on implications 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) Examination of 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.

155 Issues in Environmental Ethics (3:3:0) Philosophical examination of a variety of issues in environmental ethics, such as the moral status of animals, the moral significance of nature, our duties to protect wilderness areas, and the moral status of economic reasoning, and morally acceptable population policies.

156 What Is Art? (3:3:0) Examination of 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. Examination of some of the 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) 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) 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 populism and sovereignty, and early criticisms of liberal theory.

325 Karl Marx’s Social and Political Thought (3:3:0) Prerequisite: 3 credits of philosophy or permission of instructor. Study and evaluation of Marx’s social and political ideas based on writings selected from several phases of his career. Examination of relation of Marx’s thought to post-Marxist socialist theory and practice.

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) 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 rivaled only by ancient Greece. Kant, Fichte, Hegel, Kierkegaard, Schopenhauer, and Nietzsche mount a revolt against the rationalism and scientism of the modern world.

336 Contemporary 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, in relation to 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.

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; develop an appreciation of the need for an ethical culture; and experience the day-to-day activities of a business organization where they learn how ethics is incorporated into the culture. Students will gain understanding of ethics codes, leadership skills that rely on ethics, and management techniques that encourage and support an ethical environment in business.

355 Contemporary Ethical Theory (3:3:0) Prerequisite: PHIL 151 or permission of instructor. Major trends and issues in recent moral philosophy.

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 positivist and behaviorist, 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 calculi, and procedures for recognizing phrases.

377 Darwin: Biology and Beyond (3:3:0) Prerequisites: completion or concurrent enrollment in all other required general education courses or permission of the instructor. Philosophical-historical 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 the instructor. Philosophical-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) Examination of 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 the topic is sufficiently close to their field 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.

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.

512 Issues in Philosophy and Literature (3:3:0) Prerequisites: 90 credits, 6 credits of 300-level English, and 6 credits of 300-level philosophy, or permission of instructor. Possible topics include structuralism, technology, form and matter, conceptions of the future. Course is cross-listed and team taught.

520 Current Issues in Philosophy of Science (3:3:0) Prerequisite: graduate standing or permission of instructor. Advanced exploration of the current issues addressing the structure of scientific knowledge. The fundamental question is, What are the rational standards for acquiring knowledge of the physical world? This question is explored from rival philosophical perspectives: the logical-empiricist perspective of the Received View, represented by R. Carnap and C. Hempel; the problem-solving perspective of the historicists T. Kuhn and L. Laudan; and the rationalism of W. Newton-Smith; and the antirealism of V. van Fraassen.

531 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.

555 Environmental Ethics (3:3:0) Prerequisites: graduate standing, or permission of instructor. Examination of ethical principles affecting environmental issues with special emphasis on the problems encountered by environmental biologists.

560 Philosophical Foundations of Science (3:3:0) Prerequisite: graduate standing or permission of instructor. Focuses on metaphysical questions concerning the nature of physical reality, as presented within major scientific theories of the modern era. Questions are explored within the scientific/metaphysical principles of Kepler, Galileo, Boyle, Newton, Kant, Faraday, Einstein, and Bohr.

573 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, coherence, and various naturalized epistemologies. The nature of a priori knowledge (from mathematics and logic) is also examined.

574 Philosophical Issues in Cognitive Science (3:3:0) Prerequisite: 90 credits or graduate standing plus 12 credits in philosophy and any of the disciplines relative to cognitive science (such as psychology or computer science) required for undergraduates and recommended for graduates, or permission of instructor. Careful examination of some philosophical issue or issues relevant to contemporary studies of the mind. Typical issues examined include the mind-body problem, philosophical and psychological implications of work in artificial intelligence, and philosophical issues in psycholinguistics.

591 Special Topics in Philosophy (3:3:0) Examination of specific topics in philosophy that are both of central interest in that field and of interdisciplinary interest. Topics are selected with special reference to the areas of technology, aesthetics, philosophy of religion, ethics, and social and political philosophy.

602 Plato: Selected Dialogues (3:3:0) Prerequisites: 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.

604 Augustine and Aquinas (3:3:0) Prerequisites: 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) Prerequisites: graduate standing. An examination of the 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) Prerequisites: 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. Examination of the 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) Prerequisites: 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) Prerequisites: graduate standing. Explores themes, movements, and periods in the history of political theory.

618 Contemporary French Feminism (3:3:0) Prerequisites: graduate standing. This course examines the 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) Prerequisites: graduate standing. An exploration of 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.

640 History of Ethical Theory (3:3:0) Prerequisites: graduate standing. An examination of the 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) Prerequisites: 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) Prerequisites: graduate standing or permission of instructor. Explores the application of ethical theories and principles to issues in contemporary healthcare. Cases central to the development of the field will be examined.

643 Environmental Ethics (3:3:0) Prerequisites: 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) Prerequisites: graduate standing. An examination of organizational culture as necessary for ethical development and of the application of ethics in business and organizational settings.

645 Administration of Justice Ethics (3:3:0) Prerequisites: graduate standing. An in-depth analysis of ethical issues in the administration of justice with special emphasis placed on foundational issues such as freedom and justice in a democracy.

656 Happiness and the Quality of Life (3:3:0) Prerequisite: graduate standing or permission of instructor. Examination of the role that concepts of happiness and the good life have played in ethical theory. Focuses on the development of consequentialist ethical theories from Aristotle’s eudaimonic theory to contemporary versions of utilitarian theory. Examines the theories of the self and personal identity implied by these ethical theories. Throughout the semester, these theories are used to critically assess modern social structures.

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.

681 Philosophical Figures (3:3:0) Prerequisite: graduate standing. Examination of a 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 a specific topic in philosophy chosen by student and instructor. May be repeated for maximum 6 credits.

720 Nietzsche and his Readers (3:3:0) Prerequisites: graduate standing. Reading of the major texts of Nietzsche and of some of his most influential interpreters and critics.

733 Current Issues in Cognitive Science (3:3:0) Prerequisites: admission to master’s program in philosophy or permission of instructor. An examination of some current areas of investigation in cognitive science and the philosophy of mind, such as the nature of consciousness, the representational theory of mind 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)
118 Advanced Life Guarding (1:1:0)
127 Social Dance II (1:1:0) Prerequisite: PHED 107 or permission of instructor.
128 Fencing II (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) 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 (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)
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Notes</th>
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<tbody>
<tr>
<td>151</td>
<td>Introduction to Tennis (1:1:0)</td>
<td>PHED 151 or permission of instructor</td>
<td>Open to nonmajors. May be repeated, but no more than 3 total 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.</td>
</tr>
<tr>
<td>153</td>
<td>Intermediate Tennis (1:1:0)</td>
<td>PHED 151 or permission of instructor</td>
<td>Prerequisites: PHED 151 or permission of instructor.</td>
</tr>
<tr>
<td>155</td>
<td>Introduction to Springboard Diving (2:2:0)</td>
<td>PHED 150 or permission of instructor.</td>
<td>Prereq: PHED 150 or permission of instructor.</td>
</tr>
<tr>
<td>156</td>
<td>Intermediate Springboard Diving (2:2:0)</td>
<td>PHED 150 or permission of instructor.</td>
<td>Prerequisite: PHED 150 or permission of instructor.</td>
</tr>
<tr>
<td>158</td>
<td>Underwater Hockey (1:1:0)</td>
<td>PHED 150 or permission of instructor.</td>
<td>Prerequisite: PHED 150 or permission of instructor.</td>
</tr>
<tr>
<td>159</td>
<td>Advanced Swimming (1:1:0)</td>
<td>PHED 150 or permission of instructor.</td>
<td>Prerequisite: PHED 150 or permission of instructor.</td>
</tr>
<tr>
<td>165</td>
<td>Introduction to Racquetball (1:1:0)</td>
<td>PHED 165 or permission of instructor.</td>
<td>Prerequisite: PHED 165 or permission of instructor.</td>
</tr>
<tr>
<td>166</td>
<td>Intermediate Racquetball (1:1:0)</td>
<td>PHED 165 or permission of instructor.</td>
<td>Prerequisite: PHED 165 or permission of instructor.</td>
</tr>
<tr>
<td>200</td>
<td>Professional Dimensions of Health, Recreation, and Physical Education (3:3:0) Open to nonmajors.</td>
<td>Traces historical foundations of health, recreation, physical education, and sport.</td>
<td>May be repeated, but no more than 3 total 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.</td>
</tr>
<tr>
<td>201</td>
<td>Developmental Motor Patterns (3:3:0)</td>
<td>Analyzes motor-skill development and prescription of activities from immature to mature stages.</td>
<td>Prerequisites: BIOL 124 and 125.</td>
</tr>
<tr>
<td>202</td>
<td>Teaching Skillful Movement (3:3:0)</td>
<td>Covers planning and presenting lessons on numerous motor skills using varied teaching strategies in a peer teaching setting.</td>
<td>Prerequisites: BIOL 124 and 125 and PHED 300.</td>
</tr>
<tr>
<td>230</td>
<td>Asian Martial Arts: Origin and Development (3:3:0) Introduction to the martial arts of East, South, and Southeast Asia. Lectures address martial arts from a historical, philosophical, biographical, warfare, and sport perspective.</td>
<td>Open to nonmajors.</td>
<td>Prerequisites: BIOL 124 and 125.</td>
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<tr>
<td>250</td>
<td>Water Safety Instruction (2:1:0)</td>
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<tr>
<td>255</td>
<td>Scuba Diving (2:2:0)</td>
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<tr>
<td>273</td>
<td>Net and Target Games (2:0:2) Open to BPRE and BSED PHED majors only.</td>
<td>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.</td>
<td>Prerequisites: BIOL 124 and 125.</td>
</tr>
<tr>
<td>274</td>
<td>Dance and Educational Gymnastics (2:0:2)</td>
<td>Open to BPRE and BSED PHED majors only.</td>
<td>Skill and content knowledge in dance, rhythms, and educational gymnastics.</td>
</tr>
<tr>
<td>275</td>
<td>Field and Invasion Games (2:0:2)</td>
<td>Open to BPRE and BSED PHED majors only.</td>
<td>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.</td>
</tr>
<tr>
<td>300</td>
<td>Kinesiology (3:3:0)</td>
<td>BIOL 124 and 125.</td>
<td>Covers anatomic and mechanical study of human movement.</td>
</tr>
<tr>
<td>304</td>
<td>Sport, Culture, and Society (3:3:0)</td>
<td>PHED 200 or permission of instructor.</td>
<td>Analyzes sport from educational, political, economic, and cultural perspectives.</td>
</tr>
<tr>
<td>306</td>
<td>Psychomotor Learning (3:3:0)</td>
<td>BSED status.</td>
<td>Analyzes psychological aspects, learning theory, and practice conditions for learning motor skills.</td>
</tr>
<tr>
<td>308</td>
<td>Adapted Physical Education (3:3:0)</td>
<td>Prerequisites: BSED status, and BIOL 124 and 125.</td>
<td>Introduces disabilities in public schools. Covers national standards, federal legislation, IEPs, and developmental inclusion models.</td>
</tr>
<tr>
<td>365</td>
<td>Measurement and Evaluation of Physical Fitness (3:3:0)</td>
<td>Open to nonmajors.</td>
<td>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.</td>
</tr>
<tr>
<td>404</td>
<td>Middle and High School Instruction in Physical Education (3:3:0)</td>
<td>PHED 201, 202, 273, 274, 275, 306, and 403; BSED status.</td>
<td>Examines school curriculum, assessment, content, and teaching practices for middle and high school physical education programs. Requires field experience.</td>
</tr>
<tr>
<td>410</td>
<td>Social/Psychological Aspects of Health and Fitness (3:3:0)</td>
<td>Covers research, trends, and techniques of health and fitness from a behavioral perspective.</td>
<td>Open to nonmajors.</td>
</tr>
<tr>
<td>415</td>
<td>Student Teaching in Physical Education (9:0:0)</td>
<td>Prerequisites: Completion of all courses in approved program; acceptance into student teaching.</td>
<td>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.</td>
</tr>
<tr>
<td>442</td>
<td>Practicum in Physical Education (1-3:0:0)</td>
<td>Open to nonmajors.</td>
<td>Prerequisites: Completion of all courses in approved program; acceptance into student teaching. 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.</td>
</tr>
<tr>
<td>450</td>
<td>Physiology of Exercise (4:3:1)</td>
<td>Prerequisites: BIOL 124 and 125 and PHED 300.</td>
<td>Covers human physiological responses to environmental changes and exercise.</td>
</tr>
<tr>
<td>480</td>
<td>Special Topics (3:3:0)</td>
<td>Prerequisites: 60 credits. See course description in the Schedule of Classes. Selected topics reflect interest in specialized areas of exercise science or health promotion.</td>
<td></td>
</tr>
<tr>
<td>499</td>
<td>Independent Study in Physical Education and Fitness (1-3:0:0)</td>
<td>Prerequisites: 90 credits, or 60 credits and permission of instructor.</td>
<td>Provides supervised professional practice in a selected area of interest. Students may repeat this course, but no more than 3 total credits may be earned.</td>
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</table>

**Physical Sciences (PSCI)**

**College of Arts and Sciences**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>701</td>
<td>Frontiers of Physical Sciences (3:3:0)</td>
<td></td>
<td>Prerequisite: admission to the 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.</td>
</tr>
</tbody>
</table>
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 the 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 the 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 the physical sciences doctoral program. Doctoral research performed under the direction of advisor. May be repeated three times.

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.


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 a 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 a grade of C or better (2.000) Corequisite: Math 213. Waves, electricity, and magnetism.

261 University Physics II Laboratory (1:0:3) Co-requisites: MATH 213 and PHYS 260. Experiments in mechanics, electricity, and magnetism.

262 University Physics III (3:3:0) Prerequisite: PHYS 260 with a grade of C or better (2.000) 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) Prerequisites: PHYS 260. Laws of thermodynamics, kinetic theory of gases, heat engines, and entropy. Students may not receive credit for both PHYS 262 and 266.
303 Classical Mechanics (3:3:0) Prerequisites: 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.


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. 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, 262 or permission of instructor. Survey of the electronic and structural properties of semiconductors and the physics of semiconductor processing. Topics to be discussed include crystal growth, crystal defects, thin films, thermal properties, lithography, and characterization.

326 Problems in Physics II (1-3:0:0) Individual study of physics problems of current interest. May be taken three times for credit.

328/ASTR 328 Introduction to Astrophysics (3:3:0) Prerequisites: PHYS 262 and MATH 214. Topics include physical concepts; magnitudes of stars; Hertzsprung-Russell diagram; stellar radiation; stellar structure and stellar evolution; white dwarfs, red giants, supernovas, neutron stars, black holes; interstellar matter, dust, and molecules; cosmic rays and magnetic fields; galactic structure, galaxies, quasars, and intergalactic matter; high energy astrophysics, cosmology, and general relativity; and models of the universe.

390 Topics in Physics (1-4:0:0) Selected topics in physics not covered in fixed content courses.

402/PHYS 502 Introduction to Quantum Mechanics and Atomic Physics (3:3:0) Prerequisites: PHYS 308 or permission of instructor. Experimental basis of quantum mechanics; the wave function; systems in one, two, and three dimensions.

403, 406 Honors Thesis in Physics (3:0:0) Prerequisites: 21 credits of physics courses. PHYS 262, 305, 308, and admission to the 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. A student may receive no more than six credits of PHYS 405, 406, 408, and 409.

407 Senior Laboratory in Modern Physics (3:0:9) Prerequisite: 21 credits of physics courses and PHYS 305, 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.

408 Senior Research (2-3:0:0) Prerequisite: 21 credits of physics courses. Student works under the guidance of a faculty member on a research project in experimental or theoretical physics. May be taken twice with permission of the Physics Department. A student may receive no more than six credits of PHYS 405, 406, 408, and 409.

409 Physics Internship (3:0:0) Prerequisites: 75 credits, 21 credits of physics courses, and permission of department. See department for other requirements and application procedures prior to enrollment. On-the-job experience for physics majors in industry or government laboratories including summer programs. A student may receive no more than six credits of PHYS 405, 406, 408, and 409.

416 Special Topics in Modern Physics (1:2:0) Prerequisite: 21 credits of Physics courses. Topics of current interest in modern physics with emphasis on the breadth of physical understanding needed to approach many of today’s problems. The course will also review all of undergraduate physics through assigned problems from the GRE test.

417/GEOL 417 Geophysics (3:3:0) Prerequisites: GEOL 101, 102, 201, 301; MATH 113, 114; and PHYS 160. Corequisites: MATH 213 and PHYS 260, 261. Seismological and gravitational theory and application to an understanding of the Earth’s interior. Geology requirement may be waived for physics and engineering students with sufficient background.

428/ASTR 428 Relativity and Cosmology (3:3:0) Prerequisite: 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.

502/PHYS 402 Introduction to Quantum Mechanics and Atomic Physics (3:3:0) Prerequisite: PHYS 308 or permission of instructor. Experimental basis of quantum mechanics, the wave function, and systems in one, two, and three dimensions.

510 Computational Physics I (3:3:0) Prerequisites: PHYS 303, 305 and FORTRAN or C++ programming. Study and development leading to computer simulations of various physical systems. Requires the study and development of computational techniques and numerical algorithms to obtain both numerical results and visualization of these results. Application to individual physical processes taking place in a variety of physical systems. In computational physics research, individual physical processes are only components of a larger simulation.

512/CSI 687 Solid State Physics and Applications (3:3:0) Prerequisite: PHYS 402 or 502. Crystal structures, binding, lattice vibrations, the free electron model, metals, semi-
concerning imaging methods using acoustic and optical fibers. Classical electromagnetic theory with applications. Topics include electrostatics, magnetic fields, and materials, electromagnetic wave propagation, waveguides, transmission lines, radiation, and antennas.

533/CHEM 620 Modern Instrumentation (3:3:0) Prerequisites: PHYS 513 and an electronics course. Topics include sensors for radiation, particles, electric and magnetic fields, pressure, and motion; electronic instruments, computer data collection, instrumentation noise and noise reduction methods, and specialized instrumentation systems for various areas of applied physics.

540 Nuclear and Particle Physics (3:3:0) Prerequisite: PHYS 402 or 502. Accelerators, detectors and related electronics; nuclear and elementary particle structure; symmetries and conservation laws; the electromagnetic, weak, and hadronic interactions; nuclear models; the quark model; and nuclear science and technology.

575/CSI 655 Atmospheric Physics I (3:3:0) Prerequisites: PHYS 305, 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 in high-temperature plasmas, stellar interiors, hydrodynamics, and cosmology.

580 Selected Topics in Physics (1-6:0-6:0) Prerequisite: graduate standing or permission of instructor. Selected topics from recent theoretical or experimental developments and applications. Satisfies needs of professional community to keep abreast of current developments.

600 Special Topics in Physics (1-6:0) In-service course to strengthen and update teachers’ knowledge of physics and astronomy.

611 Electro-optics (3:3:0) Prerequisites: PHYS 502 and 513. Optical modulators, display devices, types and operation of lasers, mode locking, Q-switching, photodetectors, optical fibers.

612 Physics of Modern Imaging (3:3:0) Prerequisite: PHYS 513. Study of imaging methods using acoustic and electromagnetic waves to probe extended objects, and mathematical transformations to produce images from scattered waves. Topics include classical imaging, physical optics, Fourier transform, holography, tomography, seismic mapping, underwater acoustic imaging and mapping, side-looking radar, antenna arrays, applicable computer methods.

613/CSI 780 Computational Physics II (3:3:0) Prerequisites: PHYS 303, 305, and 510; PHYS 502 or equivalent recommended. Study of diverse physical systems with emphasis on modeling and simulation. Study and development of numerical algorithms and techniques to obtain both numerical results and visualization of these results. Projects undertaken will draw from such areas as many-body dynamics, molecular dynamics and interactions, atmospheric structure and dynamics, high-temperature plasmas, stellar structure, hydrodynamics systems, galactic structure and interactions, and cosmology.

620 Continuum Mechanics (3:3:0) Prerequisites: 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.

676 Atmospheric Physics (3:3:0) Prerequisites: PHYS 303, 305, and 308, MATH 314. Covers the basic conservation laws of mass, momentum, and energy, and a scaling analysis of the equations of motion and thermodynamics. Balanced flows in the atmosphere are discussed. Concepts of circulation and vorticity; the role of the atmospheric boundary layer in mass, momentum, and energy transfer; synoptic scale motions; and the role of gravity and Rossby waves in controlling the general circulation of the atmosphere are covered.

701 Theoretical Physics (3:3:0) Prerequisites: PHYS 502, 510, 513, or permission of instructor. Study of the physical basis for selection of particular mathematical tools in physics; topics include Lagrangian mechanics, Hamiltonian mechanics, canonical transformations, Hamilton-Jacobi theory, nonintegral systems, rigid body dynamics, and normal modes of vibration.

705 Classical Mechanics (3:3:0) Prerequisites: PHYS 502, 510, 513, or permission of instructor. Study of classical mechanics; topics include Lagrangian mechanics, Hamiltonian mechanics, canonical transformations, Hamilton-Jacobi theory, nonintegral systems, rigid body dynamics, and normal modes of vibration.

711/ CHEM 730/CSI 782 Statistical Mechanics (3:3:0) Prerequisites: PHYS 502 and 510, or permission of instructor. Statistical methods, systems of particles, thermodynamics, macroscopic parameters, the ideal gas, kinetic theory, quantum statistics, and transport processes.

722/CSI 785 Electromagnetic Theory (3:3:0) Prerequisites: PHYS 513 and 510, or permission of instructor. Advanced study of electric and magnetic fields; topics include electrostatic fields, magnetostatic fields, boundary-value problems in field theory, multipoles, simple radiating systems, relativistic electrodynamics, and radiation by moving charges.

728/CSI 788 Simulation of Large-Scale Physical Systems (3:3:0) Prerequisites: PHYS 613 or equivalent, and FORTRAN or other high-level language programming. Study of diverse large-scale physical systems with emphasis on the modeling and simulation of these multifaceted systems. Study and development of numerical algorithms and techniques to obtain both numerical results and visualization of these results. Projects will be drawn from such areas as many-body dynamics, molecular dynamics and interactions, atmospheric structure and dynamics, high-temperature plasmas, stellar structure, hydrodynamics systems, galactic structure and interactions, and cosmology.

732/CSI 784 Quantum Mechanics (3:3:0) Prerequisite: PHYS 502 or permission of instructor. Study of 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, scattering theory.

736/CHEM 736/CSI 783 Computational Quantum Mechanics (3:3:0) Prerequisite: PHYS 502, 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 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.

780/CSI 789 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) 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.

799 Master’s Thesis (1-6:0:0) Prerequisites: 9 graduate credits and permission of instructor. Project chosen and completed under the guidance of a graduate faculty member, which results in an acceptable technical report and oral defense. Graded S/NC.

Psychology (PSYC)

100 Basic Concepts in Psychology (3:3:0) Prerequisite to all 200-, 300-, and 400-level courses in psychology. Introduction to psychology as a scientific discipline. Includes an examination of concepts and methods in learning, motivation, development, personality, and measurement.

110 Seminar in General Psychology (1:1:0) Corequisite: PSYC 100. Seminar exploring 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 the instructor has special expertise. Short papers are required.

211 Developmental Psychology (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Review of major developmental theories including perspectives of childhood, adolescence, adulthood, and old age.

231 Social Psychology (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Study of human behavior development in a social matrix, including such topics as socialization, cultural behavior, group norms, and attitude formation.

260 Basic Research Methods in Psychology (1-3:0:0) Prerequisite: 6 credits of psychology or permission of instructor and department. Introduction to research methods in psychology in the context of assisting faculty with research; individualized sections by arrangement with faculty. Methods taught vary but generally include basic data collection and recordkeeping methods in research. Course culminates in a paper describing techniques learned. No more than six credits in PSYC 260, 350, and 460 can be used toward a psychology major.

