

## CHAPTER 7

## DEPARTMENTS AND CAMPUS.WIDE PROGRAMS

## ACCOUNTING

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## AEROSPACE ENGINEERING (ENAE)

## A. James Clark School of Engineering

3181 Glenn L. Martin Hall, (301) 405-2376
http:/ / www.enae.umd.edu
Professor and Chair: Fourney
Professors: Chopra, Lee, Lewis, Schmidt
Associate Professors: Akin, Baeder, Barlow, Celi, Leishman, Pines, Sanner, Vizzini, Wereley, Winkelmann, Yu
Assistant Professors: Atkins
Visiting Professor: Bowden, Korkegi, Spence
Martin Professor of Rotorcraft Acoustics: Schmitz
Lecturers: Carpenter, Carigan, Garrison, Gefke, Howard, Keller, Nelson, Shaikh, Van Wie
Emeritii: Anderson, Gessow, Jones

## The Major

Aerospace engineering is concerned with the processes, both analytical and creative, that are involved in the design, manufacture and operation of aerospace vehicles within and beyond planetary atmospheres. These vehicles range from helicopters and other vertical takeoff aircraft at the lowspeed end of the flight spectrum, to spacecraft traveling at thousands of miles per hour during launch, orbit, transplanetary flight, or reenty, at the high-speed end. In between there are general aviation and commercial transport aircraft flying at speeds well below and close to the speed of sound, and supersonic transports, fighters, and missiles which cruise supersonically. Although each speed regime and each vehicle poses its special problems, all aerospace vehicles can be addressed by a common set of technical specialties or disciplines.

The subdisciplines of Aerospace Engineering are: aerodynamics, flight dynamics, propulsion, structures, and "design". Aerodynamics addresses the flow of air and the associated forces, moments, pressures, and temperature changes. Flight-dynamics addresses the motion of the vehicles including the trajectories, the rotational dynamics, the sensors, and the control laws required for successful accomplishment of the missions. Propulsion addresses the engines which have been devised to convert chemical (and occasionally other forms) energy into useful work, to produce the thrust needed to propel aerospace vehicles. Structures addresses material properties, stresses, strains, deflection, and vibration along with manufacturing processes as required to produce the very light weight and rugged elements needed in aerospace vehicles. Aerospace "design" addresses the process of synthesizing vehicles and systems to meet defined missions and more general needs. This is a process that draws on information from the other subdisciplines while embodying its own unique elements.

## Department Mission Statement

The mission of the Department of Aerospace Engineering is, (1) to provide the highest quality education in state-of-the-art aerospace engineering principles and practices at undergraduate and advanced degree levels and
through continuing education programs for practicing engineers, (2) to conduct research that will significantly advance the state of knowledge in the aerospace sciences and technologies, (3) to advance aerospace engineering practice and education through publications in the engineering and educational literature and through close relations with industry, government and other academia. (4) to contribute to the advancement of the College of Engineering, the University of Maryland, and the state of Maryland.

The Aerospace Engineering program is designed to provide a firm foundation in the various subdisciplines. The Aerospace Engineering Department has facilities to support education and research across a range of special areas. There are subsonic wind tunnels with test sections ranging from a few inches up to 7.75 feet by 11.00 feet as well as a supersonic tunnel with a 6 inch by 6 inch test section. There are a number of structural test machines with capabilities up to 220,000 pounds for static loads and 50,000 pound for dynamic loads. There are experimental facilities to test helicopter rotors in hover, in forward flight, and in vacuum to isolate inertial loads from aerodynamic loads. There is an anechoic chamber for the investigation of noise generated by helicopters, and an autoclave and other facilities for manufacturing and an x-ray machine for inspecting composite structures. There is a neutral buoyancy facility for investigating assembly of space structures in a simulated zero gravity environment which is supported by robots and associated controllers.

There are many personal computers and workstations that provide local computing capability and extensive network access to campus mainframes, supercomputing centers, and all the resources of the Internet including the World Wide Web.