300 Statistics in Psychology (4:3:2) Prerequisites: 6 credits of psychology including PSYC 301 as a prerequisite or corequisite, and three credits of mathematics course work, or permission of instructor. 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) Prerequisites: 6 credits of psychology 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 (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 (grade of C or better) or permission of instructor. Principles of perception, including topics such as psychophysics, perceptual organization, perceptual learning, and perceptual constancies. Laboratory projects demonstrate and investigate perceptual phenomena. PSYC 309 is a writing-intensive course.

313 Child Psychology (3:3:0) Prerequisite: 6 credits of psychology or permission of instructor. Study of human psychological development from conception to adolescence including such topics as genetic factors, emotional and intellectual growth, and environmental influences.

314 Adolescent Psychology (3:3:0) Prerequisite: 6 credits of psychology or permission of instructor. Study of the biological and cultural changes accompanying adolescence, including the effect of these changes on emotional, intellectual, and social development.

317 Cognitive Psychology (3:3:0) Prerequisite: 6 credits of psychology or permission of instructor. An in-depth overview of important topics in cognitive psychology, including memory, attention, pattern recognition, problem solving, reasoning, and psycholinguistics.

320 Psychological Tests and Measurements (4:3:2) Prerequisite: PSYC 300 (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 or permission of instructor. Examination of experimental or permission of instructor. Examination of experimental or permission of instructor. Examination of experimental or permission of instructor. Examination of experimental or permission of instructor. Examination of experimental 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 (grade of C or better) or permission of instructor. Review and application of research techniques including interviewing, survey analysis, and process analysis. PSYC 323 is a writing-intensive course.

324 Personality Theory (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Introduction to classical and contemporary theories of personality, and comparative evaluation of major theories in terms of relevant studies.

325 Abnormal Psychology (3:3:0) Prerequisites: PSYC 100 and one of PSYC 211, 231, or 324 or permission of instructor. Study of development of abnormal behavior patterns, including such topics as methods of diagnosis and prevention of serious mental disorders such as psychosomatic disorders, psychoses, character disorders, and mental retardation.

326 Therapeutic Communication Skills (3:3:0) Prerequisite: PSYC 325 or permission of instructor. Introduction to understanding and use of basic therapeutic communication skills used in clinical and counseling psychology.

327 Psychology in the Community (3:3:0) Prerequisite: psychology major with a minimum of six psychology credits and permission of the 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.

328 Psychology in the Community Laboratory (1:0:0) Prerequisite: psychology major with a minimum of 6 psychology credits and permission of course instructor and associate chair for undergraduate studies. Corequisite: Enrollment in psychology course for which this is service learning component. Course comprises one-hour service learning component linked to selected psychology courses. Maximum 6 credits of PSYC 327, 328, 421, 422, 548, and 549 can be applied to the psychology major.

330 Psychology of Adjustment (3:3:0) Prerequisite: PSYC 100 or permission of instructor. PSYC 330 cannot be taken for credit by psychology majors. Nature of effective and faulty patterns of adjustment. Factors in healthy and unhealthy personality development, unique motivation patterns of individuals, and influence of personally significant groups on adjustment. Resources for personal growth and application of contemporary psychological principles to achievement of increased intellectual, emotional, and social competence.

333 Industrial and Organizational Psychology (3:3:0) Prerequisite: PSYC 100, 300. Examination of application of psychological principles and methods to problems commonly encountered in business and industry.

350 Directed Reading and Research in Psychology (1-3:0:0) Prerequisites: PSYC 100, 300, and permission of instructor and department. Library research in psychology, culminating in a substantial formal paper; individualized sections by arrangement with faculty. No more than six credits in PSYC 260, 350, and 460 can be used toward psychology major.

362 Psychology of Women (3:3:0) Prerequisites: PSYC 100 and BIOL 103, 104, or permission of instructor. Behavior and attitudes of women: influence of chromosomes and hormones on behavior, influence of culture on sex role differentiation, and theories of sex role development.

372 Physiological Psychology (3:3:0) Prerequisites: PSYC 100 (grade of C or better) and BIOL 103-104, or permission of instructor. Survey of neuroscience, including basic neuroanatomy, neural and synaptic transmission, neural mechanisms underlying normal and abnormal behavior, and biological mechanisms of drug action.

373 Physiological Psychology Laboratory (1:0:2) Prerequisite or corequisite: PSYC 372 or permission of instructor. Functional anatomy and physiology of the brain, including dissection of brain and eye, and a demonstration and practice in research methods for studying physiological mechanisms underlying behavior.

379 Applied Cross-Cultural Psychology (3:3:0) Prerequisite: PSYC 100 or permission of instructor. A review of important landmarks in cross-cultural research, showing how this research impacts psychology as a discipline. Emphasizes an empirical approach to cross-cultural study and includes topics such as theoretical and empirical developments in cross-cultural psychology, development of coherent schemas to guide cross-cultural research and interventions, comparison of psychology’s goals and assumptions in Western and other cultures, and integration of course materials into educational and career goals of students.

414 Behavior Disorders of Childhood (3:3:0) Prerequisites: PSYC 313 and 325, or permission of instructor. Review of the theories, methods, and research dealing with emotional and behavioral disorders of children.

415 Psychological Factors in Aging (3:3:0) Prerequisite: PSYC 100 or permission of instructor. Examination of the sensory, perceptual, intellectual, and personality changes that occur in older people. Common adjustment problems as well as more serious adjustment difficulties are discussed. Applications of various personality theories of aging.

418/518 Death, Dying and Grieving (3:3:0) Prerequisite: PSYC 100. Advanced survey of processes of grieving and their relationship to death and dying. Topics include ways of dying, effects of death on loved ones, and care for the terminally ill.

421, 422 Undergraduate Practicum in Psychology (3:3:0), (3:3:0) Prerequisites: PSYC 325 and 326 and permission of Clinical Review Committee. No more than 6 credits in PSYC 327, 328, 421, 422, 548, and 549 can be used toward the psychology major. Supervised experience in application of psychological principles requiring work in a nonclassroom situation.

423 Group Psychotherapy Techniques (3:3:0) Prerequisite: PSYC 324 or permission of instructor. Review of theory and methods of group therapy with emphasis on humanistic and interpersonal approaches, including applications to family therapy, alcoholism, and drug abuse.
435 Personnel Training and Development: A Psychological Perspective (3:3:0) Prerequisite: PSYC 236; prerequisite or corequisite: PSYC 320 or permission of instructor. Overview and critique of training methods currently used in industry from the 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 the framework of industrial psychology.

460 Independent Study in Psychology (1-3:0:0) Prerequisites: 18 credits of psychology including PSYC 301 (grade of C or better), 2.50 GPA in psychology, and written proposal approved before registration by instructor and the department. No more than 6 credits in PSYC 260, 350, and 460 can be used toward psychology major. Advanced research methods in psychology in the 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 (grade of C or better) or permission of instructor. Historical background and major theoretical systems in modern psychology. Approaches include behaviorism, cognitive/information processing approaches, and psychodynamic theories.

466 Psychology of Intimate Relationships (3:3:0) Prerequisite: PSYC 100, 231; PSYC 324 recommended. Advanced survey of theories and research related to intimate relationships, including romantic relationships and those among family members and friends.

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 the 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 the 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 will vary. May not be repeated.

491 Psychology Honors II. (3:3:0) Prerequisite: PSYC 300, 301, and 490. Introduction to advanced statistics, research methodologies, statistics packages, computing and information technology, and library technology appropriate for psychological research and pedagogy. Students are required to complete a 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. Also expected to prepare proposal to present project or thesis at regional or national conference, or prepare manuscript for publication in an 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. Student should take PSYC 460 with the same advisor to develop thesis proposal before registering for PSYC 499. Student 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 BIOL 303. Introduction to neurobiology with overview of the embryological development of the nervous system in an evolutionary context. Regional and systems neuroanatomy is introduced by study of the mammalian visual system with a 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 the interactions among human cognition, artifact, and task. Recent research and case studies that emphasize empirical research, analytical modeling techniques, systems design, and the development of tools and methods are discussed.

531 Mammalian Neurobiology (3:2:3) Prerequisite: PSYC 327. 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.


541 Survey Research (3:3:0) Prerequisite: PSYC 300 or SOCJ 221, or permission of instructor. Introduction to theory, method, and practice of survey research; students complete a survey research project.

548, 549 Practicum in Gerontology (3:0:0), (3:0:0) Prerequisite: completion of three of the required courses in the 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 the psychology major. Practical experience in a gerontological setting under supervision of a qualified professional for 150 contact hours per 3 credits.
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, their (bio)synthesis, and properties, and examples from the nervous system. 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. Examination of the concepts of psychological measurement with emphasis on the relation between test results and actual abilities or characteristics. Discussion of reliability, validity, and specialized techniques used 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. Examination of neuronal mechanisms involved in learning and memory, in animals ranging from invertebrates to humans.

559 Behavioral Chemistry (3:3:0) Prerequisite: PSYC 372 or permission of instructor. Neurochemistry and neuroendocrinology, including neurotransmitter synthesis, genetic aspects of neural functioning, mechanisms of action of neurotransmitters and second messenger systems, regulation of neuroendocrine systems, neuroendocrine effects on behavior, and neuroimmunology.

560 Advanced Applied Social Psychology (3:3:0) Prerequisite: PSYC 231 or permission of instructor. Study of major trends in social psychological research with emphasis on the practical problems posed by human experimentation. Topics include attitude measurement, social comparison, and small group interaction.

561 Behavioral Biology of Substance Abuse (3:3:0) Prerequisite: PSYC 372 or equivalent. Overview of the biological effects of substance abuse and the biological mechanisms underlying addiction. Topics include alcohol, cocaine, marijuana, and other drugs; genetics of addiction; and biological 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 a total of 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 (1-3:1-3:0) Prerequisite: permission of instructor. Directed reading or research for MA students in psychology. Independent reading or research on a topic agreed on by student and faculty member. May be repeated for a total of no more than 6 credits. A maximum of nine credits of 597, 598, and 599 may be applied to a master's degree.

611 Advanced Statistics (4:3:2) Prerequisite: screening test given on the first evening of the class. This test must be passed to take the course. Open only to degree students. Integrates basic psychological statistics with an overview of research methodology (including experimental, quasi-experimental, field approaches, and measurement issues) from an advanced perspective. Lab work includes the use of 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 an overview of research methodology (including experimental, quasi-experimental, field approaches, and measurement issues) from an advanced perspective. Lab work includes the 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, and role changes in later life.

615 Language Development (3:3:0) Prerequisite: 3 credits of graduate development psychology or permission of instructor. This seminar course covers current theory and research on the acquisition of language, including biological and environmental influences and constraints, research methods, the role of parents, individual and cultural differences, links between language and other domains (cognitive, behavioral, social, emotions) of development, and the brain, animal language, bilingualism, and atypical language development.

616 General Psychopathology (3:3:0) Prerequisite: PSYC 325. Intensive survey of the current psychiatric nomenclature (DSM-III) of major types of psychopathological disturbances.

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.

630 Developmental Disabilities (3:2:1) Prerequisite: 3 credits of graduate developmental psychology courses, or permission of instructor. A combination of lectures and seminars to discuss state-of-the-art and evidence-based information about developmental disabilities across the life span with an emphasis on mental retardation. Includes epidemiology, etiology, diagnoses, risk factors, treatment and support, and the prevention of developmental disabilities. Pertinent philosophical, ethical, and legal issues concerning this special needs population will be discussed. In addition to the course work and assigned reading, students will 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. Examination of research techniques that are specifically designed to evaluate the human effectiveness of organizations and mental health programs.

635 Topics in Organizational Psychology (3:3:0) Prerequisite: PSYC 230, PSYC 632, or MGMT 610. Selected topics reflecting interest in a specialized area of organizational psychology, announced in advance. Emphasis on recent experimental research literature related to the selected topic.

636 Survey of Industrial Psychology (3:3:0) Prerequisite: PSYC 300 or permission of instructor. Intensive
survey of the historical and current issues in the major areas of applied (nonclinical) psychology.

638 Training: Psychological Contributions to Theory, Design, and Evaluation (3:3:0) Prerequisite: PSYC 636 or permission of instructor. Focus on the application of learning principles derived from psychological research in the development of training models and techniques of skill acquisition. Discussion of research designs and empirical results appropriate to training evaluation.

639 Survey of Organizational Processes (3:3:0) Prerequisite: PSYC 230 or 632. Trains students at a conceptual/theoretical and an empirical level in organizational processes. Includes individual, interpersonal, intragroup, and intergroup phenomena as they exist in the context of organizational settings.

640 Techniques in Industrial/Organizational Psychology (3:3:0) Prerequisite: PSYC 300 or permission of instructor. Skills-oriented course that enables 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 and/or classical human factors/applied cognition research methods (exact methods are 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 the lifespan.

648 Developmental Psychopathology (3:3:0) Prerequisite: 6 credits of graduate developmental psychology. In-depth look at the emerging discipline of developmental psychopathology. Specific disorders and contexts are discussed to illustrate how knowledge of normal development enhances understanding of deviant development and how knowledge about 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 is on quasi-experimental designs and methods of systematic observation.

666 Cognitive and Perceptual Development (3:3:0) Prerequisites: 6 credits of child psychology and a course in experimental psychology, or permission of instructor. Survey of theory and research on the 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 a small group setting. Effects of the individual on the group, effects of the group on the individual, and interaction effects among individuals.

668 Personality: Theoretical and Empirical Approaches (3:3:0) Prerequisite: PSYC 324 or permission of instructor. Presents a comprehensive overview of current theoretical and empirical approaches to personality. Areas of special relevance to clinical, developmental, and industrial/organizational psychology will be emphasized.

669 Social and Emotional Development (3:3:0) Prerequisite: 6 credits of developmental psychology or permission of instructor. Survey of theory and research relevant to the development of social relationships, emotional expressiveness and regulation, aggressive and altruistic behaviors, sex roles, and morality. Influences on such development, including parents, other adults, peers, siblings, and the broader culture will be emphasized.

671 Role and Function of the School Psychologist (3:3:0) Prerequisite: open only to school psychology M.A. students or by permission of instructor. Roles and functions of the school psychologist within the educational environment. Certification and ethical standards of the school psychologist and current issues and trends are considered.

673 Consultation and Behavior Modification (3:3:0) Prerequisite: open to practicing school psychologists and students in school psychology or by permission of instructor. Examines the theory and practice of behavior modification and consultation in the school environment.

678 Topics in School Psychology (1-6:0:0) Prerequisite: open to practicing school psychologists and advanced students in school psychology, or by permission of instructor. Selected topics reflecting a specialized area of school psychology. Content varies. May be repeated for total of 9 credits.

684 Psychological Counseling Techniques (3:3:0) Prerequisite: open to practicing school psychologists or psychology graduate students with a prior course in counseling. Application of various counseling approaches and techniques to the school-age child and adolescent. Students gain experience in counseling techniques used in schools and contemporary practice.

701 Cognitive Bases of Behavior (3:3:0) Prerequisite: open only to degree students. Survey of 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) Prerequisite: open only to degree students. Survey of biological bases of behavior, including such topics as neural conduction, the role of specific neurotransmitters, cortical functioning and brain disorders.

703 Social Bases of Behavior (3:3:0) Prerequisite: open only to degree students. Survey of social influences on behavior, including group processes, person perception, and attitude formation.
704 Life-Span Development (3:3:0) Prerequisite: open only to degree students. Survey of theories and research regarding life-span development and personality formation.

705 Historical and Philosophical Issues in Psychology (3:3:0) Prerequisite: 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) Prerequisites: open only to school psychology MA students. Permission of department required. PSYC 617 or 822 and PSYC 320 or equivalent; corequisite: PSYC 611. Administration, scoring, and interpretation of the 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) Prerequisites: open only to school psychology MA students. 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 the conceptualization and assessment procedures of the brain-behavior relationship in the 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) Prerequisite: open only to degree students in psychology. Permission of department. Apply in writing to the area coordinator 60 days prior to the beginning of the semester. Practical experience in an organizational setting as assigned. PhD students may repeat this course for a maximum of 15 credits; MA students for maximum 6 credits. Course is graded S/NC.

732 Attention and Performance (3:3:0) Prerequisite: PSYC 530, graduate experimental course in psychology, or PSYC 701. Human factors seminar focusing on theories, concepts, issues, methods, techniques, and research in the area of attention and performance.

733 Issues in Personnel Psychology (3:3:0) Prerequisite: PSYC 636 or permission of instructor: Examination of the psychological literature on job analysis, job evaluation and compensation, performance appraisal, training, and EEOL selection issues. Methodological and psychometric issues in the 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. Emphasizes current research and development in human-computer interaction, cognitive systems engineering, cognitive ergonomics, and cognitive engineering. May be repeated for credit.

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.

738 Simulation and Training (3:3:0) Prerequisite: PSYC 530, graduate experimental course in psychology, or PSYC 701. Human factors seminar focusing on training issues from the perspective of the human factors professional. Special attention is given to the role of hardware and simulation techniques in the design of technical training programs.

739 Seminar in Industrial/Organizational Psychology (3:3:0) Prerequisite: PSYC 230, PSYC 636, or permission of instructor: Rotating topics (leadership theories and management development, performance appraisal) to be announced in advance. May be repeated for credit.

741 Psychology of Work Motivation (3:3:0) Prerequisite: PSYC 230 or permission of instructor. Examination of the psychological literature of the need, cognitive, and reinforcement theories of motivation; organizational attachment (commitment, absenteeism, and turnover); job design and quality of work issues. Methodological and psychometric issues in the interpretation and evaluation of work motivation research are emphasized.

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 the beginning of the semester. Practical experience in school psychology.

754 Quantitative Methods III: Psychological Applications of Regression Techniques (3:3:0) Prerequisites: PSYC 611 and 612. Psychological applications of regression techniques are reviewed in a variety of contexts including experimental, field, and survey settings.

755 Statistical Packages for Psychology (3:3:0) Prerequisites: PSYC 611 and 612, PSYC 652 or 653 or equivalent. Introduction to manipulation techniques of statistical analysis appropriate for applied problems in psychology.
with three widely used statistical packages: BMD, SPSS, and SOUPAC.

756 Quantitative Methods IV: Multivariate Techniques in Psychology (3:3:0) Prerequisite: PSYC 611 and 612 or equivalent; PSYC 755 recommended. Survey of multivariate statistical techniques as applied to psychological research. Emphasizing 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. Focus on non-cognitive individual differences that predict performance. Published work discussed in a seminar format with emphasis on conceptual development, methodological adequacy, and new directions.

758 Dispositional Predictors of Performance (3:3:0) Prerequisite: PSYC 656. Focuses on individual differences other than cognitive ability that predict performance. Papers are discussed in a seminar format with an eye towards 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 the course reviews basic psychological research on judgment and decision making, and the second half applies this research to various practical problems. Overarching goal is to understand how the basic decision making literature can better inform applied research and practice.

760 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.

761 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.

762 Applied Developmental Psychology (3:3:0) Prerequisites: PSYC 704 or 3 credits of other graduate development psychology courses and permission of instructor. Examines how developmental theory, knowledge base, and methodology can be used to promote health and welfare of individuals across lifespan. Topics include contemporary social issues and child development, research in applied settings, developmental assessment and intervention, and program evaluation.

763 Assessment and Treatment in Gerontology (3:3:0) Prerequisite: course in the psychology of aging, PSYC 320 and PSYC 423, or equivalent courses. Functional assessment of older adults including the conceptual and methodological problems involved. Intervention strategies with older adults are examined, including interviewing, group work with older persons, milieu therapy, reality therapy, and the design of supportive environments.

764 School Psychology Internship (3-12:0:0) Prerequisite: completion of required courses in school psychology and permission of program coordinator. One-school-year, supervised field experience in which the advanced school psychology student functions as a full-time staff member within a school system. Student completes a paper on a practical research project involving an alternative school psychology role in the school system. Enrollment is for a total of 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, Physiological, and School Psychology (1-6:1:0) Open to degree students in developmental, physiological, or school psychology MA/PhD programs. Interested students must apply to the area coordinator 60 days before registration. Prerequisites: Three credits of graduate developmental or physiological psychology or advanced standing in school psychology. Supervised experience in developmental, physiological, or school psychology.

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 the master’s degree. A minimum of nine credits of 798, 799, 597 or 792 may be applied toward the master’s degree. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: PhD admission to study in psychology. Program of studies designed by student’s discipline director and approved by student’s doctoral committee, that brings student to participate in research of discipline director and results in paper reporting the original contributions of the student. Paper presented in subsequent PhD seminar year. Enrollment may be repeated.

810 Intellectual Assessment (4:3:2) Open only to clinical psychology PhD students. Administration, scoring, and interpretation of individual adult and child assessment procedures. Problems of assessment and theories of intelligence are reviewed.

811 Personality Assessment (4:3:2) Open only to clinical psychology PhD students. Prerequisite: PSYC 810. Administration, scoring, and interpretation of adult and child projective and objective tests of personality functioning.

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 the major assessment techniques including Luria Nebraska, Halstead-Reitan, and Michigan Neuropsychological batteries.

822 Psychopathology I (3:3:0) Open only to clinical psychology PhD students. Introduction to psychopathology, including conceptions of mental disorder, cross cultural issues, DSM diagnostic criteria, assessment, treatment, and examples of recent research.

823 Psychopathology II (3:3:0) Open only to clinical psychology PhD students. Advanced course on psychopathology, providing coverage of the empirical literature on the biology and treatment of the major mental disorders.

830 Theories of Psychotherapy (3:3:0) Open only to clinical psychology PhD students. Prerequisites: PSYC 822 and 823. Review of the major approaches to psychotherapy, including the psychoanalytic, humanistic-existential, and
cognitive-behavioral approaches. Students study individual, group, and family therapy from each of these perspectives.

831 Cognitive Therapy (3:3:0) Open only to clinical psychology PhD students. Survey of procedures for altering emotional distress and behavioral dysfunction within the conceptual framework of social cognitive theory and cognitive-behavioral therapy.

832 Group, Marital, and Family Psychotherapy (3:3:0) Open only to clinical psychology PhD students. Prerequisites: PSYC 822, 823, and 830. Introduction to the major models of group, marital, and family functioning as well as current approaches to group, marital, and family psychotherapy.

840, 841 Community Psychology: Theory and Practice (3:3:0), (3:3:0) Open only to clinical psychology PhD students. Introduction to the history, concepts, and practice of community psychology. Course work and practical focus on community mental health theory, consultation, prevention, program planning and evaluation, and human service management.

842 Clinical Neuropsychology: Foundations of Brain- Behavior Relations (3:3:0) Prerequisites: PSYC 702 or permission of instructor. Provides a framework for understanding how the human brain is organized and mediates cognitive and emotional processes. Reviews links between brain anatomy and functions and changes caused by brain injury and neurological disorders.

843 Special Topics in Clinical Neuropsychology (1:1:0) Prerequisites: PSYC 702 or permission of instructor. Provides an overview of the latest theories and findings regarding the etiology, diagnosis, and management of patients with brain disorders. Topics provide an integrated approach that uses information from allied medical and surgical disciplines.

844 Clinical Neuropsychology: Basic Assessment (3:3:0) Prerequisites: PSYC 720, 810 or 709, enrollment in the Clinical PhD program or permission of instructor. Introduces students to core neuropsychological tests and procedures, which codify cognitive or emotional deficits associated with brain damage and disorders. Focuses on the selection, administration, scoring, and interpretation of assessment tools; skills in report writing are developed.

845 Clinical Neuropsychology: Advanced Assessment (3:3:0) Prerequisite: PSYC 844. Provides more advanced and intensive training in the assessment process, and includes interviewing techniques and interpreting specialized cognitive and personality tests. Case presentations of patients with different neurological disorders as well as demonstrations of family interviews.

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 an undergraduate course (not a lab) for the first time. Topics include course planning, syllabus development, lecture resources, effective lecturing skills, use of audio visuals, leading of a 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/interac-
509 Justice Organizations and Processes (3:3:0) Examination of the structures, practices, and performance of organizations involved in the administration of justice (law enforcement, courts and legal agencies, corrections, regulatory and related agencies, private organizations) Explores the applicability of various theoretical perspectives on organizational processes and considers the extent to which these processes operate as a system. Focus is on comparing formal goals and system expectations to actual practice.