## Requirements for Major

Freshman Year II II

ENES 100-Introduction To Engr. Design ............................ 3
ENAE 100-The Aerospace Engineering Profession ................. 1
CHEM 133-General Chemistry............................................ 4
CORE
. 3
MATH 140, 141-Calculus I, II ... ........................................................ 4
PHYS 161-General Physics. 4
3ENES 102-Statics.
2ENAE 202-Computer Languages
Total ..... 15
Sophomore Year ..... II ..... 
MATH 241-Calculus III
ENAE 261-Aerospace Analysis \& Computation. .....  .3
ENES 220-Strength Of Materials ..... 3
PHYS 262, 263-General Physics ..... 4
CORE .....  3
MATH 246—Differential Equations .....  3
ENAE 283-Introduction To Aerospace Systems .....  3
ENES 221-Dynamics ..... 3
Total ..... 16
Junior Year ..... II ..... 1
ENAE 311-Aerodynamics !
ENME 232-Thermodynamics .....  3
ENAE 301-Dynamics Of Aerospace Systems ..... 3
ENAE 362-Aerospace Instrumentation \& Experiments .....  3
CORE 3
ENAE 324-Aerospace Structures .....  4
ENAE 432-Control Of Aerospace Systems .....  3
ENGL 393-Technical Writing ..... 3

AERO TRACK:
ENAE 414-Aerodynamics I ... ........................................................... 3
OR
ASTRO TRACK:
ENAE 404-Space Flight Dynamics ... ............................................... 3
Total ..................................................................... 15 .......... 16
Senior Year ..............................................................I .............I
ENAE 423-Vibration And Aeroelasticity ... ........................... 3
CORE ..................................................................... 3 ............ 3
ENAE 464-Aerospace Engr. Lab ... ................................................... 3
Aerospace Elective ... ..................... ... ............................................. 3
Technical Elective ... ... ... ... ......................... ... ... ... ............................ 3
AERO TRACK:
ENAE 403-Aircraft Flight Dynamics ... ................................. 3
ENAE 455-Aircraft Propulsion \& Power ............................. 3
ENAE 481-Principles Of Aircraft Design ... ........................... 3
ENAE 482-Aeronautical Systems Design
OR
ASTRO TRACK:
ENAE 441-Space Navigation \& Guidance ............................ 3
ENAE 457-Space Propulsion \& Power .............................. 3
ENAE 483-Principles Of Space Systems Design .................. 3
ENAE 484-Space Systems Design
Total .15 .. 15
Minimum degree credits: 124 credits and the fulfillment of all department, college, and university requirements.

The Aerospace Elective is either ENAE 398 or a 400 level ENAE course in addition to the student's chosen track sequence. The General Technical Elective must be a 300 or 400 level course in Engineering, Mathematics, or Physical Science that has been approved for this purpose by the Undergraduate Program Director. Only one of either ENAE 398, a 488 project course or 499 may be used for these electives.

Minimum Degree Credits: The fulfillment of all Department, School, and University requirements. Approximately 125 credits are required for an Aerospace Engineering degree.

## Honors Program

The Aerospace Engineering Honors Program provides eligible students an opportunity to pursue an enriched program of studies which will increase the depth of their knowledge.

Academically talented students will be invited to participate in the Aerospace Honors program. Honors sections of ENAE 283, ENAE 311, ENAE 423 are offered as part of this program, in addition to an honors research project, ENAE 398.

## Admission

Admission requirements are the same as those of other Engineering Departments. See Clark School of Engineering entrance requirements.

## Cooperative Education Program

Participation in the Cooperative Education Program is encouraged. See Clark School of Engineering entry for details.

## Financial Assistance

The Department offers eight Glenn L. Martin merit-based scholarships and the Robert Rivello Scholarship. Space Systems Laboratory, Departmental and Alfred Gessow merit-based Scholarships are available as well. Students may obtain information in the main Aerospace Office.

## Scholarships and Awards

The Department offers the following awards: Academic Achievement Award for highest overall academic average at graduation; R.M. Rivello Scholarship Award for highest overall academic average through the junior year; Sigma Gamma Tau Outstanding Achievement Award for scholarship and service to the Student Chapter; American Helicopter Society Outstanding Achievement Award for service to the student chapter; American Institute of Aeronautics and Astronautics Outstanding Achievement Award for scholarship and service to the student chapter. Eligibility criteria are available in Department office.

## Student Organizations

The Department is home to student chapters of the American Institute of Aeronautics and Astronautics and the American Helicopter Society, and the Sigma Gamma Tau honorary society. Aerospace Engineering students are also frequent participants in student activities of the Society for Advancement of Materials and Process Engineering.

## AFRO-AM ERICAN STUDIES PROGRAM (AASP)

## College of Behavioral and Social Sciences

2169 Lefrak Hall, (301) 405-1158
http:/ / www.bsos.umd.edu/ aasp/
Director: S. Harley
Professor: R. Walters
Associate Professors: S. Harley, R. Williams, E. Wilson* (GVPT)
Assistant Professors: O. Johnson* (GVPT), F. Wilson
Lecturer: M. Chateauvert

* J oint appointment with unit indicated.

The Afro-American Studies Program offers an interdisciplinary bachelor of arts degree in the study of the contemporary life, history, and culture of African Americans. The curriculum emphasizes the historical development of African-American social, political, and economic institutions, while preparing students to apply analytic, social science skills in the creation of solutions to the pressing socio-economic problems confronting AfricanAmerican communities.

Students should consult a departmental adviser for updated information.
Two program options lead to the Bachelor of Arts degree. Both require a 12-credit core of course work that concentrates on Afro-American history and culture.

The General Concentration provides a broad cultural and historical perspective. This concentration requires 18 additional credit hours in one or more specialty areas within Afro-American Studies such as history, literature, government and politics, sociology or anthropology, as well as a departmental seminar and a thesis.

The Public Policy Concentration provides in-depth training for problem solving in minority communities. It requires 21 additional credit hours in analytic methods, such as economics and statistics, nine credit hours of electives in a policy area (with departmental approval) and a thesis. Substantive areas of study include the family, criminal justice, employment, health care, discrimination, and urban development.

## Requirements for Major

Foundation courses: AASP 100, 101 (formerly 300), 200, 202.
General Concentration Requirements: In addition to the foundation course requirements, 18 credits of AASP upper-division electives (300-400 numbers), AASP 400 or AASP 402 and AASP 397.

Semester
CORE Liberal Arts and Sciences ........................................................... 43
AASP Foundation Courses: (total 12)
AASP 100-Introduction to Afro-American Studies..................................... 3
AASP 101 (Formerly 300)—Public Policy and Black Community................. 3
AASP 200-African Civilization ............................................................... 3
AASP 202-Black Culture in the United States ......................................... 3
Upper-Division Electives in Afro-American Studies ................................ 18

## Seminars

AASP 402-Classic Readings in Afro-American Studies ............................ 3
AASP 397-Senior Thesis ................................................................................ 3
Public Policy Concentration Requirements: In addition to the foundation courses, three credits of statistics; eight credits of elementary economics (ECON 200 and ECON 201); AASP 301, AASP 303, AASP 305 or approved courses in other departments; nine credits of upper-division AASP electives in the policy area (AASP numbers 300-400) or, with approval, elective courses outside of AASP; and AASP 397.
CORE Liberal Arts and Sciences ........................................................ 43
Cremester
AASP Foundation Courses: (total 12)
AASP 100-Introduction to Afro-American Studies ..................................... 3
AASP 101 (Formerly 300)-Public Policy and the
Black Community................................................................................................................................................................ 3
AASP 200-African Civilization................................................................................... 3
AASP 202- Black Culture in the United States ........................................................................................................................................................................................................................................................................... 3

## Honors Program

Academically talented undergraduates may enroll in the University Honors Program with a specialization in Afro-American Studies. The Honors Program includes seminars and lectures presented by distinguished University of Maryland, College Park, faculty and guests. A reduced ratio of students to faculty ensures more individualized study. In addition, AASP majors with junior standing may petition to become individual honors candidates in Afro-American Studies.

## BA/ M PM Program

In this innovative joint program, candidates earn a bachelor's degree in Afro-American Studies and a master's degree in public management after approximately five years. The BA/ MPM is designed to integrate the study of the history, culture, and life of African Americans with technical skills, training, and techniques of contemporary policy analysis. The program also features a summer component that includes a lecture series, research opportunities, and special seminars.

## Admission into the BA/ MPM program requires two steps:

## Undergraduate

(1) Students must major in the public policy concentration within the Afro-American Studies program and maintain an overall GPA of 3.0 or greater.