510 Policing in a Democratic Society (3:3:0) Fundamental issues in policing a democratic society. Topics include the police mission; impact of the police subculture; defining and recognizing a moral police work; moral hazards of policing (corruption, brutality, and deception); the promotion of integrity, discretion, and control; impact of police practices on crime and disorder; securing the support of the public; and the legitimacy of police, community policymaking, and other reforms.

611 Problem Solving and Data Analysis I (3:3:0) Prerequisite: undergraduate statistics course and passing grade on screening exam. Techniques, skills available to and used by 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 available to and used by public managers to solve policy-related problems or analyze policy-related data. Focus is on data gathering and analysis, use of computers, systems theory and analysis, and operations research.

615 Administrative Law (3:3:0) Law as a guiding and controlling force in public-sector operations. Covers application of legal processes to administrative practices and situations, and administrative determination of public rights and obligations.

620 Organization Theory and Management Behavior (3:3:0) Consideration of behavior within the context of public organization and the consequent changes required in management. Focus 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 the American federal system. Emphasis is on organization, structure, and operations. The relationship of theories to management practices in contemporary American administration is explored.

622 Program Planning and Implementation (3:3:0) Prerequisite: PUAD 620. Practical exploration of implementing public law in the American federal system. Construction of organizational apparatus, development of operational plans, and systems of control and evaluation necessary to implement government programs are studied. Emphasis is on coordinating tasks and resources required for effective program implementation.

625 Higher Education Law (3:3:0) Analysis of the many legal issues confronting higher education: governance, faculty matters and student issues. Examples include due process, freedom of speech, and privacy. Review all the key constituents in higher education—student, faculty, administrators, board of trustees, and parents—and how their roles are changing.

634 Management of International Security (3:3:0) Examination of theory and practice of managing international security. Emphasis is on interplay of organizational structure and bureaucratic dynamics in the international context. Theory and practice of crisis management and coordination and comparison of security methods and techniques are presented.

636 The NGO: Managing the International Nonprofit Organization (1-3:3:0) Unique aspects of nonprofit organizations operating in international environments, particularly in relief and development work. Relationship between the NGO and U.S. and foreign governments is examined. International philanthropy, cross-cultural understanding, and key managerial concerns such as communications, planning, human resource management, control, group process, and project evaluation are covered.

640 Public Policy Process (3:3:0) 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 efforts in the U.S. from 1970 to the present to mitigate pollution of the nation’s air, land, and water, and addresses issues of global concern, including biodiversity loss, ozone depletion, and climate change.

643 Public Policy Research (3:3:0) Prerequisite: PUAD 640. Examination of major concepts, designs, and methods used in applied policy research. The underlying logic of policy inquiry, and the use of quantitative and qualitative techniques, is explored. Includes case applications of each of the major styles of inquiry, and the steps in planning, administering, and reporting policy research.

644 Public Policy Models (3:3:0) Prerequisite: PUAD 640. Approaches to modeling policy problems. Includes an analysis and comparison of the dominant paradigms in the policy sciences. Assumptions and implications of different models and their utility for analysis, implementation, and evaluation are reviewed.

651 Virginia Politics, Policy, and Administration (3:3:0) Prerequisite: 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.

654 The Community, Marketing, and Public Relations (3:3:0) Prerequisite: PUAD 502 or 505. Focuses on marketing concepts and communications issues of a nonprofit organization as they apply to the identification of its market, its ability to formulate a public image and reputation, and its capability to raise money and retain membership or volunteers.

655 Philanthropy and Fund Raising (3:3:0) Prerequisite: PUAD 502 or 505. Examines the history of philanthropy and its relationship to the nonprofit, government, and commercial sectors in the United States. The principles
of financial development are studied including governance, development of organizational capacity, and the identification of funding sources and donor motivations. Provides an understanding of the many fund-raising techniques that generate financial support for nonprofits and the context in which these methods may be used.

657 Association Management (3:3:0) Prerequisite: PUAD 502 or 505. The practical application of management theory within the context of professional and trade associations. The legal structures, tax-exempt status, and general organizational structure are covered. Topics include volunteer management, budgeting and accounting practices in associations, fund raising, media relations, media and event planning, and human resource management.

659 Nonprofit Law, Governance, and Ethics (3:3:0) Prerequisite: graduate standing. Overview of the nonprofit governance as well as basic contract, labor, and tax law issues within nonprofit corporation law. Relationship between the board and the executive is covered, 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) Study of fundamental normative debates in the public and nonprofit financial management arena with a focus on resulting implementation principles and techniques in governmental accounting, financial reporting, budget and revenue decisions, debt management, cash and investment management, pensions and employee benefits, and risk management.

661 Public Budgeting Systems (3:3:0) Survey focusing on policy and theoretical framework of revenue and expenditure choices at all levels of government. Topics include development, theories, structure of budgeting; political, economic, and managerial aspects of public budgeting; public policy implications; and budgetary reform movements and successes and failures.

664 Advanced Topics in Nonprofit and Public Financial Management (3-3:3-0) Prerequisite: PUAD 660 or permission of instructor. Focus on advanced issues in fiscal management systems, with attention to the accounting and fiscal features of nonprofit and public systems. Students will compose and read financial statements and examine such issues as investment policies, endowment management, and enterprise income. Elements of financial management such as raising money, budgeting, and control are discussed, with attention to conflicts among charitable, competitive, and public regarding norms.

670 Human Resources Management in the Public Sector (3:3:0) Prerequisite: PUAD 502. Overview of the range and complexity of functions, responsibilities, and expectations of human resource staff and line managers within the public sector. Focus is on human resources management within the 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, representational elections, bilateral policy negotiations, administration of agreements, management rights, union and membership security, the 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. Examination of 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. The development and construction of organizational systems to implement government policies and programs. Emphasis on 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) Prerequisites: 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 the final two semesters of the MPA program. Examination of normative issues in management of programs in international context. Emphasis is on interplay of cultural, sociopolitical, legal, and ethical factors and on management and policy problems arising from conflicting goals, values, and inequities among nations and regions.

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. Preparing 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. Examination of decision making under risk and uncertainty. Readings introduce the major intellectual perspectives on the topic and are drawn from a variety of disciplines, including biology, economics, law, and psychology. Emphasis is on making actual decisions under uncertainty.

729 Issues in Public Management (1-3:3-0) Prerequisites: PUAD 502 and 9 graduate credits. May be repeated with different topics. Current issues in management of public organizations in contemporary American government. Practical applications of theories and analysis to managerial problems are included. Competence in improving management in selected government settings is emphasized.

730 Professional Development Workshop (1-3:1-3:0) Exploration of external and internal factors that are reshaping public and nonprofit organizations. Investigation of processes and techniques that managers and staff can use to respond to rapid environmental change. Emphasis is placed on case studies and the application of techniques and processes.

732 Managing Technology Transfer (3:3:0) Prerequisite: 12 graduate credits. Examination of how governments,
businesses, and international organizations manage cooperation and competition in the transfer of technology. Case studies on East-West, West-West, and North-South relations are included.

738 Issues in International Security (1-3:3:0) Prerequisites: PUAD 504 and 9 graduate credits. May be repeated with different topic. Examination of issues of topical interest in the general area of international security. Possible topics include nuclear strategy, disarmament, American defense policy, and international terrorism.

739 Issues in International Management (1-3:3:0) Prerequisites: PUAD 502 and 9 graduate credits. Examination of significant current issues in public international management. Emphasis is on practical applications of theories and analysis of problems in the public international management arena. Competence in improving management practices in international management settings.

741 Policy Analysis (3:3:0) Prerequisites: PUAD 502, 611, 612, and 640. Introduction of concepts and techniques for formal policy analysis, development of skills in applying policy analysis techniques through case studies, and exploration of the 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 the 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. Examination of significant current issues in public policy in contemporary American government. Emphasis is on practical applications of theories and analysis to policy problems. Competence in improving policy analysis in selected government settings is also emphasized.

Federalism and Changing Patterns of Governance (3:3:0) Prerequisites: PUAD 502 and 9 graduate credits. Examination of broad trends in governance, including both the 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) The evolution and current state of environmental policymaking. History, strengths, and weaknesses of key U.S. environmental laws and central international environmental agreements. Introduction to analytical approaches, including cost-benefit and risk analysis. Discussion of economic incentives and normative considerations.

759 Issues in Local Government Administration (1-3:3:0) Prerequisites: PUAD 502 and nine graduate credits. May be repeated with different topic. Management and policy formulation in American local governments. Addresses environments, institutions, and actors involved. Contemporary problems, such as education, criminal justice, transportation, land use, economic development, and environmental impact, are examined.

760 Issues in Public Financial Management (1-3:3:0) Prerequisites: PUAD 502 and nine graduate credits. Current issues in budgeting and financial management in contemporary American government. Practical applications of administration and management issues and policy choices at all levels of government are emphasized.

761 Information Management: Technology and Policy (3:3:0) Prerequisite: PUAD 680 or permission of instructor. Examine the challenges that organizations encounter as they move to a more technologically sophisticated information and communication environment. Organizational policy issues evolving from new technologies, including privacy, security, authentication, content control, intellectual property, and taxation, are studied, focusing on the effectiveness of previous policy solutions and analyzing proposed solutions.

790 Justice Organization and Administration (3:3:0) Examines the 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 assessment 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: JTCP 740/GOVT 790 or instructor’s permission. How justice organizations behave at lowest levels, where service is delivered and discretion is greatest (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. Work-study programs with specific employers. Credit is determined by the department.

795 Leadership in Justice and Security Organizations (3:3:0) Prerequisite JTCP 740/PUAD 790 or instructor’s permission. 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 a specific topic under the direction of a faculty member. Written report is required; oral examination over the research and report may be required. May be repeated once.

797 Changing Justice and Security Organizations (3:3:0) Prerequisite: JTCP 740/PUAD 790 or instructor’s permission. 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.

799 Issues in Justice Administration (1-3:3:0) Prerequisites: PUAD 502 and 9 graduate credits. Exploration of current issues in justice administration. Consideration of diverse perspectives on current and emerging issues concerning administration of justice. Emphasis on 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 the justice process, or crossnational 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. Examination of 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. Case studies are used.

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. A survey of the major institutions that formulate and implement public policy in the 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 or permission of instructor. This course is the second of a two-semester sequence (PUAD 840, 841) in the governance and public management policy concentration. The division of responsibilities between the several levels of government and between the public and private sectors. Focuses on the impact of these divisions on the 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 the basis for a doctoral dissertation.

999 Doctoral Dissertation (1-24:0:0) Prerequisite: permission of participant’s dissertation committee. Registration for the 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 interactional. Using case studies, students learn pertinent approaches to study 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.

601 Theory and Practice of Regional Economic Development (3:3:0) Focuses on traditional theories of economic development (economic base, growth pole, infrastructure investment, location theory, central place theory) as well as nontraditional perspectives, emphasizing application of theory to practice through case studies.

602 Regional Economic Development and Technology (3:3:0) Introduces students to the role of technology in economic development policy and practice. Examines the processes of technological development and change in enterprises and collaboration among industry, government, and academic institutions through case studies.

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 a two-semester sequence on international peace operations. Focuses on the emerging theory of peace operations, including peace-making activities of the 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 a two-semester sequence on international peace operations. Focuses on the application of the emerging theory of peace operations, including peace-making activities of the 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 (4:4:0) Theories of public policy emphasizing both the historical intellectual development of the discipline and the role that theory and ethics may be expected to play in public policy making. Assumptions made by policy professionals examined reflectively against a broad range of philosophical, social, political, and economic imperatives affecting public policy environment.

702 Comparing Political Institutions (4:4:0) Examines political institutions and processes from comparative and international perspectives, and the role of the political environment in economic policy decisions, trade and investment. Examines issues of generalizability, objective knowledge and understanding, and the nature of evidence, and how they impact public policy.

703 Organizational Informatics in Public Policy (4:4:0) Helps policy professionals develop proficiency in technological skills necessary for effective practice by teaching the 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 (4:4:0) Prerequisite: PUBP 501. Graduate-level introduction to statistical methods and techniques used in the 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 an introduction to computer-based statistical analysis.

705 Advanced Statistical Methods in Policy Analysis (3:3:0) Prerequisite: PUBP 704 or equivalent. Classical regression methods and their application to public policy analysis. Simple and multiple regression, analysis of variance, time series, and simultaneous equation structural models. Problems associated with applications include specification error, multicollinearity, qualitative variables, heteroskedasticity, serial correlation, and structural identification. Course develops analysis skills by discussing sample empirical studies and models using advance statistical computer software.

706 Environmental Decisions: Modeling Rational Judgment (3:3:0) Prerequisite: PUBP 705. Discusses decision aids for environmental or other policy makers to make and defend decisions soundly and economically. Integrates public policy and environmental science with decision analysis; for example, prescriptive models that quantify the knowledge and values a person or institution brings to bear on a decision. Simple aids, based on decision theory, are applied to real consulting cases.

709 Research Design and Writing (3:3:0) Helps students revise a draft scholarly paper into a form acceptable in a refereed public policy journal. Focuses on how to find a researchable question, identify appropriate methods, build a bibliography, outline an 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 Rational Choice and Uncertainty: Systems Dynamics Policymaking (3:3:0) Introduces basics of decision analysis. Examines quantitative modeling of judgment to aid the evaluation of perplexing or controversial policies involving conflicting objectives or outcomes. Also covers assessing uncertainty about events and quantities, directly and indirectly, and changing uncertainty in the light of new evidence. Focuses on systems dynamics.

712 Policy Systems Analysis and Management Science (3:3:0) Introduces analytical models and analysis that can be applied to support decisions. Primary emphasis is on understanding the techniques of operation research and management science, cost benefits, and cost effectiveness for public decision-making. Mathematical details of algorithms used to solve the models are not emphasized except as they contribute to understanding the reliability and validity of these methodologies. Through case studies and computer solutions, students gain an appreciation of when, where, and how to use the models. Finally, students demonstrate their understanding of these techniques by applying them to a term research project on a government program.

713 Policy and Program Evaluation (3:3:0) Examines how programs of public agencies are proposed, established, operated, and evaluated. Covers the role of research in the program-evaluation process, including alternative methodologies for policy assessment. Considers demand estimation, supply and pricing of publicly produced goods and services, and the role of subsidies in nonmarket environments.

714 Topics in Transportation Policy, Operations and Logistics (1-3:3:0) Current issues in transportation policy, operations and logistics in the 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 the 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; their contribution to and impact on society; institutions and practices that govern their planning, design, construction, operation, maintenance, and retirement from service; policy and managerial challenges that they pose; and tools and techniques for addressing them.

716 Transportation Operations and Logistics (3:3:0) Provides a survey of freight logistics 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 between three parties, typical document flow (electronic and paper), 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 the gravity model. Sources of transportation data and research design are also covered. Teaches mathematical base and logic of each technique, but application of these methods to relevant policy and management problems is primary emphasis. Students required to complete a series of assignments along with a research proposal focused on applying one or more of the methods to a problem of their own interest.

718 Transportation Planning and Policy (3:3:0) Introduces highway, rail, air, and water transport planning in the United States. Teaches legislative, organizational, fiscal, legal and political environment within which planning for transportation facilities and services takes place. Introduces technical and analytical methods for transportation planning. Focus is largely on the public sector, but also considers commercial transport planning and the role of the private sector in helping to design, manage, and finance transport systems.

719 Transportation Law (3:3:0) Examines the 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 a basis for understanding the economics of the 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 the design and delivery of actions to manage or resolve problems and opportunities. Range of application areas depends on interests of the 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 the importance of well-planned transportation facilities and policies. Course introduces students to 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 a wide range of information technology applications to surface transportation. Categories of ITS 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) Increasing internationalization and globalization of markets is producing new challenges for transportation services, not only in terms of offering efficient and effective freight transportation options, but also in terms of the international movement of people both as part of international trade and as part of direct consumer services such as tourism. Technology shifts have created new supply conditions to meet demands of international commerce that transcend transportation to embrace communications. Changes are also embedded in new institutional structures, including liberalized regulatory regimes and the emergence of international bodies such as the WTO that are beginning to influence the trade in transportation services themselves. Course is concerned with making an efficient match between these new demands on transportation and the ways they can be met. Topics embody a multidisciplinary approach to international transportation logistics drawing on economics, law, information technology, and network analysis. Subjects covered include international supply-chain management, global performance indicators, international intermodal transportation, air-freight logistics, new technologies, and border-crossing issues.


727 Transportation Evaluation (3:3:0) Transportation impinges on many aspects of life: economic, social, and political. The provision and operation of transportation services involves a wide-range of trade-offs. Course looks at the range of evaluation techniques and concepts that are applied in making decisions over such matters as transportation investments, transportation operating strategies, and public policy as it affects transportation. Considers theory and concepts as well as more detailed assessments of standard evaluation methods used in the United States and elsewhere. Case studies reviewed in depth.

728 Fleet Operations (3:3:0) Overview of the 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 the main elements of transportation asset management, which has attracted significant attention over the past decade. It is a response to a number of developments that have challenged the traditional framework for transportation service delivery, including changes in the transportation environment; a shift in the public’s attitude toward the provision of public goods; and extraordinary advances in communication and computer technologies. The adoption of transportation asset management poses significant challenges on both the organizational structure and the existing knowledge base within transportation agencies. Course provides an overview of these challenges, and introduces theoretical frameworks within which the challenges may be analyzed.

730 National Policy Systems and Theory (1-4:3:0) Provides an inquiry into the policy-making environment, organized around the U.S. federal system. Examines the nation’s policy systems and its key components: the actors, institutions of governance, outside groups, and other influential interests. Special emphasis on the dynamic character of policy making. In addition, different policy theories are discussed in the context of current political realities.

731 Macroeconomic Policy Assessment (3:3:0) Covers monetary theory, theories of consumption and saving, budget deficits, economic growth, international finance, and monetary and fiscal policy. Investigates national income and product accounts, savings, employment, and investment, as well as alternatives to Keynesian principles. Evaluates theories of inflation, investment, capital accumulation, and nonproportional growth.

732 Transport and the Environment (3:3:0) Multidisciplinary course examines implications of transportation and how public policy has attempted to handle them, and how policy may move in the future. Looks at all modes of transportation and at most of the 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, the policy analyst must understand contemporary methods used to influence policy. Course focuses on the roles and techniques of organized influence and its impact on policy.

736 The Global Information Economy and the Digital Divide (3:3:0) Discusses many of the institutional, social, and policy issues involved in the development of a global information economy and society. Economic development needs, public institutional capacity, nongovernmental networks examined critically, and course deals with the implications of universal access to the Internet and equality of use in areas such as online delivery of government services, privacy, online voting, and e-government. Focus also is on efforts to ameliorate digital divide sponsored by major criticism. 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 the delivery of government services, but also portends major debate about government intrusion. Course covers the emerging public policy issues associated with electronic government: job displacement in the 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, non-profit organizations, and government.

739 Media and Public Policy (3:3:0) Examines the 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 their 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. Mobilizing and allocating resources through the planning, adoption, and execution of the budget is stressed. 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 a 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 the 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 the National Security Act of 1947 and the Goldwater-Nichols Act of 1986.

744 Federal Institutions and Management (3:3:0) Covers management and policy in the federal government, examining policy problems within the context of national system of governance, including political environment, evolution and constitutional framework of American government, the U.S. Congress, executive branch from the White House to the 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. Examines all modes of transportation and most environmental ramifications.

746 Maritime Transportation Policy, Operations and Logistics (3:3:0) Examines how the 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 the 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 interaction with airline economics; safety and security technologies and regulations; the future of various elements of air transportation; and effects of deregulation on air travel.

748 Public Transportation Policy, Operations and Logistics (3:3:0) Provides a general system description for the components comprising the 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), the reporting structure, customer service, and contracted operations. Also discusses current topics of interest, such as security of transit systems and the transit’s role in the pursuit of air quality.

749 Highway Transportation Policy, Operations and Logistics (3:3:0) Highways have played a central role in the development of the American transportation system. In particular, the interstate highway system has revolutionized both freight and passenger transport. Course examines the history and development of the highway system, institutions responsible for its development and ongoing operation, environmental impacts and efforts to mitigate them, the emerging emphasis on operations and management of the highway system, and its role in the freight logistics and supply chain management system.

750 History of Military Operations Other than War (3:3:0) Focuses on the history of military activity in support of noncombat missions. Uses historical examples of the early days of the United States and colonial histories of Western and Eastern powers. Also touches on the use of military force in support of multinational peace operations.

751 International Police Operations (3:3:0) Analyzes the 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 the prospects for success of international peace operations. Examines the origins, mandates, planning, and deployment of international civilian police forces, the problems of coordinating these international police operations with international military forces and local security forces, the international role in developing democratically oriented police forces, the relationship of police to the entire judicial system, and the need to continue assistance to all parts of the judicial system beyond the initial intervention.

752 Infrastructure Finance (3:3:0) Covers the 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) Inquires 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 the impact of culture and politics on ethical dilemmas confronting society. Also looks at the 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 an emphasis on how they affect public policy.

754 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 in current policy issues. Explores tension in decisions between rational goal seeking by actors vs. organizational process, and aims to develop usable decision tools.

755 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 region-by-region political, military, economic, and social trends.

756 Public Policy in Global Health and Medical Practice (3:3:0) Introduction to 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.

757 Global Threats and Medical Policies (3:3:0) Explores biomedical research, medical and public policy, the health security agenda, and global health and medical policies including aspects of global health security, and policy and politics in the field.

758 Science and Technology Policy in the 21st Century (3:3:0) Examines the roles dynamic scientific research and technological innovation play in contemporary society. Focuses on design and analysis of alternative public policies intended to influence the rate and direction of technological change in institutions, and on the 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 the “new economy” such as biotechnology, networked telecommunications and computing, and the 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 the concept be plugged into economic models? Can social capital be introduced to improve our ability to fashion or improve specific social policies for crime, education, family, or social welfare?

762 Social Institutions and Public Policy (3:3:0) The 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 the family, schools and colleges, the criminal justice system, and government agencies. Many of these policies have been controversial, with debates over their efficacy and whether they have cured or exacerbated the social problems they were designed to alleviate. Course examines the 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 are linked to readings and discussions on social theories and value systems that underpin these 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, the role of school resources in academic outputs, and equity topics.

770 Topics in Regional and Urban Development Policy (1-3:3:0) 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 the issue of leadership in the context of regional economic development.

771/SYST 691/EPP 601 Introduction to Enterprise Engineering and Policy (3:3:0) Provides an overview of extended enterprise integration. Lectures focus on the SAP architecture and the R/3 standard software solution. Laboratory requires students to complete an end-to-end implementation project with the Great Plains Software midrange ERP solution, Dynamics C/S +. For modeling, students must demonstrate proficiency in the Architecture of Information Systems (ARIS) methodology and the supporting ARIS Toolset.

772/SYST 692/EPP 602 Decision Support for Enterprise Integration (3:3:0) Prerequisite: SYST 542 and SYST 691 or equivalent. Lectures focus on the use of “business intelli-
gence” to enhance competitive advantage, development of an information-driven set of controls to improve profitability, and emphasis on the creation of a balanced business with aligned corporate direction and strategic intent. Solutions provided within ERP systems are examined.

773/SYST 693/EPP 603 Supply Chain Integration and Management (3:3:0) Prerequisite: SYST 691 or equivalent. Lectures focus on two issues: supply chain integration from an information technology perspective, and supply chain management from a decision support perspective. Course motivation is the 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/EPP 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 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.

775/SYST 695/EPP 605 Economics of Electronic Commerce (3:3:0) Prerequisite: SYST 691 or equivalent. 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; and business-to-consumer relationships and the economics of strategic procurement, ERP hosting, customer relationship management, catalog hosting, portal operations, and supplier management.

776/SYST 696/EPP 606 Customer Relationship Management (3:3:0) Prerequisite: SYST 691 or equivalent. Focuses on the “front office” and its integration with the “back office.” The modern world of e-commerce extends intraenterprise integration as implemented in Enterprise Resource Planning (ERP) systems to include external constituents such as customers, partners, and suppliers. Course focuses on modern system support for the demand chain and the value creation process that results from integrating the front office systems with the back office systems.