## Graduate

(2) Students apply to the joint program after completing 81 credit hours of undergraduate work. Applicants must meet both University of Maryland, College Park graduate and School of Public Affairs graduate admission requirements.

## Eligibility

Freshmen or University of Maryland, College Park, students in good academic standing with fewer than 60 credits may apply to the BA/ MPM program.

Contact: The Afro-American Studies Program at (301) 405-1158 for application and scholarship details.

## Options for Study with AASP

For students who major in other departments, the Afro-American Studies Program offers three options for study:

1. Students may obtain a certificate in Afro-American Studies by completing 21 credit hours of course work.

For more information on the Afro-American Studies Certificate, see the section on campus-wide programs later in this chapter
2. Students may designate Afro-American Studies as a double major, completing the major requirements for both AASP and another program.
3. AASP can be a supporting area of student for majors such as Computer Science, Business, or Engineering.

## Scholarships and Financial Aid:

John B. and Ida Slaughter Scholarship

## Advising

Undergraduates in good academic standing may enroll in the Afro-American Studies Program or obtain more information about available options and services by contacting the Undergraduate Academic Adviser, Afro-American Studies Program, 2169 Lefrak Hall, University of Maryland, College Park, MD 20742, (301) 405-1158.

Course Code: AASP

## AGRICULTURAL SCIENCES, GENERAL (GNAS)

College of Agriculture and Natural Resources<br>0115 H.J. Patterson, (301) 405-1331<br>E-mail: dg11@umail.umd.edu<br>Coordinator: D.S. Glenn

Agriculture is a complex scientific field, encompassing all other scientific and professional fields. However, majoring in Agricultural Sciences does not require an agricultural background. Students in this major have backgrounds as varied as is the field itself. The Agricultural Sciences program is designed for students who are interested in a broad education in the field of agriculture. It is ideal for students who would like to survey agriculture before specializing and for those who prefer to design their own specialized programs, such as International Agriculture or Agricultural Journalism. To supplement their class room work, students in this major are encouraged to obtain summer positions that will provide technical laboratory or field experience in their chosen area. This program is administered by the Department of Natural Resource Sciences and Landscape Architecture.

## Requirements

|  | Semeste Credit Hours |
| :---: | :---: |
| CORE Program Requirements* | ...... 40 |
| BSCI 105-General Biology 1 |  |
| BSCI 106-General Biology II |  |
| CHEM 103-General Chemistry |  |
| CHEM 104-Fundamentals of Organic and Biochemistry |  |
| or (CHEM 113-General Chemistry II and CHEM 233-Organic | CHEM I) 4-8 |
| MATH 110 or higher (115 recommended) |  |
| ENBE 100-Basic Agricultural Engineering Technology |  |
| ENBE 200-Introduction to Agricultural Mechanics |  |
| AGRO 101-Introductory Crop Science |  |
| NRSC 200-Fundamentals of Soil Science |  |
| ANSC 101-Principles of Animal Science |  |
| ANSC 314-Comparative Animal Nutrition. |  |
| ANSC or AGRO** |  |
| AREC 250-Elements of Agricultural and Resource Economic |  |
| AREC-** |  |
| BSCI 341-Introduction to Plant Pathology |  |
| ANSC 412-Introduction to Diseases of Animals |  |
| ENTM - **Insect Pest Type Course. |  |
| HORT-** |  |

SOCY 305-Scarcity and Modern Society.............................................. 3
Community Development Related, Non-Agricultural Life Science,
Biometrics, Computer, or Accounting........................................... 6
Electives (18 credit hours at 300-level or above) .................... $20-29$
*Includes 11 required credits listed below.
**Student may select any course(s) having required hours in the
department indicated.

Course Code: AGNR

## AGRICULTURAL AND RESOURCE ECONOMICS (AREC)

## College of Agriculture and Natural Resources

2200 Symons Hall, (301) 405-1293
E-mail: arecuinfo@umail.umd.edu
http:/ / www.arec.umd.edu

## Professor and Chair: Chambers

Professors: Bockstael, Gardnert $\dagger$, Hardie, Hueth, Just $\dagger$ †, Lichtenberg, Lopez, McConnell, Musser, Nerlove, Olson, Strand
Associate Professors: Hanson, Horowitz, Leathers, Lipton, McNew, Wade
Assistant Professors: Aggarwal, Alberini, Lynch, Parker
Emeriti: Bender, Brown, Cain, Foster, Moore, Stevens, Tuthill, Wysong
$\dagger \dagger$ Distinguished University Professor
Agricultural and Resource Economics majors complete a set of prerequisite courses, a core of classes offered by the Agricultural and Resource Economics Department, and one or more fields comprised of selected courses from outside the department. The core includes courses in economic reasoning, agribusiness management, environmental and resource policy, agricultural policy, economic development, and analytical methods. The program permits students flexibility in choosing fields to fit their career interests. Majors must complete one and should complete two fields. The curriculum balances breadth and depth, and lets students develop academic skills in two or more areas. The program provides a good foundation for careers in economics, resource or environmental policy, agribusiness, and international agriculture.

## Advising

Because the program is flexible, advising is mandatory. Appointments may be made in Room 2200 Symons Hall, (301) 405-1291.

## Awards

Scholarships honoring Arthur and Pauline Seidenspinner and Ray Murray are available. Contact a faculty adviser for more information, (301) 405-1291.

## Double Majors

The department features a double major with Spanish for students interested in careers in multinational agribusiness firms or international agencies. It features a double major with Government and Politics for students interested in law school. Both can be completed within 120 credits.

## Requirements for M ajor

Semester
Credit Hours
Prerequisite Courses
ECON 200-Principles of Microeconomics.................................................... 4
ECON 201-Principles of Macroconomics
ECON 306- Intermediate Microeconomic Theory $\quad 3$
ECON 321 (or BMGT 230) - Economic (or Business) Statistics ................. 3
MATH 220 (or MATH 140)-Calculus ............................................................ 3
STAT 100 (or MATH 111)— Introduction to Probability............................... 3
Major Core Courses
Seven of these courses must be successfully completed.
AREC 306-Farm Management
AREC 404—Prices of Agricultural Products .............................................. 3
AREC 405-Economics of Agricultural Production
AREC 407-Agricultural Finance .....  3
AREC 414-Agricultural Business Management .....  3
AREC 427-Economics of Agricultural Marketing Systems .....  3
AREC 433-Food and Agricultural Policy. .....  3
AREC 445-Agricultural Development in the Third World. .....  3
AREC 453-Economics of Natural Resource Use. ..... 3
AREC 484-Introduction to Econometrics in Agriculture.$\begin{array}{r}. .3 \\ \ldots \\ \hline\end{array}$
AREC 435-Commodity Futures and Options .....  .3
Fields
All majors must complete one of the following fields. Two arestrongly encouraged.

- Business Management
BMGT 220 - Principles of Accounting I. .....  3
BMGT 221-Principles of Accounting II .....  3
BMGT 340-Business Finance .....  3
BMGT 350-Marketing Principles and Organization .....  3
BMGT 364-Management and Organization Theory .....  3
BMGT 380—Business Law .....  3
- Farm Production
AGRO 101 or HORT 100 - Intro. to Crop Science or Horticulture .....  4
ANSC 101-Principles of Animal Science .....  .3
ENBE 100—Basic Biological Resources Engineering .....  .3
and
ENBE 110— Introduction to Biological Resources Engineering. .....  3
Three other courses in animal sciences, natural resouce scieFood Production
PHYS 117 (or PHYS 121) - Introduction to Physics .....  4
BSCl 105-Principles of Biology .....  4
NFSC 100- Nutrition .....  3
NFSC 112-Introduction to Food Science .....  3
BSCI 223-Introduction to Microbiology. .....  4
NFSC 430-Food Microbiology .....  2
NFSC 431-Food Quality Control 4
NFSC 398-Seminar in Food Science .....  1
- Environmental and Resource Policy
ECON 381-Environmental Economics .....  3
ECON 454-Public Finance ..... 3
Four other courses in biological sciences and chemistry, political science,natural resource management or geography, chosen from a list ofselected courses.
- International Agriculture
ECON 305-Intermediate Macroeconomic Theory and Policy.$\ldots 3$
ECON 315/ 146-Economics Development of Underdeveloped Areas .....  3
ECON 380-Comparative Economic Systems ..... 3
ECON 440/441-International Economics .....  3
BMGT 392-International Business Management. .....  3
One other course in iof selected courses.
- Political Process
GVPT 100 - Principles of Government and Politics .....  3
GVPT 170 - American Government .....  3
Four other courses in government and politics, chosen from a list ofselected courses.
- Advanced Degree Preparation
ECON 407-Advanced Macroeconomics 3
ECON 417-Advanced Microeconomics .....  3
ECON 422-Quantitative Methods in Economics I. ..... $\ldots 3$
ECON 423-Quantitative Methods in Economics II .....  3
Two other courses in mathemfrom a list of selected courses.
- Student Designed Field