777/SYST 697/EPP 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) Explores evolution and future of the Washington metropolitan area economy, its historical context, the role of federal spending, tourism, the technology sector, international business, regional organizations, local government policies, and forecasts. Evaluates development patterns in the District of Columbia, Northern Virginia, and suburban Maryland.
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 the operations of the International Monetary Fund and the World Bank, development of the European Monetary Union, and debate over “international financial architecture.”

783 Global Governance (3:3:0) Surveys important issues in global governance given changes in the contemporary world. Explores dynamics and complexity of formal and informal actors, institutional arrangements, organizations, and the roles they play in the process of governance in the 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.

785 Urban Development Economics (3:3:0) Examines changing structure and functions of the 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 innercity neighborhoods, central and suburban business districts, waterfronts, and surplus military bases.

794 Internship (1-6:0:0) Prerequisite: 12 PUBP credits or permission of instructor. Open only to students in a SPP degree program requiring internship. Contact appropriate program director one semester before enrollment. Work-study programs with specific employers. Credit determined by the appropriate degree program.

795 Final Project (1-3:0:0) Writing of a capstone paper related to the student’s program concentration, under the guidance of a three-person committee.

796 Directed Readings and Research (1-3:3:0) Independent reading and research at the master’s or doctoral level on a 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 a public policy master’s program, completion of the required credits of graduate course work, and approval of thesis proposal by faculty advisor, two committee members, and the program director. Individualized section form required. Original research endeavor related to the student’s program concentration. Research must result in a 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 the 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 the 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 the patterns of international trade, demographic composition of the population, and trends in the social structure. Builds awareness of the need to factor alternative assumptions about the macro environment into policy planning; show how macro events can affect social welfare and policy performance indicators; and suggest how national income accounting analysis and simple macroeconomic models can help to 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. Emphasis is on 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. Inquiry on an advanced level into national and international policy-making environment, with special emphasis on the dynamic character of the political arena. Examines policy systems and their key components: major actors; institutions of governance; and influence of outside groups, political parties, and special interests.

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.

807 Advanced Qualitative Research: Theory and Methods (4:3:0) Prerequisite: SOCI 530, SOCI 634, or equivalent. Prepares students who intend to use qualitative methods in their public policy PhD dissertations. Covers ethnography, theory and practice of survey research, case study, and discourse analysis.

808 Advanced Economic Analysis for Policy Research (4:3:0) Prerequisite: PUBP 720 or equivalent. Builds analytical skills in the use of economic analysis for policy modeling. Designed for graduate students in public policy with competence in elementary calculus and matrix algebra. Reviews basic mathematical techniques and then covers basic consumer theory, demand estimation and forecasting, production theory, technological change and productivity analysis, market structure and competition, capital budgeting, and the role of the public sector.

810 Theory and Methods in Regional Policy I (2:2:0 to 4:3:1) Introduces and critiques theory and methods used in regional policy analysis. Covers central place theory,
growth pole theory, and economic base theory, as well as other theoretical constructs used in regional policy analysis. Also examines methodological tools such as regional econometric modeling, multivariate programming, shift-share analysis, economic base analysis, location quotient analysis, input-output analysis. Also studies selected current regional public issues using theoretical and methodological constructs introduced in first part of course.

811 Theory and Methods in Regional Policy II (2:2:0 to 4:3:1) Second of two semesters of required concentration seminar sequence in regional development policy. Only students who have participated in the first semester of sequence (PUBP 810) are admitted. Students develop research papers that investigate some element or aspect of regional policy, with the goal of producing publishable papers. Students develop the focus of their paper based on work carried out in the first semester, and are expected to prepare a two-page proposal, followed by a detailed proposal and finally, the completed paper. Each is critiqued in the seminar, which is organized to conform to this process of review and critique. Instructor works with students individually, as well as in the seminar sessions.

817 Policy Research Topics: Transportation Policy (2:2:0 to 4:3:1) Research workshop examining the development of policy research and relevant methodologies linked directly to faculty and student interests. Students identify cutting-edge policy concerns and execute a research program. The 4-credit version of course requires a discussion section and research laboratory.

820 Technology, Science, and Public Policy I (2:2:0 to 4:3:1) First of a two-semester core seminar sequence required for PhD public policy students in the science and technology policy concentration. Covers literature relevant to science and technology policy. Core sequence begins with the postulate that technology has become a major causal force in the contemporary world. Looks at the key formulations of the relationship of science, technology, and public policy.

821 Technology, Science, and Public Policy II (2:2:0 to 4:3:1) Second of a two-semester core seminar sequence in the science and technology policy concentration. Students develop research papers that investigate some element or aspect of science and technology policy. Course helps students identify and develop topics with the goal of producing publishable papers. Students identify and develop topics with the goal of producing publishable papers. Students identify and develop topics with the goal of producing publishable papers.

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 Research Seminar in Policy Governance I (2:2:0 to 4:3:1) First of a two-semester sequence (PUBP 840, 841) in the governance and public management policy concentration. Surveys the major institutions that formulate and implement U.S. public policy. Examines the development of public policy in several policy areas, such as urban governance, environmental policy, and health care.

850 Seminar in Public Policy (1:1:0) Weekly colloquium series, required of public policy PhD students. Features a variety of speakers from universities, government, and nonprofit sectors. Topics include policy formulation and analysis, and theoretical and methodological foundation.

860 Social Theory and Public Policy (2:2:0 to 4:3:1) Introduces social theory and how it affects public policy. Major theoretical frameworks in social sciences are analyzed in relation to role they play in the formulation of public policies in such selected areas as poverty and inequality, the family, education, crime and drugs, race and minority.

861 Research Seminar in Culture and Policy (2:2:0 to 4:3:1) Emphasizes integration of theory and method into empirical research projects. Covers linkage between theoretical constructs and empirical literature, derivation of research questions from existing body of literature, and selection of methods appropriate to answer those questions. Requires development of concrete proposals for empirical research and criticism of such proposals.

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 Processes and Technology (1-4:3:0) Prerequisite: PUBP 870. Introduces the modern vertically and horizontally integrated organization. Focuses on the modern managerial policy aspects of creating, integrating, and managing modern information technology-enabled public and private sector organizations.

872 Decision Support for Enterprise Integration and Policy (4:3:0) Focuses on use of technology to enhance competitive advantage, developing policies and techniques to improve profitability, and the creation of a balance between corporate direction and strategic intent. Examines solutions within extended enterprise resource planning systems.

880 Global and International Public Policy (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 the institutional arrangements governing world trade. Covers the World Trade Organization (including constituent agreements in goods, services,
intellectual property and trade-related investment measures), regional trade agreements such as NAFTA, dispute settlement regimes, and relations between trade and the environment.

997 Field Statement (1:1:0) Requires work on field statement in preparation for field exam. Must register in the 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 a research proposal that forms the basis for doctoral dissertation. May be repeated, although 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 an approved dissertation topic under director on dissertation committee. May be repeated, although 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 for Specialist Teachers (3:3:0) Research-based introduction to K–12 content area reading, writing, and language arts. Emphasizes integration of reading and other language arts across the curriculum. Field experience in public schools required. Note: Course intended as introduction to educational issues, and not applicable in Mason’s graduate-level teacher education programs.

301 Facilitating Literacy in School or Community Settings (3:3:0) Corequisite: 45 clock hours of school-based field experience during course. Provides background knowledge, teaching strategies, and support for students who wish to work with developing readers and writers in school or community settings. Emphasizes implementation strategies that foster and enrich literacy development; incorporation of trade books and technology resources into individual and small group work; and reflection on work as a literacy facilitator. Field experience in public schools required.

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 the 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 the curriculum, bilingual acquisition, historical and current approaches for second language learners, preliteracy skills for younger and older English language learners, and special issues in developmental and diagnostic reading for language minority students.

619 Literacy in Content Areas (3:3:0) Prerequisites: Methods I (EDCI 567, 569, 572, or 573) and Methods II (EDCI 667, 669, 672, or 673) Corequisite: EDCI 790 Internship. Offers understanding of language and literacy process as it applies to teaching in secondary schools. Emphasizes reading and writing in the content areas, and instructional strategies to support students’ literacy development. Focusses 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. Introduction to the reading and writing processes in foreign and second languages, research on reading comprehension, and effective teaching and assessment approaches for students in PK–12 schools. Topics include reading goals and standards for foreign language learning, sociocultural perspectives, multimedia computer-assistance, research on related strategies and skills, and performance-based assessments.

630 Advanced Literacy Foundations and Instruction, Birth to Middle Childhood (3:3:0) Prerequisite: admission to the literacy emphasis, or permission of program coordinator. Advanced study of literacy theory, research, and practice as it relates to younger learners. Addresses sociocultural, cognitive, linguistic, psychological, and developmental influences on children’s literacy. Includes reading, writing, and oral communication.

631 Advanced Literacy Foundations and Instruction, Adolescence through Adulthood (3:3:0) Prerequisites: EDRD 630 and admission to the literacy emphasis, or permission of program coordinator. Advanced study of literacy theory, research, and practice as it relates to adolescents and adults. Addresses sociocultural, cognitive, linguistic, psychological, and developmental influences on literacy. Includes reading, writing, and oral communication.

632 Literacy Assessments and Interventions for Groups (3:3:0) Prerequisites: EDRD 630 and 631; admission to literacy emphasis, or permission of the program coordinator. Provides literacy assessments and interventions for groups of learners. Includes exploration of assessment tools for both classrooms and large populations. Class members conduct related practice in their own classrooms or in 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 the program coordinator. Provides literacy assessments and interventions for individuals. Includes diagnosis and
remediation for learners who find reading and writing difficult. Requires assigned practicum experience.

634 School-Based Leadership in Literacy (3:3:0) Prerequisites: EDRD 630, 631, 632, and 633; admission to literacy emphasis or permission of program coordinator. Prepares reading specialist as a school leader. Expands knowledge of literacy gained in prerequisite courses, and applies it to professional development work with teachers at their own site.

635 School-Based Inquiry in Literacy (3:3:0) Prerequisites: EDRD 630, 631, 632, 633, and 634; admission to literacy emphasis or permission of program coordinator. Capstone course in literacy emphasis focusing on research-based inquiry related to literacy in school settings. Includes review of literature and teacher inquiry project.

636 Supervised Literacy Practicum I (1:1:0) Prerequisites: EDRD 630, 631, corequisite: EDRD 632. Supervised literacy practicum that requires students to engage in 30 practicum hours and five seminar hours.

637 Supervised Literacy Practicum II (2:2:0) Prerequisites: EDRD 630, 631, 632, 636; Corequisite: EDRD 633. Supervised literacy practicum requiring students to engage in 45 practicum hours and five seminar hours.

797 Advanced Topics in Education (1-6:1-6:0) See EDUC 797.

829 Advanced Foundations of Literacy Education (3:3:0) Prerequisites: 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)

Philosophy and Religious Studies

100 The Human Religious Experience (3:3:0) Examines main forms of religious expression as embodied in several important religious traditions in the contemporary world. Religious experience, myth and ritual, teachings and scripture, and the ethical, social, and artistic aspects of religion are investigated, as well as the nature and function of religion in human society.

211 Religions of the Near (Middle) East (3:3:0) Survey of the religions of the Middle East. Focuses on Judaism, Christianity, and Islam from historical, comparative, and cross-cultural perspectives but may also include modern developments of those faiths such as Mormonism and Baha’ism, as well as Zoroastrianism and the religions of ancient Near Eastern cultures.

212 Religions of the Orient (3:3:0) Survey of the religions of India, Hinduism, Jainism, Sikhism, Buddhism, and the religions of the Far East, China, and Japan, including Daoism, Confucianism, Shinto, from their origins to the 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.

272 Islamic Religious Life (3:3:0) Introduces students to the basic religious beliefs and practices of Islam, with a view to the diverse manifestations of Islamic culture in different ethnic and social contexts. Provides an overview of the essential rituals of Islamic life, the mystical practices of the Sufis, certain popular forms of religious practice, the 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. Survey of the major religious traditions and philosophical themes of China including Confucianism, Taoism, and Chinese Buddhism and Neo-Confucianism. Examines the foundation of the Chinese world view and spirituality by investigating the 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. Survey of the Buddhist religious traditions. Main thrust of the course includes the 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 the Buddhist traditions in the South Asian and East Asian countries.

316 The Christian Traditions (3:3:0) Prerequisites: RELI 211, 251, 252 or permission of the instructor. Survey of the origins and development of the Christian traditions to the present. Emphasis on 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 the Daoist tradition reading classic
337 Mysticism: East and West (3:3:0) Prerequisite: 3 credits in religious studies or permission of instructor. Comparative treatment of major expressions of mysticism in East and West through exploration of various ways of understanding mystical experience. Readings and discussion emphasize one or more of the Eastern (Hinduism, Buddhism, Taoism, Zen) and Western (Judaism, Christian-ity, Islam) traditions.

341 Global Perspectives on Spirituality and Healing (3:3:0) Prerequisite: 30 credits or permission of instructor. A cross-cultural investigation of human understandings of the relationship between spirituality and health. Beliefs about the spiritual causes of sickness and health and spiritual techniques of healing in a variety of world cultures are placed within the context of religious beliefs of those cultures.

351 Religions of the Ancient Near East (3:3:0) Prerequisites: RELI 100, 211, 212, 251 or 252, or permission of the instructor. Examination of the religions of the ancient Near East, ancient Egypt, Mesopotamia, the Levant (Syria-Palestine), or Asia Minor. Selection of the religion depends on the instructor.

352 Judaism between the Old and New Testaments (3:3:0) Prerequisite: RELI 211, 251, 252 or permission of instructor. Examination of Jewish religion, history, and literature from the Babylonian Exile to the third century C.E. Special attention is given to the development of the Hebrew Bible, Apocalyptic and Apocryphal literature, belief in resurrection and final judgment, the Dead Sea Scrolls, Jewish sects, and the 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 the instructor. Examines the Gospel accounts of Jesus within the context of first-century Christianity. A variety of historical and literary methods will be applied to gain an understanding of Jesus and the history and theology of the early church.

370 Judaism: Life and Thought (3:3:0) Prerequisite: RELI 211 or 251, or permission of instructor. A study of Judaism from ancient times to the present. Covers topics such as the 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 the Holocaust of the twentieth century, contemporary American Judaism, and relations between Jews, Christians, and Muslims.

374 Islamic Thought (3:3:0) Prerequisite: RELI 211, 3 credits in Religious Studies, or permission of instructor. Examination of Islamic views on fundamental issues in religious thought, such as the nature of God, the nature of man, and the relationship between God and man as reflected in both divine revelation and the human religious vocation. Course investigates a number of intellectual approaches to these problems within the 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 the instructor. Explores the two primary sources of Islamic belief and practice: the Qur’an and the Hadith. Discussion of the thematic structure and literary quality of the texts is accompanied by an examination of some theological and moral issues they raise and an introduction to the various methods of interpretation and critical analysis applied to the texts in both Islamic and Western scholarship. The format for this course is lecture and discussion.

376, 377 Special Topics in Religious Thought (3:3:0), (3:3:0) Prerequisite: 3 credits in philosophy or religious studies or permission of instructor. Selected topics from a philosophical perspective.

381 Beginnings of Christianity (3:3:0) Examination of the early Christian church from the time of Jesus to 700 C.E. Both the internal development of Christianity as it formed official doctrines and institutions and the external relations of Christians with followers of other religions in the Roman Empire are covered. Special attention given to reasons for the success of Christianity in the 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 the 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) Prerequisites: 60 credits including 6 credits in religious studies or permission of the instructor. Study of the origins and development of fundamentalism and violence in global religions with special emphasis on their 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 the instructor. Examination of the 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) Prerequisites: 60 credits including 6 credits of religious studies or permission of the instructor. Exploration of diverse value systems, ethical norms and teaching found in different religious traditions and cultures. Assumption that globalization is an attempt to universalize western culture will be examined.

407 Women in the World’s Religions (3:3:0) Prerequisites: 60 credits; 6 credits of philosophy or religious studies. Seminar course offering a theoretical and comparative study of the 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 the instructor. Exploration of religious rituals and drama in selected world religions. Emphasis on ritual and drama spanning the divine and human realms, actualizing myth, presenting beliefs and shaping the lives of the believers. Religious themes in modern drama may be considered.
Courses

558 Religious Studies (RELI) • Russian (RUSS)

420, 421, 422, 423 Seminar (3:3:0) Prerequisite: limited to students in the religious studies track of the philosophy major, but others may be admitted if the topic is sufficiently close to their fields of study. Topics vary.

425, 426 Independent Study (3:3:0), (3:3:0) Prerequisites: limited to students in the religious studies track majors 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 the comparative aspects of religious phenomena. Examines the 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 the field of religious studies and their pertinence to the role of religion in social, political, and ethical concerns.

641 Drama in the World’s Religions (3:3:0) Prerequisite: graduate standing or permission of instructor. Examines how drama is used in the religions of the world, past and present, to enact the myths, convey the concepts, and involve the worshippers. Ritual dramas, mystery, morality, and passion plays are studied, together with plays that explore profoundly religious themes.

657 “Scripture” in Religious Traditions (3:3:0) Prerequisite: graduate standing or permission of instructor. Exploration of the phenomena of “sacred text” or “scripture,” a widespread and important cultural phenomenon in the major religious traditions of the world.

Russian (RUSS)
Modern and Classical Languages

Placement: See Academic Testing section of Admission chapter.

101 Elementary Russian I (3:3:1) Designed for students with no knowledge of Russian. Introduction to Russian, including 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 a single semester. Recommended for students who desire an intensive introduction to Russian. 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 the 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 the 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 the original language with lectures, discussions, and examination in Russian.

311 Contemporary Russian Short Fiction (3:3:0) Prerequisite: RUSS 202 or equivalent. Reading and discussion of recent short stories by the 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 consists of a survey of Russian literature from its beginning to 1880. RUSS 327 consists of a survey of Russian literature of the late 19th and 20th centuries. Course work in English. May be taken toward fulfillment of the 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. The civilization and culture of Russia and the 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 the 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 the areas of grammar, style, and vocabulary usage. Emphasis on developing fluency 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 the Moscow Art Theater. Reading and discussion of major Russian plays of the 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 the major poets. Reading is 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 the 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 a selected problem in language, literature, or culture in consultation with a member of the 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 the 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 corequisites: C or better in ENGL 302, DESC 210, and ACCT 203. Introduces fundamentals of business models, and writing as a 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.

498 Capstone Course: Advanced Business Models (3:3:0) Prerequisites: ACCT 301, DESC 301, FNAN 301, MGMT 301, and MKTG 301; senior standing; and 6 credits of major courses. Taken in final semester. 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.

Social Work (SOCW)

Social Work

200 Introduction to Social Work (3:3:0) Introduces historical roots of social work profession and social welfare. The person-in-environment perspective is discussed as the framework for social work knowledge, values, and skills. This initial course in the social work curriculum is designed to introduce the student to the social work profession, professional values, ethics, fields of practice, and the settings in which social workers are employed. The profession’s commitment to diverse and at-risk populations and social/ economic justice is highlighted. Presentations by social work professionals in different fields of practice supplement classroom lecture, discussion, and small-group exercises. f,s,summer

301 Laboratory in Interpersonal Communication (3:3:0) Prerequisites: SOCI 101, PSYC 100, and sophomore standing; or permission of instructor. Emphasis on experiential learning of the biological, psychological, social, and cultural influences on the behavior of those who need and those who give help. Students examine their own behavioral and learning patterns, values, ethics, and attitudes to increase their ability to understand and help clients. Field placement of at least 60 hours required. f,s

323 Human Behavior in the Social Environment I (3:3:0) Prerequisites: SOCI 101, BIOL 104, and PSYC 100; or permission of instructor. Completion or concurrent enrollment in all other required general education course work. Social systems approach unifying and integrating concepts and knowledge from biology, anthropology, sociology, and psychology about human behavior. Applications to professional practice, from the social work literature, and to the field experience. f

324 Human Behavior in the Social Environment II (3:3:0) Prerequisite: SOCW 323 with a minimum grade of C or permission of instructor. Examination of social systems theories as they pertain to the study of macro systems. Focus of study involves families, the social group, the formal organization, and the community. Student will apply theoretical concepts to contemporary social problems. s

351 Social Policy and Social Justice I (3:3:0) Prerequisites: SOCI 101 and GOVT 103; or permission of instructor. Introduction to social welfare policy, including its historical development, central concepts, institutional nature, and origins of social work as a profession. Analysis of service delivery systems and the role of the social work profession in bringing about social and economic change. f

352 Social Policy and Social Justice II (3:3:0) Prerequisite: SOCW 351 with a minimum grade of C or permission of instructor. Analysis of 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. s

357 Methods of Social Work Intervention I (3:3:0) Open to majors only. Prerequisites: SOCI 101, SOCW 200 (or corequisite), and PSYC 100; or permission of instructor. Social work practice from a systems perspective. Particular emphasis on problem-solving activities with microsystems. The common core of knowledge, values, and skills essential to social work practice is analyzed to gain insight into social work functions and the role of the social worker as a change agent. f

358 Methods of Social Work Intervention II (3:3:0) Open to majors only. Prerequisites: 60 credits or permission of instructor. Continues a generic problem-solving model, focusing on group and macro intervention systems, settings, and skills. Emphasis on working with both treatment and task groups. Process groups, such as goal formulation, contract setting, composition, and termination necessary for effective worker intervention, are part of the knowledge base of the course. Field service of 40 hours required. s

359 Junior Seminar (1:1:0) Corequisite: Must be taken simultaneously with SOCW 358. Provides students the opportunity to integrate theory, research, and practice in the area of group work. Time is allotted to process successes and obstacles, and to share with other students the issues, knowledge, and skills being learned in the junior-level practicum. s

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. Models of ethical decision making and critical thinking are emphasized.

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 the use and abuse of alcohol and other drugs. Emphasis on the impact of the policies and programs on the well-being of ethnic minority and disadvantaged service populations. sum

415 Child and Family Welfare (3:3:0) Prerequisite: 45 credits or permission of the instructor. Emphasis on 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 the individual to the global. Provides overview of the existing child welfare system with focus on current issues, challenges, and “at-risk” 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 the 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 an interest in pursuing community organization as a professional career specialty. Students are provided with a basic understanding of community organization and planning, with special emphasis on conducting a needs assessment in the community. Students examine the 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) Prerequisites: 45 credits or permission of instructor. Introduces students to the social worker’s role in the legal system and familiarizes students with legal processes and their application to issues of interest to social workers and their clients, including child abuse, foster care, reproductive rights, juvenile justice, and legal rights of the poor/women/minorities.

435 An Intergenerational Approach to Aging (3:3:0) Prerequisites: 45 credits or permission of instructor. Survey of issues related to working with the aged, their families, and care providers. A study of the biological, psychological, and sociocultural aspects of aging, as well as the unique problems that are intricately involved with service delivery to aged persons. Examines the forces that impinge on the aged person and explores critical issues related to extended life span, family changes, institutionalization, and the role of the aged persons in society. Students increase their sensitivity and knowledge of aged individuals through an 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 a grade of C or better and recommendation of faculty. Concurrent with Senior Practicum I (SOCW 453), this seminar provides an integrative team experience designed to support the field experience and provide opportunities for students to demonstrate required competencies through special assignments. f

453 Senior Practicum I (3 credits) Open only to social work majors. Prerequisites: SOCW 200, 301, 323, 324, 351, 352, 357, 358, and 359 with a grade of C or better and recommendation of faculty. Supervised learning experience (practicum) under the guidance of qualified faculty liaisons and professional staff designated and approved by the 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), this seminar is a continuation of the integrative team experience designed to support the practicum experience and provide opportunities for students to demonstrate required competencies through special assignments. s

456 Senior Practicum II (3 credits) Prerequisites: SOCW 452, 453, 471. Continuation of the 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 desig-
471 Research in Social Work (3:3:0) Prerequisites: SOCI 313 or PSYC 300; six credits of social work courses; senior standing; or permission of instructor. Must be completed with a minimum grade of C. Principles and the theory underlying scientific inquiry. Emphasis on the use of research in social work practice, steps in conducting research, and research efforts in developing and evaluating social work knowledge and skills.