This field requires a written proposal listing at least six courses totaling 18 or more credits. The proposal must be submitted to the Undergraduate Committee of the Agricultural and Resource Economics Department. Committee approval must be obtained 30 or more credit hours before graduation. A self-designed field may be used to study a foreign language as part of the AREC curriculum.

Course Code: AREC

## AGRONOMY (AGRO)

## College of Agriculture and Natural Resources

Department of Natural Resource Sciences and Landscape Architecture
2102 Plant Sciences Building
301-405-4351, 301-405-4355
kh26@umail.umd.edu, cw5@umail.umd.edu
http:/ / www.agnr.umd.edu/ users/ nrsl/
Professor and Chair: Weismiller
Professors: Angle, Dernoeden, James, Kenworthy, McIntosh $\dagger$, Miller, Mulchi, Rabenhorst, Steiner, Weil, Weismiller
Associate Professors: Carroll, Coale, Glenn, Grybauskas, Hill, Ritter, Slaughter, Turner, Vough
Assistant Professors: Costa, Dzantor
Adjunct Professors: Lee, Tamboli, Thomas
Adjunct Associate Professors: Daughtry, Meisinger, Saunders, Van Berkum
Affiliate Professors: Kratochvil, Terlizzi
Instructors: Buriel, Steinhilber
Emeriti: Aycock, Axley, Bandel, Clark, Decker, Fanning, Hoyert, Kuhn, Miller $\dagger$ Distinguished Scholar-Teacher

The Agronomy and Horticulture programs have been reorganized into a single major, Natural Resource Sciences (NRSC). See Natural Resource Sciences elsewhere in this chapter. (Note: Courses are offered under both AGRO and NRSC codes.)

## The Major

The Department of Natural Resource Sciences and Landscape Architecture offers five undergraduate majors. Four lead to a bachelor of science (B.S.) degree and one leads to a bachelor of landscape architecture (B.L.A.) degree. See entry on Landscape Architecture later in this chapter.

Agronomy instruction combines the principles of basic sciences with a thorough understanding of plants and soils and environmental sciences. This amalgamation of basic and applied sciences provides the opportunity for careers in conserving soil and water resources, improving environmental quality, increasing crop production to meet the global need for food, and beautifying and conserving the urban landscape using turfgrass.

The agronomy curricula are flexible and allow the student either to concentrate on basic science courses that are needed for graduate work or to select courses that prepare for employment at the bachelor's degree level. Graduates with a bachelor's degree are employed by private corporations as environmental soil scientists, golf course managers, agribusiness company representatives, or by county, state, or federal government as agronomists or extension agents. Students completing graduate programs are prepared for research, teaching, and management positions with industry, international agencies, or federal and state government.

## Curriculum in Agronomy

Changes in requirements are under review. Students should check with a departmental adviser for updated information.