475 Selected Topics in Social Work Policy (3:3:0) Prerequisite: 45 credits or permission of instructor. In-depth study of special areas of social work that are of interest to students, faculty, and the 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 critically personal use of different approaches to social work intervention currently employed in practice settings. Students have an opportunity to use the technical skills with clients that these approaches require. May be taken more than once for credit. Topics vary.

498 Child Welfare Capstone (3:3:0) Prerequisites: 45 credits; 21 credits completed toward the Child Welfare Certificate or permission of instructor. Capstone course to be completed for the Child Welfare Certificate. Consists of weekly seminars and the completion of a 140 hour field placement.

499 Independent Study in Social Work (1-3:0:0) Prerequisites: 60 credits and a research proposal approved by instructor before enrollment. Investigation of a research problem in the field of social work.

509 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 the study of human behavior and diversity by exploring the 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. Introduction to 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 students to 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. Introduction to the 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) Graduate standing and 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 the incorporation of social work knowledge, values, and skills.

670 Writing for Professional Practice (3:3:0) Prerequisite: SOCW 657 and graduate standing. Study of various forms of written communication pertinent to social work practice. Examines the 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. Examination of the 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 two days per week in a field practicum and attend a monthly seminar in which they share their learning and integrate theory with practice.

673 Foundation Field Practicum and Seminar II (3:0:0) Prerequisites: SOCW 672. Corequisite: SOCW 658. Continuation of the supervised social work learning experience begun in SOCW 672. Students spend two full days per week in a field practicum and attend a monthly seminar in which they share their learning, process their experiences, and integrate theory with practice.

675 Selected Topics in Social Work: Management (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) Prerequisites: 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 the policy-making process, conducting legislative research, and mastering advocacy skills in order 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 the 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 the 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 are placed in public, nonprofit, or for-profit venues reflecting their specific interests in agency supervision, organizational management, community change, electoral policies, or social policy.

691 Integrative Seminar (3:0:0) Prerequisite: SOCW 680. Corequisite: SOCW 690. Processing of field practicum experiences: analysis of successes and challenges; application of social work knowledge, values, and skills from across the curriculum. Culminates in professional presentations by students.

Sociology (SOCI)

101 Introductory Sociology (3:3:0) Introduction to basic sociological concepts. Examines aspects of human behavior in a 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 an introduction to sociology through the 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 Problems in the Global Society (3:3:0) Introduction to examination and analysis of an important global issue. Considers historical development of the problem and the theoretical analysis of its effect on different societies and cultures. The perception of the problem by different cultures and nations and the efforts of international institutions to address the issue are also investigated. Emphasis is on the interrelationship of social, political, economic, and cultural change in the 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. Course serves as a foundation of many specialized courses offered by the 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. Examination of the social factors involved in the development of delinquency, including family, political economy, schooling, community environment and culture. Examination of various theories of delinquency, the rates of delinquency in relation to age, race, gender and social class, and the 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. Introduction to 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, the human consequences of industrialization, and the impact of the transition to post-industrial society. Special emphasis on the changing position of professional employees and on the social factors that affect the distribution of opportunity among various groups, and on the growing significance of technology for the future 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 are 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 the evolution of racial and ethnic sentiments from the Western colonial period in African, Asian, Middle East-
ern and Latin American countries as well as contemporary US racial and ethnic relations. Explores how changing demographic and 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 the family in history and family forms in contemporary societies. Looks at interaction within families and the relationship between society and families.

310 Sociology of Deviance (3:3:0) Prerequisite: 6 credits of sociology or permission of instructor. Analysis of the macro- and microlevel deviance-producing processes, the meaning and control of deviance, and the major theoretical approaches to deviance.

311 Classical Sociological Theory (3:3:0) Prerequisite: 9 credits of sociology including SOCI 101, or permission of instructor. Sociological tradition is explored through readings and discussions of ideas drawn from the writings of selected sociological thinkers such as Comte, Marx, Weber, Durkheim, and others.

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 an aspect of the symbolic order, social institutions, and the everyday practices of social life. Introduces students to a range of different approaches to the sociological study of culture with emphasis on problems of cultural difference and the narrative aspects of culture in the institutions of a democratic society.

315 Sex and Gender in Contemporary Society (3:3:0) Prerequisite: SOCI 101 or 102, or permission of instructor. 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 the changing social structure in which it takes place.

320 Human Dimensions of Global Change (3:3:0) Prerequisite: SOCI 101 or 102, or permission of instructor. While focusing on the nature and process of change in human society, students consider the social impact of political, economic and environmental change and how their lives are shaped by the complexities of global social forces. Examines specific global issues such as conflict and insecurity, economic disparity, ecological deterioration, populations and migration, the legitimization of commerce, the diffusion of innovations, and the impact of class, status and power in modern societies.

326 Armed Conflict and Conflict Resolution (3:3:0) Prerequisite: SOCI 101 or 102, or permission of instructor. Examination of the political, economic and socio-cultural reasons why countries engage in armed conflict. Conflicts within and between states are explored with special focus on the consequences for global, regional and local instability, the loss of life and limb, and the fragmentation of the 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. The urban community: historical development, demography, and ecology of metropolitan areas; urbanism as a way of life; the emergence of suburbia; and the future of cities.

340 Power, Politics and Society (3:3:0) SOCI 101 or 102, or permission of instructor. Analysis of 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 Modern 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.

373 The Community (3:3:0) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. Examination of small to moderately sized communities ranging through the village, rural community, small town, and city subcommunity. The 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 a 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. Contemporary issues, such as debates about artistic freedom and public morality, the commercialization of art, and the relationship between cultural and social hierarchies, also are explored.

382 Education in Contemporary Society (3:3:0) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. Study of education as a social institution and its function as a 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. Analysis of 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. Study of the place of religious consciousness in human action and the institutional and organizational networks created to sustain religious beliefs. Emphasis on a comparative and historical analysis of the role that religion has played in human society. Examines theories of the nature of religious experience, religious symbolism, and the basis of religious community. Explores changing demographics in relation to older traditional religious faiths and newer non-traditional faiths.

390 Sociology of Health, Illness, and Disability (3:3:0) Prerequisite: 6 credits of sociology including SOCI 101, or permission of instructor. Examination of social context of health, illness, and disability; the relationships of health care professionals and patients; and the structure and delivery of health care in different medical systems.

399 Independent Study (1-3:0:0) Open to sociology majors only. Prerequisites: 6 credits of sociology including SOCI 101 and approval of a written proposal. Individual study of a sociological topic of interest to the student.

401 Social Class and Social Inequality (3:3:0) Prerequisite: SOCI 101 or 102 or permission of instructor. Study of class structures and their 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 the construction, experience, and meaning of such differences.

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 the management and analysis of empirical social science data, including file construction, scaling and measurement, data transformation, and treatment of missing data. Manipulation, management, and analysis of data sets using computer programs are emphasized.

410 Social Surveys and Attitude and Opinion Measurements (3:3:0) Prerequisites: SOCI 303 and 313 or equivalents, or permission of instructor. Survey of research methods and techniques to collect, measure, and analyze social data, attitudes, and opinions with special emphasis on using computer software, the Internet, and other information technologies for social research. Ethical issues for social research, computing, and information technology are highlighted.

412 Contemporary Sociological Theory (3:3:0) Prerequisite: 12 credits of sociology including SOCI 101 and 311, or permission of instructor. Contemporary sociological theorists such as Parsons, Merton, Mills, Berger, and Gouldner are analyzed in terms of their relationship to major schools of contemporary sociological theory.

413 Seminar in Social Issues (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.

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. Focus on language as revealing culturally specific rules of interpretation; the sex, class, race, and setting of specific uniformities in producing talk; and language as it constrains the individual.

416 Internship in Sociology (3:3:0) Prerequisite: 21 credits of sociology, including Research Methods, or permission of instructor. Intended to promote learning in the application of sociological knowledge and build skills in different work settings. Students work in approved setting as applied sociologists. Minimum of 40 credits of work for each credit hour is required.

421 Field Work in Social Change (3:3:0) Prerequisite: 6 credits of sociology or permission of instructor. In-depth investigation of planned social change through field work internship with a 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 covered include demographic trends and the aging population in America, the social construction of life stages and the 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 the Holocaust, the destruction of European Jewry, through testimonies of survivors and narratives of historians. Topics include historical and cultural circumstances that encouraged German anti-Semitism; the rise of Nazism; ghettoization of the Jews in Poland; Jewish life in the 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; the United States’ and the world’s responses; and reflections on the Holocaust today. Eyewitness testimony, memory, narrative, and literature are also considered.

455 Qualitative Research Methods (3:3:0) Prerequisite: 9 credits of sociology including SOCI 101 or 102 or permission of instructor. Introduction to the use of ethnography, fieldwork methods, interviewing, life histories and other qualitative methods to generate data about the cultures in which various groups and classes are immersed. Students learn by applying qualitative methods to term projects, developed under the guidance of the instructor.

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 the changing position of women in law from both a legal and a sociological perspective. Focuses on how the law defines and regulates women’s rights in a variety of areas such as employment, marriage and divorce, reproduction and control of one’s body, and violence against women. Explores the social and economic consequences of various legal doctrines and compares laws and policies in the 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 the sociology honors program and permission of instructor. Linked, sequential courses, normally given by the same instructor. SOCI 480 involves the application of theoretical and methodological knowledge to the analysis of a social issue that serves as the course’s central theme. SOCI 481 culminates in the preparation and presentation of a substantive research paper.

482 Honors Internship in Sociology (3:0:0) Prerequisites: admission to the Sociology Honors Program and permission of instructor. Research internship that is intended to provide students with hands-on experience in sociology and the opportunity to do research within approved work settings. In addition to 120 hours of field work (for 3 credits), students meet at the discretion of the instructor to plan their research and share their ongoing field work experiences.

483 The Sociology of Higher Education (3:3:0) Prerequisite: 60 credits. Exposes students to sociological theory and research on the evolution of higher learning in the United States; explore the social forces that have shaped the distinctively American approach toward higher education and have led to the transformation of higher education in contemporary society. Particular attention to relation between universities and elites within the surrounding society; the linkage between education and industry; the norms and values that are presupposed by educational institutions; and the bearing of sports on the values and traditions of higher education.

492 McDonaldization of Organizations (3:3:0) Theories and analysis of types of organizations from informal voluntary associations to large complex ones. Nonprofit organizations and alternatives to bureaucracies, such as feminist collectives, cooperatives, self-help groups, and social movement organizations are explored. Students do field work in organizations applying theories and concepts to their observations.

499 Independent Research in Sociology (1-4:0:0) Prerequisite: 18 credits of sociology including SOCI 311, 313, and 412; a 3.00 GPA in sociology; and a research proposal approved by instructor and department chair before enrollment. Investigation of a 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 the law and the community, special group interests, social change, and social deviance. Case studies. Consideration of the 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, course 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 their 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 an 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.

525 Current Research in Sex and Gender (3:3:0) Prerequisite: undergraduate senior status in sociology, graduate standing, or permission of instructor. Advanced study of the current social science research and research methodology used in the study of sex and gender.

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 the gathering, interpretation, and evaluation of scientific evidence. Course develops critical-thinking skills by using a set of rules and logical criteria for the evaluation of social science research. Covers the 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 the published literature.

531 Statistical Reasoning (3:3:0) Prerequisite: graduate standing and undergraduate statistics and research methodology or permission of instructor. Intermediate treatment of the statistical methods used in the analysis of social data. Topics include sampling, inference, hypothesis testing, analysis of variance, linear regression, and correlation. Introduction to the logic of multivariate analysis is included.

550 The Holocaust (3:3:0) Prerequisite: undergraduate senior status in sociology or graduate status. Examines the Holocaust, the destruction of European Jewry, through testimonies of survivors and the narratives of historians. Topics include the historical and cultural circumstances that encouraged German anti-Semitism; the rise of Nazism; the ghettoization of the Jews in Poland; Jewish life in the ghettos; European Jews under Nazi occupation; Jewish resistance; Christian rescuers; the invasion of Russia and mobile killing units; life in hiding and passing, forced labor camps, and concentration camps; the United States’ and the world’s responses; and reflections on the Holocaust.
590 Gender, Race, and the Natural World (3:3:0) Prerequisite: graduate standing or permission of instructor. Advanced study of the links among gender, race, and nature using a social-psychological framework. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.

591 Sociology of Aging (3:3:0) Prerequisite: graduate standing or permission of instructor. Sociology of aging and the position of the professions in the medical care. The role of sociologists in understanding social policy development. Concentration strategies. Prerequisite: graduate standing or permission of instructor.

592 Globalization and Social Change (3:3:0) Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor.

593 Social Theory and Methodology (3:3:0) Prerequisite: graduate standing or permission of instructor. Focus on general linear model and multiple regression analysis in nonexperimental data. Range of topics include logic of causal analysis, multivariate, influential observations, categorical independent and dependent variables, violation of assumptions, missing data, structural equation and measurement models, and discrete multivariate analysis. Prerequisite: graduate standing or permission of instructor.

594 Social Research Methods (3:3:0) Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor.

595 Social Policy and Social Problems (3:3:0) Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor.

596 Social Welfare and Social Services (3:3:0) Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor.

597 Social Psychological Perspectives on Aging (3:3:0) Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor.

598 Advanced Sociology of Health, Illness, and Disability (3:3:0) Prerequisite: graduate standing or permission of instructor. The role of sociologists in understanding social policy development. Major theories of social organization and social change as a means of understanding social policy development. Prerequisite: graduate standing or permission of instructor.

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. Required for each credit. Prerequisite: graduate standing or permission of instructor.

600 Internship in Sociology (1-6:0:0) Prerequisite: graduate standing or permission of instructor. Advanced study of the links among gender, race, and nature using a social-psychological framework. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.

601 Research Methods in Social Work (3:3:0) Prerequisite: graduate standing or permission of instructor. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.

602 Advanced Research Methods (3:3:0) Prerequisite: graduate standing or permission of instructor. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.

603 Social Research (3:3:0) Prerequisite: graduate standing or permission of instructor. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.

604 Survey Research Design (3:3:0) Prerequisite: graduate standing or permission of instructor. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.

605 Quantitative Research Methods (3:3:0) Prerequisite: graduate standing or permission of instructor. Students work in an approved setting to analyze empirical data about nature and gender and to develop sociological understandings of these issues. Prerequisite: graduate standing or permission of instructor.
structure, the delivery of medical care, and the 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 the society. Analysis and theories of change in health care systems and their impacts on society and various stakeholders. For-profit and non-profit organizations and their impacts are examined. 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 the theory and methods of historical and comparative sociology, primarily for students with a background in sociological theory and methods. Examination of the basic approaches and research data of history and sociology, a survey of the development of the field, and an analysis of exemplary studies.

686 Sociology of Aging (3:3:0) Prerequisite: graduate standing or permission of instructor. Analysis of sociological issues in aging. Issues include class and cultural factors, problems of work, retirement, attachment and loss, and ageism. Different theories of aging are examined.

692 McDonaldization of Organizations (3:3:0)
Prerequisite: graduate standing or permission of instructor. Classical and contemporary theories and analysis governing formal organizations, their development, characteristics and relationships to society are examined. Alternative conceptualizations to bureaucracy considered 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 the student to participate in the current research of the discipline director and results in a paper reporting the original contributions of the student. Enrollment may be repeated.

Sociology and Anthropology (SOAN)

Sociology and Anthropology

190 Classical Texts in Society, Nature, and Culture (3:3:0) Seminar course that explores the conceptual foundations of social science through readings and discussions of seminal texts by such major figures as Aristotle, Galileo, Hobbes, Kant, Hegel, and Darwin.

670 Special Topics in Sociology and Anthropology (4-8: 0-8:0-8) Prerequisites: graduate standing or permission of instructor. Provides a cross-disciplinary pedagogical format within the Department of Sociology and Anthropology. Covers a variety of pedagogical formats, such as combining ethnographic field techniques taught in anthropology with sociological-based urban issues, or providing archaeological laboratory analyses with a grounding in statistical techniques continue to be proposed by department faculty.

Software Engineering (SWE)

Information and Software Engineering

432 Design and Implementation of Software for the Web (3:3:0) Prerequisite: Math 125 and CS 421. Teaches students how to develop software for web applications. The concepts of client-server computing, theories of usable graphical user interfaces, and models for web-based information retrieval and processing are covered. Goals are to understand how to design usable software interfaces and implement them on the web, learn how to build software that accepts information from users across the web and returns data to the 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.

619 Object-Oriented Software Specification and Construction (3:3:0) Prerequisites: SWE foundation courses or equivalent. In-depth study of software construction using a 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 the 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 using the Unified Modeling Language (UML) notation. Students participate in a group project on software requirements and specification using a modern method.

621 Software Modeling and Architectural Design (3:3:0) Prerequisites: SWE 619, with 620 recommended, or permission of instructor. MSCS students may substitute CS 540 and CS 571 for SWE 619. Concepts and methods for the architectural design of large-scale software systems. Fundamental design concepts and design notations are introduced. Several design methods are presented and compared. In-depth study of object-oriented analysis and design modeling using the Unified Modeling Language (UML) notation. Students participate in a 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
Courses

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 (3:3:6) Prerequisites: SWE 619, 620, and 621 or permission of instructor. Students work in teams to develop or modify a software product, applying sound principles of software engineering. Both industrial and academic standards are used to assess the quality of the work products.

630 Software Engineering Economics (3:3:0) Prerequisite: SWE 625. Covers quantitative models of the 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 ensuring its quality. Topics cover software testing at the unit, module, subsystem, and system levels; automatic and manual techniques for generating and validating test data; the 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. Introduction to the concepts and foundations of software component and component-based software. Detailed study of the engineering principles of modeling, designing, implementing, testing, and deploying component-based software. State-of-the-art component technologies will also be explored.

699 Special Topics in Software Engineering (3:3:0) Prerequisite: permission of instructor. Special topics not occurring in the 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 the software concepts that promote reuse of software architectures. The influence of object technology on software design and reuse is studied. Domain Modeling methods, which model the application domain as a software product family from which target systems can be configured, are investigated. The course also 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 but not limited to introducing precision, performance, security and safety aspects. UML, its meta-models and proposed enhancements such as Object Security Constraint Language, Object Temporal Constraint Language, QoS Profiles and the theory behind them and their implementations will be discussed.

763 Software Engineering Experimentation (3:3:0) Prerequisite: SWE 621 or permission of instructor. A detailed study of the scientific process, particularly using the experimental method. The course examines how empirical studies are carried out in software engineering. The distinction between analytical techniques and empirical techniques is reviewed. Other topics include experimentation required in software engineering, kinds of 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 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: 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 a contemporary problem in software engineering. Prior approval by a faculty member who supervises the student’s work is required. Written report also required. A maximum of 6 credits may be earned. To register, students must complete independent study form, available in the department office. It must be initiated by the faculty sponsor and approved by the department chairman.

799 Thesis (6:0:0) Prerequisite: permission of advisor. Research project completed under the supervision of a faculty member, which results in a technical report accepted by a three-member faculty committee. The report must be defended in an oral presentation. To register, students must complete independent study form, available in the department office. It must be initiated by the faculty sponsor and approved by the department chairman.

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.

201 Intermediate Spanish I (3:3:1) Prerequisite: SPAN 102, 105, 109, appropriate placement score, or permission of department. Further development of skills in listening, speaking, reading, and writing. SPAN 201 and 202 must be taken in sequence. Lab work required.

202 Intermediate Spanish II (3:3:1) Prerequisite: SPAN 201, appropriate placement score, or permission of department. Application of skills to reading, composition, and discussion. Lab work required.

209 Intensive Intermediate Spanish (6:6:2) Prerequisite: SPAN 102, 105, 109, appropriate placement score, or permission of department. Equivalent to SPAN 201 and 202 taught in a single semester. May not be taken for credit in combination with SPAN 201 or 202. Lab work required.

301 Grammar and Syntax (3:3:0) Prerequisite: SPAN 202, 209, appropriate placement score, or permission of instructor. In-depth review of Spanish grammar and syntax. Extensive practice in controlled and free writing with emphasis on fundamental differences and points of interference that exist between English and Spanish.

302 Reading and Writing Skills Development (6:6:0) Prerequisites: SPAN 202 or 209, appropriate placement score, or permission of the instructor. Development of ability to write on topics of current interest. Readings provide examples of each topic and the necessary vocabulary for compositions. Introduces reading strategies and provides practice in the reading of different kinds of texts.

321 Introduction to Spanish Culture (3:3:0) Prerequisite: ENGL 101 or equivalent, or permission of instructor. Designed for nonmajors. History, culture, economic and social development, and scientific and artistic achievements that have contributed to the formation of modern 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: ENGL 101 or equivalent, or permission of instructor. Designed for nonmajors. History, culture, economic and social development, and scientific and artistic achievements that have contributed to the formation of modern Latin America. Course work in English. Credit may be earned in either SPAN 322 or 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 equivalent, or permission of instructor. Designed for nonmajors. Study of the works of major Hispanic writers in translation. Writers studied vary. Course work in English. May be taken toward fulfillment of the general requirement in literature for baccalaureate degrees. May be repeated for credit with permission of department.

329 Special Topics in Spanish and Latin American Literature (3:3:0) Prerequisite: ENGL 101 or permission of instructor. Designed for nonmajors. Course work in English. May be taken toward fulfillment of the humanities requirement in literature for baccalaureate degrees. May be repeated once for credit.

351 Oral Spanish (3:3:0) Prerequisite: SPAN 202, 209 or equivalent; appropriate placement score; or permission of instructor. Development of oral expression on topics of current interest and everyday situations, including written assignments. Not open to native speakers.

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 331, or advanced ability in Spanish, or permission of the 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 484 studies Spanish literature from 1700 to the present.

488 The Literature of Spanish America (3:3:0) Prerequisites: SPAN 390 and 452, or permission of instructor. Survey of the literature of Spanish America. Study of texts that are representative of the colonial, romantic, modernista, avant garde, and contemporary periods.

490 Internship in Spanish (1-6:0:0) Prerequisites: 9 credits in Spanish at the 300 level, or permission of instructor. Qualified students work with area schools, social service programs, government agencies, interest groups, museums, or corporations. Specific arrangements must be made with, and approved by, a member of the Spanish faculty during the semester prior to enrollment.

497, 498 Senior Honors Tutorial (3:0:0), (3:0:0) Prerequisites: Spanish major with 90 credits, a cumulative GPA of 3.00, and GPA of 3.00 in the major field. Students meet-
Emphasis on the function and technique of documentation in translation. Translation from Spanish to English and from English to Spanish.

580 Contemporary Hispanic Institutions (3:3:0) Study of 20th-century cultural, social, and political institutions in Spain and Spanish America with emphasis on language and terminology used to describe their functions, regulations, and conditions.

635 Seminar in Don Quixote (3:3:0) Study of Don Quixote and the major critical approaches to the work.

650 Seminar in Twentieth-Century Drama (3:3:0) Study of major dramatists in the generation of 1898 and in the contemporary theater.

655 Seminar in Twentieth-Century Prose (3:3:0) Study of a major writer, theme, or movement in the novel or the essay.

670 Seminar in Spanish American Prose (3:3:0) Study of a major writer, theme, or movement in the novel or the essay.

675 Seminar in Literature and Art (3:3:0) Comparative analysis of a literary theme or style in relation to other media (painting, architecture, film) for an integral understanding of the arts.

680 Seminar in Literature and Society (3:3:0) Study of a literary topic, a genre, or selected authors in relation to a given economic, social, or political system in Spain or Latin America.

685 Seminar in Literature and Ideas (3:3:0) Study of major ideological-philosophical themes and their artistic expression in literature.

798 Directed Reading and Research (3:0:0) Prerequisite: open only to degree students who have completed at least 18 credits. Reading and research on a specific project under the direction of a department member. Oral or written report required.

799 Thesis (1-6:0:0) Students who take SPAN 798 and then elect thesis option receive 3 credits for SPAN 799 on completion of thesis. Students who do not take SPAN 798 receive 6 credits for SPAN 799 on completion of the thesis. Graded S/NC.

800 Studies for the Doctor of Philosophy in Education (variable credit) Prerequisite: admission to PhD in education program to study in Spanish. Studies designed by student’s discipline director and approved by student’s doctoral committee that prepare the student to do research and writing in the current area of interest in the discipline. Enrollment may be repeated. See also FRLN course listings.

Special Education (EDSE)

Graduate School of Education

401 Introduction to Special Education (3:3:0) Provides a survey of current knowledge on individuals with disabilities within the context of human growth and development across the life span. Content includes historical factors, legislation, etiology, characteristics, needs, educational strategies, assessment, and support services of and for individuals with disabilities ranging from mild and moderate to severe levels of varying disabilities. Includes the impact of disabilities on academic, social, and emotional performances. Field experience required.

402 Classroom Management and Applied Behavior Analysis (3:3:0) Focuses on identifying, recording, evaluating, and changing social and academic behaviors of special and diverse populations. Explores theories of classroom management and various approaches to management, including use of technological advances. Emphasizes developing classroom and individual behavior management plans.

403 Language Development and Reading (3:3:0) 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.

415 Early Intervention for Infants and Toddlers with Disabilities (3:3:0) Explores current public policy initiatives for coordinating services for infants and toddlers. Covers models of services delivery and approaches to family-centered service.

422 Augmentative Communication (3:3:0) Focuses on alternative language, literacy, and communication techniques for children with severe language and speech impairments.

428 Elementary Reading, Curriculum, and Strategies for Mild Disabilities (3:3:0) Applies research on teacher effectiveness, teacher accountability, instructional approaches, and advances in technology at the elementary level for individuals with emotional disturbance, learning disabilities, and mental retardation. Includes curriculum and instructional strategies in reading, language arts, mathematics, science, social studies, and social skills; cognitive strategies in self-regulation, study skills, attention, memory, and motivation; and peer-mediated instruction including cooperative learning and peer tutoring.

429 Secondary Curriculum and Strategies for Mild Disabilities (3:3:0) Applies research on teacher effectiveness, teacher accountability, instructional approaches, and technological advances at the secondary level for individuals with emotional disturbance, learning disabilities, and mental retardation. Includes curriculum and instructional strategies in reading, language arts, math, science, social studies, and social skills; cognitive strategies in self-regulation, study skills, attention, memory, and motivation; peer-mediated instruction including cooperative learning and peer tutoring; and self-advocacy and strategies for facilitating transition to community, workplace, and post-secondary environments.

431 Transition and Community-Based Instruction (3:3:0) Addresses issues in transition for youth with severe disabilities. Covers self-determination, development and implementation of a transition plan, post-secondary opportunities including education and community-based instruction, and vocational environments.

432 Positive Behavior Supports (3:3:0) Focuses on concepts and skills to design, implement, and evaluate behavior support programs derived from functional assessment; use effective teaching strategies; address relevant replacement skills; facilitate generalization and maintenance of
### Courses

**572 Special Education (EDSE)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>434</td>
<td><strong>Communication and Severe Disabilities</strong> (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.</td>
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<tr>
<td>440</td>
<td><strong>Characteristics of Students with Emotional Disturbance and Learning Disabilities</strong> (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.</td>
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<tr>
<td>442</td>
<td><strong>Characteristics of Students with Mental Retardation</strong> (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.</td>
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<tr>
<td>447</td>
<td><strong>Medical and Developmental Risk Factors for Children with Disabilities</strong> (3:3:0) Examines nature and causes of disabling or special health conditions. Examines screening and evaluation techniques, characteristics, and educational implications.</td>
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<tr>
<td>456</td>
<td><strong>Language Development and Communication for Diverse Infants and Toddlers</strong> (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.</td>
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<td>457</td>
<td><strong>Language Development and Emergent Literacy for Diverse Learners</strong> (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 interrelationship of speaking, listening, and writing. Includes review of characteristics and etiology of children with language disabilities. Also addresses the diversity of communication styles in families, communities, and cultures. Field experience required.</td>
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<tr>
<td>458</td>
<td><strong>Physical and Sensory Disabilities: Developmental, Education, and Medical Aspects</strong> (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.</td>
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<tr>
<td>459</td>
<td><strong>Curriculum and Methods: Early Childhood Special Education</strong> (3:3:0) Emphasizes planning, organizing, implementing, and evaluating programs for young children with special needs.</td>
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<tr>
<td>500</td>
<td><strong>In-Service Educational Development</strong> (1-6:0:0) See EDUC 500.</td>
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<tr>
<td>501</td>
<td><strong>Introduction to Special Education</strong> (3:3:0) Survey of current knowledge on individuals with disabilities within the context of human growth and development across the life span. Includes historical factors, legislation, etiology, characteristics, needs, educational strategies, assessment, and support services for individuals with disabilities ranging from mild and moderate to severe. Includes the impact of disabilities on academic, social, and emotional performances. Field experience required.</td>
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<tr>
<td>502</td>
<td><strong>Classroom Management and Applied Behavior Analysis</strong> (3:3:0) Explores how to identify, record, evaluate, and change social and academic behaviors of special and diverse populations. Explores theories of classroom management and various approaches to management including use of technological advances. Emphasizes developing classroom and individual behavior-management plans.</td>
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<tr>
<td>503</td>
<td><strong>Language Development and Reading</strong> (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.</td>
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<tr>
<td>510 / EDIT 510</td>
<td><strong>Introduction to Assistive Technology</strong> (3:3:0) See EDIT 510.</td>
</tr>
<tr>
<td>517</td>
<td><strong>Computer Applications for Special Populations</strong> (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.</td>
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<tr>
<td>522 / EDIT 522</td>
<td><strong>Assistive Technology for Individuals with Sensory Impairments</strong> (2-3:2-3:0) See EDIT 522.</td>
</tr>
<tr>
<td>523 / EDIT 523</td>
<td><strong>Accessibility/Input Modification</strong> (1-3:13:0) See EDIT 523.</td>
</tr>
<tr>
<td>524 / EDIT 524</td>
<td><strong>Assistive Technology for Individuals with Learning Disabilities</strong> (2:2:0) See EDIT 524.</td>
</tr>
<tr>
<td>525 / EDIT 525</td>
<td><strong>Software for Individuals with Special Needs</strong> (1-2::1-2:0) See EDIT 525.</td>
</tr>
<tr>
<td>526 / EDIT 526</td>
<td><strong>Web Accessibility</strong> (2:2:0) See EDIT 526.</td>
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</tbody>
</table>
| 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, re-
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) Pre-requisite: HTML experience. Provides overview of the web and Internet as an educational tool for students with disabilities. Focuses on presentation of strategies, accommodations, assistive technology, and Internet resources for educators. Students review and evaluate web sites, and develop an accessible Internet lesson plan or web site.

530 Policy Perspectives Affecting Diverse Young Learners and Their Families (3:3:0) Provides understanding of historical and current trends and issues involving legislation and policy in early childhood education, bilingual education, early childhood special education, and multicultural education. Focuses on historical role of social advocacy, development of advocacy skills, and collaboration and consultation with other professionals and staff in the field of early childhood education.

531 Transition and Community-Based Instruction (3:3:0) Addresses issues in transition for youth with severe disabilities. Covers self-determination, development, and implementation of a transition plan, post-secondary opportunities including education and community-based instruction, and vocational environments. Course is equivalent to EDSE 544 for students in the severe disabilities program.

532 Positive Behavior Supports (3:3:0) Designed for professionals working with individuals with severe disabilities. Focuses on concepts and skills needed to design, implement, and evaluate behavior support programs derived from functional assessment. Covers effective teaching strategies; addresses relevant replacement skills; facilitates generalization and maintenance of skills; and incorporates individually designed crisis intervention procedures. Course is equivalent to EDSE 620 for students in the severe disabilities program.

533 Curriculum and Assessment in Severe Disabilities (3:3:0) Addresses best practices in curriculum and assessment for individuals with severe disabilities. Covers the design of assessment and evaluation techniques and procedures for the severe-needs population, including adaptations and accommodations. Covers IEP formulation and implementation with linkage to assessment. Course is equivalent to EDSE 649 for students in the severe disabilities program.

534 Communication and Severe Disabilities (3:3:0) Introduces professionals to augmentative and alternative communication (AAC) for individuals with severe speech and language impairments. Addresses the knowledge and skills needed to assess the potential AAC user, make team decisions, develop and implement instruction, and evaluate the effects of instruction, aimed at motivating, building, and expanding communication, choice-making, and social interaction.

535 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.

536 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.

537 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.

538 Medical and Developmental Risk Factors for Children with Disabilities (3:3:0) Examines nature and causes of disabling or special health conditions. Covers screening and evaluation techniques, characteristics, and educational implications.

539 Classroom Management: Theory and Practice (3:3:0) Focuses on identifying, recording, evaluating, and changing social and academic behaviors of diverse student populations. Explores theories of classroom management, and presents various approaches to instructional, behavioral, and environmental management. Addresses the development of Individualized Education Programs and their impact on management issues. May require field experience in public schools.

540 Teaching Mathematics to Students with Special Needs (3:3:0) Covers techniques for assessing and remediating difficulties in mathematics.

541 Language Development and Emerging Literacy for Diverse Infants and Toddlers (3:3:0) Provides understanding of early language development in terms of each of the five major components of language. Discusses speech, language, and communication, particularly in terms of their interrelatedness with cognitive and sociocultural development. Explores the importance of adult-child interaction and the impact of bilingualism, cultural diversity, cognitive ability, and language disorders.
557 Language Development and Emergent Literacy for Diverse Learners Ages 3–5 (3:3:0) Prerequisite: admission to a Mason graduate program. Addresses first and second language acquisition and its application in 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. Requires field experience.

558 Physical and Sensory Disabilities: Developmental, Educational, and Medical Aspects (3:3:0) Prerequisite: admission to a Mason graduate program. Focuses on physical, sensory, and medical and health aspects of child development, including etiology and symptomatology of developmental disabilities affecting physical development. Emphasizes positioning, handling, adaptive strategies and understanding of assistive technology devices. Focuses on the understanding of roles of related disciplines in collaborative planning and service delivery. Requires field experience.

597 Special Topics in Education (1-6:1-6:0) See EDUC 597.

600 Workshop in Education (1-6:0:0) See EDUC 600.

610 Designing Adaptive Environments (2:2:0) Prerequisite: EDSE/EDIT 510. Overview of environmental adaptations for people with disabilities to increase their access to community, workplace, and school activities. Covers legal issues within the ADA for adapting environments, and addresses programmatic and physical access issues. Knowledge and awareness components may be delivered via distance education.

612 Special Needs Students in International Schools (3:3:0). Prerequisite or corequisite: admission to FAST TRAIN program for graduate course work, and EDSE 501. Focuses on students with special learning needs at international schools in the regular classroom environment. Enhances understanding of current issues within the field of special education in the international schools in an increasingly global community.

615 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.

619 Introduction to Applied Behavior Analysis (3:3:0) Prerequisite: admission to Applied Behavior Analysis Graduate Certificate Program (ABAC). Focuses on the basic principles and procedures of applied behavior analysis; on identification of factors that contribute to behavioral problems and improved performance; and on procedures that can be used to minimize behavioral problems, improve performance, teach new behaviors, and increase probability of behaviors occurring under appropriate circumstances.

620 Managing Severely Challenging Behaviors and Applied Behavior Analysis (3:3:0) Prerequisites: graduate standing and permission of advisor. Focuses on applying behavior analysis principles and social learning theory to increase learning by students with special needs. Emphasizes single subject research designs.

621 Advanced Applied Behavior Analysis I (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.

622 Augmentative Communication (3:3:0) Focuses on alternative language, literacy, and communication techniques for children with severe language and speech impairments.

623 Advanced Applied Behavior Analysis II (3:3:0) Prerequisite: EDSE 621. Further expands on the basic content of applied behavior analysis, and teaches how to implement behavioral procedures and develop behavioral programs for clients with fundamental behavioral needs.

624 Seminar in Applications of Applied Behavior Analysis I (3:3:0) Prerequisites: EDSE 621 and 623. Expands capability to deal with more complex behavioral situations, and enables students to relate to more sophisticated professional issues and environments.

625 Seminar in Applications of Applied Behavior Analysis II (3:3:0) Prerequisites: EDSE 621, 623, and 624. Further expands capability to deal with more complex behavioral situations, enabling students to relate to more sophisticated professional issues and environments.

626 The Inclusive Classroom (3:3:0) Introduces instructional procedures for facilitating inclusive instruction for students with disabilities in general education classes. Covers characteristics of students with disabilities and with effective strategies for adapting curriculum, 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 540. Introduces basic statistical procedures and test characteristics. Appropriate terminology and practices related to formal and informal assessment applied throughout the course. Students practice administering, scoring, and interpreting tests, including the impact of multicultural diversity on assessment.

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.

658 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 a 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 a 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.

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 the 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 the fourth EDSE prefix course or concurrently with the fourth or fifth EDSE prefix 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.
Courses

792 Final Portfolio (1:1:0) Corequisite: must be taken concurrently with last EDSE 790 internship or the last EDSE course in the program. Opportunity for students to develop their portfolio. Serves as the vehicle to assess whether they are meeting the standards of their professional organization, the Council for Exceptional Children.

794 Special Topics (1-6:1-6:0) Advanced study of selected topics in education for students preparing for doctoral studies or who have been admitted to the PhD program in education.

797 Advanced Topics in Education (1-6:1-6:0) See EDUC 797.

841 Intervention Research in Special Education (3:3:0) Prerequisite: admission to the 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 the 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 the 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 the 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 a 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.

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 a variety of sport operations such as indoor stadiums, athletic field complexes, and the management of 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 200 and 304; PRLS 317, 403, and 410. Paid or voluntary work experience in sport industry settings. Requires a minimum period of 10–12 weeks of full-time employment. 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 the internship.

Statistics (STAT)

Applied and Engineering Statistics

250/IT 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. Statistical software used for assignments. f,s,ssum

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
nonsampling error adjustment. Practical problems encoun-
tered in conducting a survey are discussed. Methods ap-
plied to case studies of actual surveys. Class project may be
required. Recommended for students of decision, infor-
mation, social sciences, and mathematics. f

498 Independent Study in Statistics (1-3:3:0) Prerequi-
site: 60 undergraduate credits; must be arranged with in-
structor and approved by the department chair before regis-
tering. Directed self-study of special topics of current
interest in statistics. May be repeated for maximum 6 cred-
its if topics are substantially different.

499 Special Topics in Statistics (3:3:0) Prerequisites: 60
undergraduate credits and permission of instructor; spe-
cific prerequisites vary with the nature of the 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) Prere-
quisites: 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 prepa-
ration beyond STAT 501 for graduate students in 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
OPTIONS, GDEVICE, GCHART, GPLLOT 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 prepara-
tion beyond STAT 501 for graduate students in use of SAS
for other graduate courses offered by department. Topics
include macro language processing, macro variables, de-
fining 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 Mak-
ning (3:3:0) Prerequisite: undergraduate course in math or
statistics, and computer literacy. Use of statistical meth-
ods as scientific tools in the analysis of practical problems.
Topics include descriptive statistics, probability, distribu-
tions, sampling, inference, estimation and hypothesis test-
ing; linear regression and correlation; the analysis of
variability; multiple regression; and the analysis of associa-
tion 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. Cer-
tificate program students granted credit for only one of
STAT 510, 535, or 554. s

530 Mathematical Methods for Statistics and Engineer-
ing (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 require-
ments for MS in statistical science. Designed for students
who have not completed the MATH 113-114-213 sequence
or need a refresher course. f
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. F

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. Course project required. F

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 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 Statistical Inference (3:3:0) Prerequisite: STAT 544 or ECE 328 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 or permission of instructor and matrix algebra. 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 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 Time Series Analysis and Forecasting (3:3:0) Prerequisite: STAT 544 or 652, or permission of instructor. Modeling stationary and nonstationary processes, autoregressive, moving average and mixed model processes, hidden periodicity models, properties of models, 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 a working knowledge of a statistical software package SAS or SPSS. Statistical methods essential to the analysis of rates and proportions from data associated with clinical trials, case-control, prospective and cross-sectional studies in the health care sector. Risk assessment as measured by relative risks and odds ratios are central concepts. Construction and interpretation of logistic regression models for binary and polytomous responses. Poisson regression models for the analysis of rates. Concepts are applied to the analysis of real data from major medical studies using statistical software packages such as SAS, SPSS, and StatExact.

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, or permission of instructor. Introduces students to decision theory and its relationship to Bayesian statistical inference. Students learn commonalities and differences between the Bayesian and frequentist approaches to statistical inference, how to approach a statistics problem from the Bayesian perspective, and how to combine data with informed expert judgment in a sound way to derive useful and policy relevant conclusions. Teaches necessary theory to develop firm understanding of when and how to apply Bayesian and frequentist methods, and practical procedures for inference, hypothesis testing, and developing statistical models for phenomena. Graphical models are introduced 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. Analysis of 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 measures of association, logistic regression, linear response models, loglinear models, repeated measurements data, and analysis of incomplete tables. Computer statistical package used extensively for data analysis.

668 Survival Analysis (3:3:0) Prerequisites: STAT 544, 554 or 553, and STAT 501 or a working knowledge of SAS. Survival analysis is a class of statistical methods for studying the occurrence and timing of events. In medical research, the events may be deaths, and the objective is to determine factors affecting survival times of patients following treatment, usually in the setting of clinical trials. Methods can also be applied to the social and natural sciences and engineering where they are known by other names (reliability, event history analysis). Concepts of censored data, time-dependent variables, and survivor and hazard functions are central. Nonparametric methods for 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) Prerequisite: STAT 674 or permission of instructor. Principles of design and analysis of longitudinal studies. Topics include retrospective and prospective studies, repeated periodic and continuous surveys, rotating of panel surveys, management of a longitudinal database, estimation of the level and change of population means, and proportions and totals over time. Techniques include classical minimum variance unbiased estimators, time series analysis, and model-based multivariate analysis. Case studies such as the Current Population Survey and the National Crime Survey are presented.

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. See OR 677.

678/OR 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.

682/OR 682/MATH 685/CSI 700 Computational Methods in Engineering and Statistics (3:3:0) Prerequisites: MATH 203 and 213 or equivalent, or permission of instructor. 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 computing probabilities. Discusses numerical methods for such problems as regression, analysis of variance, nonlinear equations, differential and difference equations, and nonlinear optimization. Emphasizes applications in statistics and engineering.

700/ HSCI 800 Advanced Quantitative Data Analysis for Healthcare Research II (3:3:0) Prerequisite: STAT 535 or HSCI 799. Multivariate analysis of variance (MANOVA, MANCOVA), multiple regression, and logistical regression. Students learn how to intelligently apply multivariate statistical methods to data, carry out necessary computations using statistical software, and correctly interpret results and make accurate statements about their findings. Cannot be used to satisfy requirements for MS in statistical science.

701/HSCI 801 Advanced Multivariate Statistics and Data Analysis for Healthcare Research (3:3:0) Prerequisites: STAT 700/HSCI 800 or equivalent. Coverage of discriminant 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 632 or 564, 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. 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 a semester-long project of their own choosing.

751/CSI 771 Computational Statistics (3:3:0) Prerequisites: STAT 544, 554, and 652. Study of the basic computational-intensive statistical methods and related methods that 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
Systems Engineering (SYST)

Systems Engineering and Operations Research

101 Understanding Systems Engineering (3:3:0) Introduces students to systems engineering and the curriculum for a BS in systems engineering at Mason. Introduces large and small systems, and explains these systems through the provision of some hands-on experiences. Key concepts include understanding requirements for a 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 student’s choice. Students working in groups design, develop and test a system, and give an oral presentation. Students responsible for writing several short papers on curriculum and the presentations that they have heard.

201 Discrete Dynamic Systems Modeling (3:3:0) Prerequisite: MATH 114. An introduction to the modeling of dynamic systems with examples from many fields in engineering, science, and social sciences: mechanical, computer, biological, economic, urban, and social systems. Linear and nonlinear systems and linearization of such systems. Discrete time system formulation used to study the properties and behavior of such systems.


203 Systems Modeling Laboratory (1:0:3) Corequisite: SYST 202. Introduction to computer modeling using an engineering modeling environment such as MATLAB. Solution to systems of linear equations, numerical integration and differentiation, interpolation and curve fitting, solution of ordinary differential equations. Simulation and numerical solution of continuous dynamic systems. Discretization of continuous time systems. Use of built-in functions and construction of macros. Graphical presentation of results.

301 Systems Design (3:3:0) Prerequisite: junior standing; corequisite: SYST 201. Systems engineering design and integration process, the development of functional, physical, and operational architectures. Emphasis is on requirements engineering, functional modeling for design, and formulation and analysis of physical design alternatives. Methods and software tools for systems engineering design are introduced.

302 Systems Methods (3:3:0) Corequisites: CS 112, STAT 344, and SYST 202. Prerequisites: MATH 114. 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.
310 or permission of instructor. An introduction to the basic concepts of modeling complex discrete systems by computer simulation. Topics include Monte-Carlo methods, discrete-event modeling, specialized simulation software, and the statistics of input and output analysis.

371 Systems Engineering Management (3:3:0) Prerequisite: SYST 301; corequisite: SYST 302. Study of the basics of systems engineering management. This includes engineering economics, planning, organizing, staffing, monitoring, and controlling the process of designing, developing, and producing a system that will meet a stated need in an effective and efficient manner. Management tools, processes, and tools and methods of linear programming and dealing with personnel issues.

420 Network Analysis (3:3:0) Prerequisite: OR 441 and MATH 213. Network nomenclature. Elementary graph theory. Linear and nonlinear network models: 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.

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.

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 briefly introduce the subject areas of dynamic programming and matrix games. Particular emphasis to pricing for allocation mechanisms for specific problems. Students required to design and develop a mechanism to a specific allocation problem. Students must develop analytical and working engineering models of their mechanism.

480/ECON 440 Economic Systems Design I: Principles and Experiments (3:3:0) Corequisite: SYST 465. Prerequisite: OR 441. Introduces economic modeling and simulation techniques 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) Students design specific allocation mechanisms for specific problems. Students required to design and develop a mechanism to a specific allocation problem. Students must develop analytical and working engineering models of their mechanism.

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 a 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 senior status in the systems engineering program; corequisites: SYST 470, and OR 441. First part of capstone course in the systems engineering program. Students apply knowledge they have gained to group project. During the first semester of the senior design course, students perform concept definition and requirements analysis. Plan for carrying out the project is developed, culminating in a proposal presented to faculty at the end of semester.

491 Industrial Project (1-3:0:3-9) Prerequisite: 75 credits, SYST 302; must be arranged with an instructor and approved by the department faculty chair before registering. Semester-long work experience in systems engineering in an industrial or governmental organization. The work is supervised jointly by a systems engineer from the sponsoring organization and a faculty member of the department. The project and the arrangements for supervision must be approved by the student’s faculty advisor. Periodic reports, a written final report, and a presentation are required.
Courses

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. The course teaches a systems engineering approach to decision support system (DSS) development. A DSS is the end product of a development process, and it is this process that is key to successfully integrating a DSS into an organization. Any DSS is built on a theory (usually implicit) of what makes for successful decision support in the given context. Empirical evaluation of the specific DSS and the underlying theory should be carried on throughout the development process. The course examines some prevailing theories of decision support, considers the issues involved in obtaining empirical validation for a theory, and discusses what, if any, empirical support exists for the theories considered. Students design a decision support system for a semester project.  

560 Introduction to Air Traffic Control (3:3:0) Prerequisite: graduate standing. Intended as an introduction to Air Traffic Control (ATC) for those who plan professions in the aviation industry. It is a necessary introduction for students who will later specialize and take more in-depth courses. The course will survey the entire field, presenting the history of ATC and how it came to be as it is, the techn-
573 Decision and Risk Analysis (3:3:0) Prerequisite: STAT 344 and 354 or equivalent. Study of decision making that addresses 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 SYST 573.) f,s

571 Systems Engineering Management (3:3:0) Prerequisite: SYST 471 or SYST 530. Study of more advanced topics in systems engineering management. Seminar style; students expected to read a number of selections from the 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 system engineering management techniques and practices on projects, organizations, and personnel. f

573 Research Methods in Systems Engineering and Information Technology (3:3:0) Prerequisite: STAT 344 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 the scientific process, the use of empirical evidence to support and refute scientific hypotheses, and the use of scientific information in decision-making. Covers different sources of scientific evidence: designed experiments, quasi-experiments, field studies, surveys, and case studies. The process of formulating testable hypotheses is discussed. Methods of measurement are discussed, including approaches to measuring soft, hard-to- quantify factors. Presentation of results is discussed. Students do a project involving empirical research. f

600/ORB 660 Air Transportation Systems Modeling (3:3:0) Prerequisite: SYST 460/560 or permission of instructor. The student will be introduced to a wide range of current issues in air transportation. The issues include: public policy toward the industry, industry economics, system capacity, current system modeling capability, human factors considerations, safety analysis and surveillance systems, and new technological developments. The student is expected to develop a broad understanding of the contemporary and future issues. The student’s knowledge will be evaluated through class discussions, a take-home midterm exam and a term project to be completed by the end of the semester. s

620/ECE 673 Discrete Event Systems (3:3:0) Prerequisites: SYST 611 or ECE 521 or equivalent. Introduction to modeling and analysis of discrete event dynamical systems. Course covers elements of discrete mathematics and then focuses on Petri Net models and their basic properties. Relation to other discrete event models of dynamical systems. f

621/ECE 674 Systems Architecture Design (3:3:0) Prerequisites: SYST 619/ECE 672 and SYST 620/ECE 673. An intensive study of the relationships between different types of architecture representations and the 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. The executable model is then used for behavior analysis and performance evaluation. The roles of the systems architect and the systems engineer are discussed. Examples from current practice including the C4ISR architectures are used, s.

622/ECE 675 System Integration and Architecture Evaluation. (3:3:0) Prerequisites: SYST 620/ECE 673 and SYST 621/ECE 675. Covers the system integration problem, the role of architectures in systems integration, integration in a system of systems and a federation of systems. Evaluation of architectures, measures performance and effectiveness. Assessment of system capabilities. Analysis of alternatives. s

659 Topics in Systems Engineering (3:3:0) Prerequisite: permission of instructor. Topics not covered in the department’s regular systems engineering offerings. Course content may vary each semester depending on instructor and the perception of students’ needs. Course may be repeated once for credit. f,s
671/OR 671 Judgment and Choice Processing and Decision Making (3:3:0) Prerequisite: STAT 310 or equivalent, or permission of instructor. How do people make judgments and decisions? Course presents an initial review of the scientific literature directed toward answering this question and emphasizes its importance when performing decision analysis and designing systems to support judgment and decision processes.

677/STAT 677 Statistical Process Control (3:3:0) Prerequisites: STAT 510, STAT 534, or STAT 544 or equivalent. Introduction to 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, and Intelligence (C3I) (3:3:0) Prerequisite: ECE 528 or OR 542 or STAT 544 or equivalent. Broad introduction to fundamental principles of Command, Control, Communication, and Intelligence (C3I). The principles and techniques are applicable to a wide range of civilian and military situations. Modeling and simulation of combat operations are discussed. The sensing, fusion, and situation assessment processes are studied in detail. Optimal decision-making rules are derived. The concepts of C3I architectures are discussed. Tools to evaluate and revise beliefs based on evidence, conjugate prior distributions. Graphical models for phenomena. Specifically, students will learn the fundamentals of the Bayesian theory of inference, including probability as a representation for degrees of belief, the likelihood principle, the use of Bayes Rule to revise beliefs based on evidence, conjugate prior distributions for common statistical models, and methods for approximating the posterior distribution. Graphical models are introduced for constructing complex probability and decision models from modular components.

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 are critical to the C3I process. Exercises and games are used to demonstrate the value of properly developed C3I modules in a combat simulation.

684 Sensor Data Fusion (3:3:0) Prerequisites: SYST 680 or ECE 670. Examines design issues in multisensor fusion systems. Studies the use of probability, evidence, and possibility theories for object identification. Studies Bayesian networks, blackboard architectures, and spatial and temporal reasoning for situation assessment.

685 Estimation and Tracking: Principles and Techniques (3:3:0) Prerequisite: ECE 528 or OR 542 or 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: INF5 614, or equivalent. Provides overview of Extended Enterprise Integration. Lectures focus on the SAP architecture and the R/3 standard software solution. Laboratory requires students to complete an end-to-end implementation project with the Great Plains Software midrange ERP solution, Dynamics C/S 1. 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 SYST 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 Infrastructures (3:3:0) Prerequisite: SYST 694. Design and implementation of high-speed network and application services in support of modern Enterprise Resource Planning (ERP) systems. Critical technologies include high-speed data communication, switched 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 C1 under the supervision of a faculty member. Written report required. F, S, sum.

760 Special Topics in Command, Control, Communications, and Intelligence Systems Engineering (3:3:0) Prerequisite: SYST 680. Special topics in the C1 area, with different content in different terms. Representative areas include quantitative evaluation of C3 systems, applications of artificial intelligence in C3 systems, and military communications systems.

781/INF5 781/STAT 781: Data Mining and Knowledge Discovery (3:3:0) Prerequisites: SYST/STAT 644 or CS 650 or INF5 623 or equivalent. Concerned with methods and systems for deriving user-oriented knowledge from large databases and other information sources, and applying this 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 the MS/SE program. Key activity is completion of a major applied team project resulting in an acceptable technical report, and oral briefing. Students should plan to take this course in their 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.
720 Analysis of IT Industries (2:2:0) 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 an 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.

501 Data Communications and Local Area Networks (3:3:0) Prerequisite: 60 credits or permission of instructor. Study of the evolution and operation of communications systems from wireline telegraphy to wireless video, 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.

450 Structure of the Telecommunications Industry (3:3:0) Prerequisite: 90 credit hours or permission of instructor. Students explore the complex interrelationships that affect modern telecommunications and how major mergers, acquisitions, regulatory decisions, congressional initiatives, or engineering breakthroughs can each profoundly affect the telecommunications industry at any given time. Serves as the capstone seminar in the telecommunications minor.

694 Telecommunications Internship (3-6:1-2:0) Prerequisite: graduate standing and permission of the MA in Telecommunications program director. Students work in an approved professional-level telecommunications position, meeting regularly with their agency and university internship supervisor. A paper and a journal are required, as well as a minimum of 60 hours of work for each credit hour of enrollment. Normally, students enroll in internships at the end of the program of study.

730 Telecommunications Management (3:3:0) Prerequisite: graduate standing. Surveys the strategic and organizational issues in the field of telecommunications management. Focus is on strategic management oriented toward the executive management level of telecommunications firms.

750 Coordinating Seminar (3:3:0) Prerequisite: open only to students in the 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 the 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 have a desire to explore a telecommunications topic in greater depth than through the current course work provided in the curriculum. A written report is required; an oral or written examination may be required.

799 Thesis (1-6:0:0) Prerequisites: degree candidacy in the MA in telecommunications, completion of 24 credits of graduate course work, and approval of a thesis proposal by the faculty advisor and telecommunications director. Individualized section form required. Original research related to the student's concentration in telecommunications. Research must result in a document meeting university standards. Graded S/NC.

Telecommunications (TELE)
School of Public Policy

350 Telecommunications Systems (3:3:0) Prerequisite: 60 credits or permission of instructor. Study of the evolution and operation of telecommunications systems from wireline telegraphy to wireless video, 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.

450 Structure of the Telecommunications Industry (3:3:0) Prerequisite: 90 credit hours or permission of instructor. Students explore the complex interrelationships that affect modern telecommunications and how major mergers, acquisitions, regulatory decisions, congressional initiatives, or engineering breakthroughs can each profoundly affect the telecommunications industry at any given time. Serves as the capstone seminar in the telecommunications minor.

500/ECE 540 Modern Telecommunications (3:3:0) Prerequisite: TCOM 575, or equivalent. A comprehensive overview of telecommunications, including current status and future directions. Topics include a review of the 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 are provided to illustrate the basic concepts and gain 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 co-
control; error control; link management; common link proto-
cols. Local Area Networks (LANs); basics, definitions, media access control; PROP; LAN; Internet; Group Management
Prococols; 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 manage-
ment; virtual private networks; introduction to network management; routing methods; internetworking; introduc-
tion to Internet Protocol concepts; OSI transport layer cli-
et-server model; domain name systems; and telnet.

502 Wide Area Networks and Internet (1.5:1.5:0) Pre-
requisite: graduate standing. OSI reference model review; packet network layer functions; connection-oriented and connectionless packet switching; X.25 and X.75 standards; SONET and Packet-over SONET; circuit-switched networks and control signaling; congestion control and traffic manage-
ment; virtual private networks; introduction to network management; routing methods; internetworking; introduc-
tion to Internet Protocol concepts; OSI transport layer cli-
et-server model; domain name systems; and telnet.

503 Fiber Optic Communications (1.5:1.5:0) Pre-
requisite: TCOM 500. Introduction and overview of optical fi-
ber 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 Multi-
plexed networks and optical switching systems.

504 Asynchronous Transfer Mode Networks (1.5:1.5:0) Pre-
requisites: TCOM 500, 501, 502, or equivalent. Asyn-
chronous Transfer Mode (ATM) concept, protocols, ser-
vices, and applications. The emphasis is on the standards and technology of ATM for local and wide area networks.
Relation to broadband ISDN; ATM switching, multiplex-
ing and transport; user-network and network-network in-
terface 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) Pre-
requisites: TCOM 500, 501, 502, or equivalent. Introduction to the systems engineering of a networked multicomputer system. Study of distributed multicomputer architectures, architecture of a network operating system, and key sys-
tem components. The focus of this course is on the develop-
ment of a thin-client/server system, requirements analysis of a client/server web computing system, system planning and imple-
mentation. Includes a study of example multicomputer systems and a discussion of future directions.

506 Personal Communication Systems (PCS) (1.5:1.5:0) Pre-
requisites: TCOM 500, 501, 551, and 552 or equiv-
alent. An introduction to Personal Communication Systems (PCS) The course guides the students through several top-
ics of this emerging area, describing the multiple technical layers of the PCS systems. It begins with data-link level and network layer protocols, including their implementa-
tion. This is followed by mobile station operation and base station operation, and description of how voice and data services work. In the final part, the vital issues of user authentication, privacy and data or voice encryption are discussed.

509 Internet Protocols (1.5:1.5:0) Pre-requisites: TCOM 501 and 502. The Internet Protocol (IP) Suite: principles, protocols, and architecture; Internetworking; Internet ad-
dressing; IP; routing protocols (RIP, OSPF, BGP); Internet Control Protocol; Internet Group Management Protocol; User Datagram Protocol; Transmission Control Protocol; Client-Server Model; Domain Name System;
518 Third Generation Cellular Telephony (1.5:1.5:0)  
Prerequisites: TCOM 506, 531, and 532. 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, 2.5G, 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 a 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, etc.); 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 a changing climate of telecommunications ownership, deregulation, and privatization; resource allocation fundamentals based on internal rate-of-return, net present value, opportunity costs, etc.; valuation of potential acquisitions in a 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. The planning and implementation of telecommunication systems from strategic planning through requirements, the initial analysis, the 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. The student gains practical experience through a 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 technologies and GNSS backup alternatives.

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. This subject includes review of traffic models in telecommunication networks including models for particular streams and multiplexing, as well as multi-rate and multi-hour 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, etc.) 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 the reliability of complex networks. This course concentrates on the modeling and evaluation. Software tools are provided and tested throughout the course.

542 Stochastic Models in Telecommunications (1.5:1.5:0)  
Prerequisite: TCOM 500. Review of teletraffic theory: Erlang’s loss formula, equivalent random method, delay and delay-loss systems, etc.; complex simulation modeling and statistical analysis of outputs. Parameter estimation, evaluation of quality, etc.

545 Reliability and Maintainability of Networks (3:3:0)  
Prerequisite: TCOM 500. Stochastic modeling of network reliability, simulation modeling, modeling replacement strategies. Introduces concepts of quality control, sampling for acceptance, and economic design of quality control systems are discussed, as is system reliability. Faulty tree analysis, life testing, repairable systems and the 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 the 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 the actual effects of policies, emphasizing economic principles. Uses economic and sociological theories to analyze the impacts 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 an integrated approach to the management of a major telecommunication project; 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 the project team, and gaining the ability to monitor and control projects in a changing environment; develops an understanding of the unique attributes of major telecommunications systems such as interoperability requirements and international technical standards.

548 Security and Privacy Issues in Telecommunications  
Prerequisite: graduate standing. Introduces philosophy of secure data and voice communications. Topics include cryptography, cipher systems, practical security schemes, confidentiality, authentication, integrity, access control,
non-reputation, and their integration across a telecommunications network. The course reviews threats and vulnerabilities in distributed systems.

551 Digital Communication Systems (3:3:0) Prerequisite: TCOM 500. Digital transmission of data, voice, and video. The course covers the following topics: 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; development of link budget evaluation (system noise temperature, Nyquist filter concepts, antenna gain, filter bandwidth, etc.)

552 Introduction to Mobile Communications Systems (3:3:0) Prerequisites: TCOM 500 and 551. An introduction to mobile communication system design and analysis. Topics include the mobile communication channel, access and mobility control, mobile network architectures, connection to the fixed network, and signaling protocols for mobile communication systems. Examples of mobile communication systems including the panEuropean GSM system, the 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; multi-level signaling; hybrid signaling; comparative performance.

555 Network Management Foundations and Applications (3:3:0:0) Prerequisites: TCOM 500, TCOM 501, and TCOM 502. Techniques that network managers utilize to maintain and improve the performance of a telecommunications network; a network management system is defined and explained; the five tasks traditionally involved with network management (fault management, configuration management, performance management, security management, and accounting management) are emphasized; the theoretical background in transmission systems sufficient to understand network parameters such as capacity and response times are reviewed; specific network management products are discussed and explained. This course explores how network performance data should be used for management and when considering upgrades in the network architecture.

556 Applied Cryptography (1.5:1.5:0) Prerequisites: TCOM 500 and 548. Broad overview of cryptographic algorithms and mechanisms and their application in today's communication networks. Discussion of modern cryptographic techniques such as public key cryptography, digital signatures, secret sharing, key management, key escrow, public key certificates, and public key infrastructure. Use of cryptography on the Internet including secure electronic mail, secure WWW, and electronic commerce. Comparison and analysis of software implementations of cryptographic algorithms.

562 Network Security Fundamentals (3:3:0) Prerequisite: TCOM 500. Introduction to full spectrum of network security. Topics include taxonomy (language commonality in incident handling; national strategy to secure cyberspace; 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 the quantitative foundations in mathematical and electrical concepts to permit registration for courses in the Telecommunications MS degree and certificate programs. Topics include polynomials, exponentials, linear and quadratic equations, graphs and functions, trigonometric functions, radial measurement 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, kirchoff's law, decibel notation. Note: This 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 the subject of the topic. Selected topics from recent developments and applications in various engineering disciplines within specialty modules 4 and 5 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.

598 Independent Study in Telecommunications (1.5, 3.0:1.5, 3.0:0) Prerequisite: 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 an instructor and approved by the program director before registering. The course may be taken for either 1.5 credits or 3.0 credits in the fall and spring semesters. NOTE: No more than a total of 6 credits may be taken from a combination of TCOM 598, TCOM 599, TCOM 696, and TCOM 697 courses for credit within the 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 an instructor and
approved by the program director before registering. The course may be taken for either 1.5 credits or 3 credits in the fall and spring semesters. Note: No more than a total of 6 credits may be taken from a combination of TCOM 598, TCOM 599, TCOM 696, and TCOM 697 courses for credit within the TCOM program.

603 Standards for Advanced Optical Networks (3:3:0) 
**Prerequisites:** TCOM 503 and 513. Introduction of current and upcoming global optical networking standards. Course will introduce the currently deployed optical networking standards, primarily SONET and proceed with the evolution of the next generation optical networks as envisioned by the various standards body. Standard work on Automatic Switched Optical Networks being worked on at ITU will be covered along with Generalized Multi-Protocol Label Switching being worked on at IETF. The course will also cover the evolution of Ethernet from local area networking to wide area networking, specifically the G.Etna standard that is being developed by ITU and the T1.X1 committee and 802.xxx developed by IEEE.

605 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) 
**Prerequisite:** TCOM 551. Topics include: Introduction to satellite communications systems; historical aspects; orbital mechanics and launches; satellite components (payload, orbital maneuvering systems, cooling systems, antennas, payload, etc.); look angle predictions; link budget; overall link design; multiple access (TDMA, CDMA, ALOHA, TDMA, MF-TDMA), etc., error control for digital satellite links, propagation effects on satellite links, elements of VSAT systems, nongeostationary satellite systems, and direct broadcast satellite services.

609 Interior Gateway Protocol (IGP) Routing (3:3:0) 
**Prerequisites:** TCOM 509 and TCOM 513, 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; analysis of latest RFC information posted on the IETF web site.

610 Border Gateway Protocol (BGP) Routing (3:3:0) 
**Prerequisites:** TCOM 509 and TCOM 513, or equivalent. Discusses development of Border Gateway Protocol and its application in today's Internet routing architecture. It will cover the 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 TCOM 610. Develops full understanding of MPLS theory, technology, and implementation aspects through a detailed analysis of the MPLS routing concepts and protocol stacks and the completion of a major project aimed at reinforcing the students understanding of MPLS.

660 Network Forensics (3:3:0) 
**Prerequisites:** TCOM 509 and a working knowledge of computer programming. This course deals with the collection, preservation, and analysis of network generated digital evidence such that this evidence can be successfully presented in a court of law (both civil and criminal). The relevant federal laws will be examined as well as private sector applications. The capture/intercept of digital evidence, the analysis of audit trails, the recordation of running processes, and the reporting of such information will be examined.

661 Digital Media Forensics (3:3:0) 
**Prerequisites:** TCOM 548 and 556, or TCOM 562, and a working knowledge of computer operating systems, or permission from instructor. Deals with the collection, preservation, and analysis of digital media such that this evidence can be successfully presented in a court of law (both civil and criminal). The relevant federal laws will be examined as well as private sector applications. Examines seizure, preservation, and analysis of digital media.

662 Advanced Secure Networking (3:3:0) 
**Prerequisites:** TCOM 509 and TCOM 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. It covers the network perimeter defense concept and the various components for a complete layered defense system. It 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.

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 within specialty modules 1, 2, and 3 of the TCOM program. Advanced topics are chosen so that they do not duplicate existing TCOM courses. Active participation of the students is encouraged in the form of writing and presenting papers in various research areas of the 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 within specialty modules 4 and 5 of the TCOM program. The advanced topics are chosen in such a way that they do not duplicate existing TCOM courses. Active participation of the students is encouraged in the form of writing and presenting papers in various research areas of the advanced topic. Enhances professional engineering community’s
696 Independent Reading and Research (1.5, 3.0:1.5, 3.0:0) Prerequisites: graduate standing; approval of program director. Study of a selected area within specialty modules 1, 2, or 3 under the supervision of a faculty member. A written report is required. Note: No more than a total of 6 credits may be taken from a combination of TCOM 598, TCOM 599, TCOM 696, and TCOM 697 courses for credit within the TCOM program.

697 Independent Reading and Research (1.5, 3.0:1.5, 3.0:0) Prerequisites: graduate standing; approval of program director. Study of a selected area within specialty modules 4 or 5 under the supervision of a faculty member. A written report is required. Note: No more than a total of 6 credits may be taken from a combination of TCOM 598, TCOM 599, TCOM 696, and TCOM 697 courses for credit within the TCOM program.

698 Telecommunications Projects Course (3:3:0) Prerequisite: graduate standing. To be taken toward the end of the degree program within any of modules 1, 2, or 3. Primary activity is completing a major applied project, preferably with group of two to three people. Secondary goal is consolidating training before graduation so that, in some cases, it may act as a capstone course. Students and outside telecommunication industry managers present ideas for projects and, through the grouping of students, new skills and approaches may be learned. Some class time used for discussion of the 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 the projects to department faculty.

699 Telecommunications Project Course (3:3:0) Prerequisite: graduate standing. Capstone of the degree program under the specialty modules 4 or 5. To be taken toward the 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. At the end of semester, projects presented to the department faculty.

707 Advanced Link Design (3:3:0) Prerequisite: TCOM 551. Topics include advanced satellite link design (VSAT optimization, intersatellite systems, propagation mitigation trade-offs), radar link design (primary and secondary radars, range ambiguities, false alarms, Doppler radar, FM radar, radar tracking, radar transmitters and receivers, phased array radars); terrestrial wireless link design (line of sight, LMDS, non-line of sight); optical link design (lasers, diffraction limits, lidar and communications links, tracking limitations, GEO and LEO intersatellite link design); Wi-Fi link design; directed energy systems.

750 Coordinating Seminar (3:3:0) Prerequisites: open only to students in the 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. The course focuses on the 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 the 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) First semester covers the development of Western drama and theater from its beginnings through Shakespeare. Second semester brings the study up to the present day. Considers readings in dramatic literature and history of the theater in their social context.

190 Special Topics (1-3:1-3:0) Rotating topic. Introductory seminar in areas of special interest. May be repeated for a maximum of 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 a total of 4 credits; fulfills the theater BA requirement. See departmental listing for more information. May be repeated for up to a total of 4 credits. Graded S/NC.

201 Stage Management (1:1:0) Principles of literary management and dramaturgy for regional/resident theater. Directed primarily toward developing new work.

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. Consideration to 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.

215 Stage Make-Up (3:3:0) Theory and practice of stage and television make-up covering character analysis, facial anatomy, application, and period styles.

230 Introduction to Technical Theater (3:3:0) Theory, practice, and historical context of the physical production component of theater. Studies current trends in technical theater, and explains how they developed from earlier technology. Lectures and hands-on experience.
231 Introduction to Technical Theater II (3:3:0) Continuation of THR 230, stressing the contributions of costumes, sound, and props to theatrical production. Intensive work in drafting for the theater. Participation in theater division productions required.

235 Fundamentals of Costume Construction (3:3:0) Basic flat pattern development, theatrical sewing techniques, and organization of the costume construction process. Includes lab study and practical experience in garment construction and related costume crafts as used in theater costume design.

300 Voice and Speech Fundamentals (3:3:0) Prerequisite: THR 210 or permission of instructor. Basic techniques in breathing, vocal production, and articulation for the actor.

301 Voice and Speech for the Performer (3:3:0) Prerequisite: THR 300 or permission of instructor. Integration of text and performance principles with voice and speech fundamentals begun in THR 300. Advanced work in vocal production and character-specific sounds.

303 Movement for the Actor I (3:3:0) Development of the physical side of the actor’s instrument emphasizing free and responsive expression of impulse and intention.

304 Movement for the Actor II (3:3:0) Advanced work in techniques established in THR 303.

310 Acting II (3:3:0) Prerequisite: THR 210 or permission of instructor; must be concurrently enrolled in THR 220. Extends principles begun in THR 210 through scene study, audition technique, and work in analysis, characterization, and relationships.

314 Lighting Stagecraft (3:3:0) Prerequisites: THR 235 or permission of instructor; must be concurrently enrolled in THR 250. Practical and theoretical instruction on becoming theatrical electrician. Includes ideas on workplace safety, basic electrical procedures, theatrical electrical production, integrating with other theater professionals, and professionalism.

320 Beginning Modern Acting (3:3:0) Prerequisites: THR 230 and 310 or permission of instructor. Builds on existing skills in observation, sense memory, relaxation, and improvisation. Students learn a variety of methods for scene preparation to apply to their own acting process.

321 Acting Shakespeare (3:3:0) Prerequisites: THR 210 and 310, or permission of instructor. Develops understanding of the challenges of performing Shakespeare by building on body of acting skills and knowledge. Focuses on how structure of language in the 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 the experience of transforming Shakespeare’s language into powerful theatrical expressions.

322 Alexander Technique/Stage Combat (3:3:0) Offered during the beginning modern acting time block, but open to all theater majors.

329 Directing I (3:3:0) Prerequisite: THR 150-151, 210, or 350; or permission of instructor. Introduces text analysis, rehearsal procedure, staging techniques, and development of production idea. Students direct exercises and short scenes along with preparing written production notes.

330 Seminar in Technical Theater (3:3:0) Prerequisite: THR 230, or permission of instructor. Rotating topic. Offered periodically; addresses selected topic in design or technical theater on an advanced level. May be repeated for a total of 24 credits.

332 Seminar in Costume History (3:3:0) Explores evolution of fashion and styles of dress. Studies subject silhouette, color, fabric, accessories, and make-up appropriate to development of clothing during specific historical era. Offers broader understanding of context relating to the sociological and psychological factors influencing Western dress. Historical era studied will rotate. May be repeated for a total of 9 credits provided specific course content differs.

333 Stage Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Fundamentals of creating, developing, and communicating design idea through sketches, plans, rendering, or models. Analysis of text from designer’s perspective.

334 Lighting Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Study of lighting design as an art that defines space and reveals form. Introduces tools, equipment, and process of lighting design. Analyzes text from designer’s perspective.

335 Costume Design (3:3:0) Prerequisite: THR 230 or permission of instructor. Project-oriented class emphasizing process of designing and building. Costume design studied in relation to historical periods and artistic demands of script. Includes lecture, lab in fundamentals of costume design for stage.

336 Advanced Theater Technology (3:3:0) Prerequisite: THR 230 or permission of instructor. Continuation of work begun in THR 230, stressing contributions of costumes, sound, and props to theatrical production. Intensive work in drafting for the theater. Participation in theater division productions required.

340 Directing II (3:3:0) Prerequisite: THR 240 or permission of instructor. With techniques developed in THR 240, students analyze and stage extended scenes or one-act plays. Emphasizes collaborative process and production organization.

343 Costume Draping and Drafting (3:3:0) Prerequisite: THR 235 or permission of instructor. Pattern development through draping and drafting. Laboratory study and practical experience in construction of stage costumes.

345 Puppetry: History and Technique (4:2:4) In the context of a comprehensive and intensive exploration of world puppetry, course experiments with building and performance styles. Emphasis on hand and rod puppets, shadow work, toy theater, and bunraku-style figures. Students develop, build, and present original work.

350 Script Analysis (3:3:0) Principles and practice of critical analysis of dramatic literature as preparation for production and performance.

351 Dramatic Theory and Criticism (3:3:0) Chronological study of the 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 a particular topic, period, or genre in dramatic literature. Topics may include 20th-century American women playwrights, Ibsen, tragedy and comedy, 17th-century drama in England, France, and Spain. May be repeated for a total of 9 credits provided 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 the 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 a 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 a variety of theatrical traditions within 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 the theater modeled on people from personal experience and observation, imagination, dreams, and other media, and transforms that information into detailed, specific, and vivid physical manifestations. Through presentations of characters drawn from personal experience, students shift their 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.

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 an actor’s approach, a midterm sonnet presentation, and final scene.

421 One-Person Show (3:3:0) Prerequisite: THR 210 and 310, or permission of instructor. Students work with designated faculty on the successful writing, rehearsal, and performance of an original 30-minute, 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 THR 334, or permission of instructor. In-depth study of lighting design. 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.

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: senior standing or above. Students design advanced-level project, classroom training, knowledge, skills, and theory to a professional situation. May be repeated for a total of 12 credits.

494 Field Experience (1-6:1-6:0) Off-campus experience with professional theater to provide opportunity to apply classroom training, knowledge, skills, and theory to a professional situation. May be repeated for a total of 12 credits.
with supervision of faculty advisor, that represents 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 general education courses; junior standing or permission of the 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) Prerequisite: open only to theater majors with 90 credits and by special permission of the department chair. Individual research and creative project in close consultation with instructor. Selection from projects in performance, directing, technical theater and design, playwriting, or theater history and criticism. May be repeated for a total of 24 credits, provided suffix citing specific course content is different.

571 Advanced Playwriting Workshop (3:3:0) Prerequisite: undergraduate degree or equivalent, or permission of instructor. Advanced playwriting workshop in which students explore their own voice in theatrical writing.

599 Independent Study (1-6:1-6:0) Prerequisite: undergraduate degree or equivalent, or permission of instructor. Independent reading, performance, or research on a specific project under direction of selected faculty member. May include attendance in a parallel undergraduate course. May be repeated for a total of 6 credits.

Tourism and Events Management (TOUR)

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 a 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. Examines 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) Prerequisite: TOUR 200 or permission of instructor. 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) 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 PRLS 328 or TOUR 352, or permission of instructor. Focuses on communication pro-
cesses and practices used by professionals to explain and interpret special characteristics of cultural and environmental resource sites for visitors. Discusses conceptual principles for planning interpretive programs, as well as techniques for analyzing and disseminating information and entertainment through various media. Examines delivery of interpretive messages across a variety of audiences, strategies for programming interpretive services, and the administration and evaluation of interpretive services at tourism, event, and recreation sites.

412 Tourism Marketing and Finance (3:3:0) Prerequisites: TOUR 200 and PRLS 410, or permission of instructor. Provides understanding and tools for marketing and management of financial resources in entrepreneurial tourism enterprises. Includes market planning, business planning, feasibility assessment, investment analysis, basic accounting, and operational control.

414 Tourism and Events Finance (3:3:0) Prerequisites: TOUR 200 and PRLS 410 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) Prerequisite: Only 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. See course description in the Schedule of Classes. 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). Pass/fail. 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) Prerequisites: TOUR majors only; 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)

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) Non-technical 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 non-science 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)

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-assess-
ment, 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 representations of women 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 Sociology of Sex Roles (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, 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.

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.

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

Board of Visitors

Membership as of December 2004

Sidney O. Dewberry, Rector, BS, George Washington University; Arlington, Va.
Leonard M. Pomata, Vice Rector, BS, Brooklyn Polytechnic; MS, New York University; Great Falls, Va.
Teresa M. Klaassen, Secretary, BS, George Mason University; McLean, Va.
David Anderson, BA, Dartmouth College; JD, National Law Center at George Washington University; Richmond, Va.
Richard H. Fink, BA, Rutgers University; MA, University of California at Los Angeles; PhD, New York University; Centreville, Va.
Dennis Garcia, BA, George Washington University; MA, George Washington University; Alexandria, Va.
Harry F. Hopper, III, BA, University of California at Berkeley; JD, Berkeley’s Boalt Hall School of Law; Alexandria, Va.
William Page Johnson, II, BS, George Mason University; Fairfax, Va.
Carol Merchant Kirby, BAs, University of West Florida; Washington, DC.

Byron F. Marchant, BS, U.S. Naval Academy; JD, University of Virginia; Arlington, Va.
Roger Mody, Information not available; McLean, Va.
Cailian Nichols (student representative), student in the College of Arts and Sciences, George Mason University; Fairfax, Va.
Long Nguyen, BS, North Carolina State University; MS, University of Virginia; PhD, Iowa State University; McLean, Va.
Gary Shapiro, BA, State University of New York—Binghampton; JD, Georgetown University Law Center; Vienna, Va.
Sudhakar Shenoy, BTech., Indian Institute of Technology; MS, MBA, University of Connecticut; Great Falls, Va.
J. Knox Singleton, BS, University of North Carolina, Chapel Hill; MS, Duke University; Oakton, Va.
Bernard Tomsa (student representative), BS, University of Michigan; student in the School of Law, George Mason University; Fairfax, Va.
Ernst Volgenau, PhD, University of California at Los Angeles; Fairfax, VA

Administration

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Chief of Staff: J. Thomas Hennessey Jr., PhD
Provost and Executive Vice President for Academic Affairs: Peter N. Stearns, PhD
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Senior Vice President: Maurice W. Scherrens, JD, EdD
Vice President for University Relations: Christine M. LaPaille, MA
Vice President for University Life: Sandra Hubler, EdD
Vice President for Information Technology: Joy R. Hughes, PhD
Vice President for University Development and Alumni Affairs and President, GMU Foundation Inc.: Judith Marshall Jobbitt, MS
Vice President Prince William: Lawrence D. Czarda, PhD
Vice President Arlington: Stanley E. Taylor, MArch
Vice President for Facilities: Reid Herlihy, MSArch
Vice President for Research: Matthew J. Kluger, PhD, MBA

Deans and Directors
Dean, College of Arts and Sciences: Daniele C. Struppa, PhD
Dean, School of Computational Sciences: Menas Kafatos, PhD
Director, Institute for Conflict Analysis and Resolution: Sara Cobb, PhD
Dean, College of Education and Human Development: Jeffrey Gorrell, PhD
Dean, School of Information Technology and Engineering: Lloyd J. Griffiths, PhD
Dean, School of Law: Daniel Polsby, JD
Dean, School of Management: Richard J. Klimoski, PhD
College of Nursing and Health Science: Shirley Travis, PhD
Dean, School of Public Policy: Kingsley Haynes, PhD
Dean, College of Visual and Performing Arts: William F. Reeder, MA
Assistant to the President and Director of Office of Equity and Diversity Services: Camile 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 McKenzie, PhD
Associate Provost for International Programs: Yehuda Lukas, PhD

Enrollment Services
Dean of Admissions and Enrollment Development: Andrew Flagg, MA
Director of Admissions: Eddie Kent Tallent, BFA
Director of Graduate Admissions: vacant
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
Dean of Students: Girard Mulherin, S.T.L.
Associate Dean, University Life, Judicial Affairs: Pam Patterson, MS
Associate Dean, University Life, Administration: Rose Pascarella, MA
Associate Dean, University Life and Director, University Career Services: Patricia Carretta, MA

Faculty Emeriti
Victorio G. Aguera, BST, MA, PhD 1971, Professor Emeritus of Spanish
Vassily P. Aksonov, MD, Professor Emeritus of Russian Literature and Writing
John A. Allen, AB, MS, PhD, Associate Professor Emeritus of Psychology
Robert A. Anthony, BA, JD, George Mason University Foundation Professor of Law, Emeritus
Marjory Brown Azarowicz, BA, MA, PhD, Professor Emerita of Education
Mary Catherine Bateson, BA, PhD, Professor Emerita of Anthropology and English
Barry Keith Beyer, BA, MA, PhD, Professor Emeritus of Education
John Blaha, BS, MA, PhD, Associate Professor Emeritus of Psychology
C. Alan Boneau, BA, MA PhD, Professor Emeritus of Psychology
John Bonfadini, BS, MEd, EdD, Associate Professor Emeritus of Education
Stephen J. Brown, BA, MA, PhD, Professor Emeritus of English
James M. Buchanan, BS, MA, PhD, Distinguished Professor Emeritus of Economics
Mary Kay Cabell, BA, MA, PhD, Associate Professor Emerita of Mathematical Sciences
Le Thi Cao, BS, MBA, DBA, Associate Professor Emeritus of Accounting
Rita M. Carty, BSN, MSN, DNSc, Dean Emerita, College of Nursing and Health Science
Ernest Cassara, AB, BD, PhD, Professor Emeritus of History
Arthur H. Chickering, AB, AMT, PhD, Professor Emeritus of Education
Jae W. Chung, BC, MC, MA, PhD, Professor Emeritus of Economics
Evelyn Ellis Cohelan, BS, MS, EdD, Professor Emerita of Nursing
Virginia Collier, BA, MA, PhD, Professor Emerita of Education
John H. Cooper, BA, MA, DPE, Chair Emeritus of Health, Sport, and Leisure Studies
Anne Cordero, MA, PhD, Associate Professor Emerita of Modern and Classical Languages
Lloyd Martin DeBoer, BS, MBA, PhD, Dean Emeritus of the School of Business Administration
Edward Clark Dobson, BME, MS, PhD, Associate Professor Emeritus of Education
Stephen T. Early, BA, MA, PhD, Professor Emeritus of Government and Politics
Albert Wesley Edgemon, BAE, MA, EdD, Professor Emeritus of Education
Michael G. Emsley, BS, ARCS, PhD Professor Emeritus of Biology
Carl H. Ernst, BS, MEd, PhD, Professor Emeritus of Biology
Edwin A. Fleishman, BS, MA, PhD, DSc (Honorary), Professor Emeritus of Psychology
James J. Fletcher, BA, MA, PhD, Professor Emeritus of Philosophy
Arnald D. Gabriel, BS, MS, DMin (Honorary), Professor Emeritus of Music
Helen S. Garson, BA, MA, PhD, Professor Emerita of English
Martha M. Giles, BMed, MMed, DMed, Associate Professor Emeritus of Music
Robert L. Gibstrap, BS, MEd, EdD, Professor Emeritus of Education
Joseph B. Gitter, BS, MA, PhD, Professor Emeritus of Sociology
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
Vernon Gras, PhD, Professor Emeritus of English
Joseph L. Harsh, BA, MA, PhD, Associate Professor Emeritus of History
Jayne Thompson Hart, BS, MS, PhD, Professor Emerita of Biology
Nand E. Hart-Nibbrig, AB, MA, PhD, Associate Professor Emeritus of Government and Politics
Peter R. Henriques, BA, BD, PhD, Associate Professor Emeritus of History
Thomas H. Hill, BM, MM, DMA, Professor Emeritus of Music
Robert Holt, BA, MA, PhD, Associate Professor Emeritus of Psychology
James Louis Jackson, BA, MA, PhD, Professor Emeritus of English
Evelyn Jacob, BA, PhD, Professor Emerita of Education
Helen M. Jenkins, MSN, PhD, Professor Emerita of Nursing
Ronald Jensen, BA, MA, PhD, Associate Professor Emeritus of History
George W. Johnson, BA, MA, PhD, President Emeritus, Professor Emeritus of English
Hazel Johnson-Brown, BS, MS, PhD, Professor Emerita of Nursing
Joseph Michael Kanyan, BS, MM, DMA, Associate Professor Emeritus of Music
Robert Emil Karlson, BA, MA, PhD, Associate Professor Emeritus of English
Kash, Don E., BA, MA, PhD, John T. Hazel, Sr. and Ruth D. Hazel Professor of Public Policy Emeritus
Irving Kayton, BA, JD, LLM, JSD, Professor Emeritus of Law
Jerome B. Kernan, BBA, MS, PhD, GMU Foundation, Professor Emeritus of Behavioral Analysis
Emelia-Louise Kilby, BS, MA, PhD, Professor Emerita of Health and Physical Education
Barbara Brant Knight, BA, MA, PhD, Associate Professor Emerita of Government and Politics
Robert Charles Krug, BS, MS, PhD, Professor Emeritus of Chemistry
Thelma Z. Lavine, AB, AM, PhD, Professor Emeritus of Government and Politics
Raymond Gratian LePage, BA, MA, PhD, Associate Professor Emeritus of French
Jack Levy, BA, MA, PhD, Professor Emeritus of Education
Seymour M. Lipset, BA, PhD, Professor Emeritus of Public Policy
Sara C. Looney, BA, MA, PhD, Associate Professor Emerita of Communication
Catherine Malloy, BSN, MPH, DrPH, Professor Emerita of Health, Fitness, and Recreation Resources
Bruce Borden Manchester, BS, MA, PhD, Professor Emeritus of Communication
Henry G. Manne, BA, JD, JSP, LL.D, Dean Emeritus of the School of Law
Michael James McDermott Jr., AB, PhL, Associate Professor Emeritus of Philosophy and Religious Studies and Registrar Emeritus
William H. McFarlane, BA, PhD, Professor Emeritus of Philosophy
Gustavo Mellander, AB, MA, PhD, DHL, Dean Emeritus of the Graduate School of Education
Henry P. Meyer, BA, MA, PhD, Associate Professor Emeritus of French
Eugenie Vorburger Mieleczarek, BS, MS, PhD, Professor Emerita of Physics
Christopher R. Mitchell, BSc, PhD, Professor of Conflict Resolution Emeritus
Mary S. Montebello, BS, MS, PhD, Professor Emerita of Education
Walter Jennings Moretz Jr., AB, BD, PhD, Associate Professor Emeritus of Psychology
Josephine F. Pacheco, BA, MA, PhD, Professor Emerita 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 D. Philos, AB, JD, Professor Emeritus of Law
Coleman Raphael, BCE, MCE, PhD, Dean Emeritus of the School of Business Administration
Georgine Redmond, BSN, MN, EdD, Associate Professor Emeritus of Nursing
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 of the School of Information Technology and Engineering
Ben F. Sands Jr., MBA, DBA, Associate Professor Emeritus of Management
David H. Schaefer, BS, Associate Professor Emeritus of Electrical and Computer Engineering
Jay Charles Shaffer, BS, PhD, Professor Emeritus of Biology
Betty Jane Schuchman, BS, MS, EdD, Associate Professor Emerita of Nursing
Carol Joyce Sears, BS, MS, PhD, Emeritus of Education
Kitty Parker Smith, BSN, MSN, Emerita of Nursing
Mary Elizabeth Silva, BS, MS, PhD, Professor Emeritus of Nursing
Linda Seligman, AB, MA, PhD, Professor Emerita of Education
Mary Elizabeth Silva, BS, MS, PhD, Professor Emeritus of Nursing
Judith Ellen Skog, BS, MS, PhD, Professor Emeritus of Biology
James G. Smith, BM, MM, DMA, Professor Emeritus of Music
Kitty Parker Smith, BSN, MSN, Associate Professor Emerita of Nursing and Health Science
William P. Snavely, BA, MA, PhD, Professor Emeritus of Economics
John P. Soder, BA, MA, PhD, Associate Professor Emeritus of History
Mark Spikell, BA, MEd, PhD, Professor Emeritus of Education
Melissa Stanley, BS, MA, PhD, Professor Emeritus of Biology
Stephan R. Taub, AB, PhD, Professor Emeritus of Biology
Nicholas John Tavani, AB, BD, MA, PhD, Professor Emeritus of Sociology
Hale Nuckolls Tongren, MBA, DBA, Associate Professor Emeritus of Marketing
Wayne Thomas, BA, MEd, PhD, Professor Emeritus of Education
Zita Tyer, PhD, Professor Emeritus of Psychology
Karen L. Vaughan, 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 Special Education
C. Robert Walter Jr., BA, PhD, Professor Emeritus of Chemistry
John N. Warfield, AB, BSEE, MSEE, PhD, Professor Emeritus of Public Policy
Keith Q. Warner, Professor Emeritus of French
Inge B. Wekerle, BA, AM, PhD, Assistant Professor Emerita of German
Louise White, PhD, Professor Emeritus, Public and International Affairs
William Scott Willis, BA, MA, PhD, Professor Emeritus of French
Norman A. Yance, BS, BD, ThM, MAPhil, PhD, Associate Professor Emeritus of Philosophy and Religious Studies
George A. Zaphiriou, LLB, LLM, Professor Emeritus of Law

Instructional and Administrative Faculty
2004–05
The faculty list reflects appointments as of the end of the fall 2004 semester.

Abdalla, Wagida, Medical Director, Student Health Services. MD 1972, Alexandria University, Egypt; Diplomat of the American Board of Pediatrics, 1982.

Abramowicz, Michael, Assistant Professor of Law. BA 1994, Amherst College; JD 1998, Yale Law School.

Adams, Lisa M., Assistant Professor of Integrative Studies. BA 1994, MAIS 1997, George Mason University.

Addleston, Mark S., Associate Professor, School of Public Policy; Director, New Professional Studies Program. BA 1972, BA 1973, Rhodes University; MA 1980, University of Natal, Pietermaritzburg; PhD 1992, University of Witwatersrand.


Agee, Anne S., Executive Director, DoIT; Deputy CIO of Information Technology Unit. PhD 1989, Catholic University of America.

Aguarron, Geir, Assistant Professor of Mathematical Sciences. BS 1990, University of Iceland; PhD 1996, University of California, Berkeley.

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.

Aigner, Deborah Tanehill, Head Coach of Women’s Basketball. BA 1992, MEd, George Mason University.

Ailes, Robert H., Lecturer of Mathematical Sciences. BS 1957, United States Naval Academy; MA 1963, United States Naval Postgraduate School.

Ailingar, Rita Louise, Associate Professor of Nursing and Health Science. BS 1961, Boston College; MS 1963, Boston University; MA 1972, PhD 1974, Catholic University of America.

Akwule, Raymond U., Associate Professor of Communication. BA 1977, MA 1979, University of Iowa; PhD 1985, Howard University.

Albanese, Denise, Associate Professor of English. BA 1978, New York University; PhD 1987, Stanford University.

Aldrich, Margaret, Enrollment Services Manager. BS 1970, University of Vermont; MEd 1996, George Mason University.

Alemi, Farrokh, Associate Professor of Nursing and Health Science. BS 1976, MS 1978, PhD 1983, University of Wisconsin.

Allen, Melissa, Core Faculty Member, English Language Institute. BA 1975, MA 1979, San Francisco State University.

Allen, Pamela A., Assistant Dean of Student Services, School of Management. BS 1972, University of Illinois; MA 1988, Hunter College, City University of New York.
Alligood, Kathleen T., Professor of Mathematical Sciences. BA 1970, George Washington University; MS 1974, PhD 1979, University of Maryland.

Allnutt, Jeremy E., Professor of Electrical and Computer Engineering. BSc 1966, PhD 1970, Salford University.

Alonso, Ana, Term Instructor, Modern and Classical Languages. BA 1982, University, Florida; MA 1998, George Mason University.

Amireh, Amal, Assistant 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., Associate Professor of Education. BS 1971, Duke University; MA 1973, Ohio State University; PhD 1983, Virginia Polytechnic Institute and State University.

Anderson, Eric G., Term Assistant Professor. AB 1981 Rutgers College; MA 1983, PhD 1994 Rutgers University.

Anderson, Mark Randolph, Instructor; Assistant Men's Basketball Coach. BS 1976, University of Missouri.


Andronikov, Sergei, Associate Professor, Geography. MSc, Moscow State University; PhD Russian Academy of Sciences.

Arciszewski, Tomasz, Professor and chair of Civil and Infrastructure Engineering. BSc 1970, MSc 1970, PhD 1975, Warsaw University of Technology.

Armour, David J., Professor, School of Public Policy. AB 1961, University of California, Berkeley; PhD 1966, Harvard University.

Ascencio, Mario A., Head, Acquisition and Gifts, University Libraries. BA 1966, CSU Northridge; MLIS 1999, UCLA.

Ascoli, Giorgio A., Associate Professor, Psychology. BS 1991, Scuola Normale Superiore, Italy; MS 1993, Pisa University, Italy; PhD 1996, Scuola Normale Superiore.

Ashcraft, Thomas D., Associate Professor of Art and Visual Technology. AA 1976, Miami Dade Community College; BA 1978, University of South Florida; MFA 1982, Indiana University.

Athenor, Martin, Assistant Professor of Nursing and Health Science. BA 1973, Michigan State University; MPH 1979, DrPH 2000, University of Michigan.

Atkinson, David C., Director, Johnson Center and Student Union Operations. MA 1998, George Mason University.

Atkinson, Jennifer H., Term Assistant Professor of English. BA 1978, Wesleyan University; MA 1985, MFA 1984, University of Iowa.

Auchter, Robert H., Production Manager, Institute of the Arts. MA 1982, Kansas State University.

Auerswald, Philip E., Assistant Professor, School of Public Policy. BA 1988, Yale University; MA 1995, PhD 1999, University of Washington.

Auffret, Jean-Pierre, Director of MS in Technology Management Program; Assistant Professor of Decision Sciences and Management Information Systems, BS 1979, Duke University, MBA 1982, Colgate Darden School of Business University of Virginia, PhD 1999, American University.

Austin, Clayton, Chair, Department of Theater; Associate Professor of Theater; BA 1973, Brandeis University; MFA 1986, Yale School of Drama.

Avruch, Kevin Andrew, Professor of Conflict Resolution and Anthropology. BA 1972, University of Chicago; MA 1973, PhD 1978, University of California, San Diego.

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