CORE Program Requirements ( 40 semester hours). Math and science requirements ( 9 hours) are satisfied by departmental requirements.
Requirements (31 semester hours) Semester Credit Hours
AGRO 101-Introductory Crop Science .....  4
AGRO 202-Fundamentals of Soil Science .....  4
AGRO 398-Senior Seminar .....
BIOL 105 -Principles of Biology I .....  .4
CHEM 103-General Chemistry I. .....  4
CHEM 104-Fundamentals of Organic and Biochemistry* ..... 4
MATH 110-Introduction to Mathematics OR
MATH 115-Pre-calculus (consult adviser) .....  .3
PHYS 117-Introduction to Physics OR .....  .4
PHYS 121-Fundamentals of Physics I
PHYS 121-Fundamentals of Physics I
COMM 100-Basic Principles of Speech Communication OR
COMM 107-Technical Speech Communication 3
*Students intending to take additional chemistry or attend graduate schoolshould substitute CHEM 113, followed by CHEM 233 and CHEM 243.
Crop Science Curriculum
University and Department Requirements ..... 61
AGRO-Advanced Crops Courses (Consult Adviser) .....  8
AGRO-Advanced Soils Courses (Consult Adviser) .....  6
BIOL 106-Principles of Biology II .....  .4 .....  4
PBIO 420-Plant Physiology
PBIO 420-Plant Physiology
One of the following: .....  4
PBIO 250-Plant TaxonomyBIOL 222-Principles of Genetics
PBIO 425-Plant Structure34-35
Turf and Urban Agronomy Curriculum University and Department Requirements ..... 61
AGRO 305-Introduction to Turf Management .....  3
AGRO 386-Experiential Learning ..... $\ldots 3$
AGRO 401-Pest Management Strategies for Turfgrass .....  3
AGRO 402-Sports Turf Management .....  3
AGRO 410-Commercial Turf Maintenance and Production ..... $\ldots 3$
AGRO 411-Principles of Soil Fertility .....  3
AGRO 453-Weed Science .....  3
BIOL 106 -Principles of Biology II .....  4
ENBE 237-Design of Irrigation Systems .....  1
ENTM 205-Principles of Entomology ..... 4
PBIO 365-Introductory Plant Pathology. .....  4
PBIO 420-Plant Physiology .....  .4
Electives ..... 18-22
Conservation of Soil, Water and Environment Curriculum University and Department Requirements ..... 61
Chemistry and Math Requirements ..... 16
MATH 140-Calculus 1 OR
MATH 220-Elementary Calculus 1 .....  4
CHEM 113-General Chemistry II .....  4
CHEM 104-Fundamentals of Organic and Biochemistry or
CHEM 233-Organic Chemistry I. .....  .4
GEOL 100 and 110-Physical Geology ..... 4
Applications and Breadth (Select three of the following) .....  9
AGRO 413-Soil and Water Conservation .....  3
AGRO 415-Soil Survey and Land Use .....  3
AGRO 423-Soil-Water Pollution .....  3
AGRO 444-Remote Sensing .....  3
AGRO 461-Hydric and Hydromorphic Soils .....  3
Advanced Soil Science (Select three of the following) ..... 11-14
AGRO 411-Soil Fertility Principles .....  3
AGRO 414-Soil Morphology, Genesis and Classification .....  4
AGRO 417-Soil Physics .....  3
AGRO 421-Soil Chemistry. .....  4
AGRO 422-Soil Microbiology .....  3
Practical Experience (Select at least 2 credits) .....  2
AGRO 308-Field Soil Morphology ..... 1-3
AGRO 386-Experiential Learning. ..... 3-6
Supporting Courses (Select two of the following) ..... 6-7
AGRO 406-Forage Production .....  .3
AGRO 407-Cereal and Oil Crops .....  3
AGRO 440-Crops, Soils and Civilization ..... 3
AGRO 441-Sustainable Agriculture .....  3
AGRO 454-Air and Soil Pollution Effects on Crops .....  3
GEOL 451-Groundwater Geology .....  3
GEOL 452-Watershed and Wetland Hydrology .....  3GEOL 340-Geomorphology (4) ORGEOG 340 3
BIOM 301-Introduction to Biometrics. ..... 3
ENBE 234-Principles of Erosion and Water Control and
ENBE 236-Design of Drainage Systems and
ENBE 237-Design of Irrigation Systems .3
NRMT 451-Water Quality: Field and Lab Analysis Methods ..... 3
AREC 432-Introduction to Natural Resources Policy .....  3
Electives ..... 18-24
Total ..... 120

## Fieldwork and Internship Opportunities

Internships with scientists are available at nearby federal and state agencies.

## Student Organizations

Student chapters of the Agronomy Club and Soil Conservation Service provide students with opportunities for professional activities. The department's soil judging team participates in regional and national competitions.

## Scholarships

Several scholarships and awards are available to Agronomy students. Contact the Associate Dean's office at (301) 405-2078 for additional information.

Course Code: AGRO

## AM ERICAN STUDIES (AMST)

College of Arts and Humanities
2125 Taliaferro Hall, (301) 405-1354
http:/ / www.inform.umd.edu/ AMST
Professor and Chair: Caughey
Professor: Kelly
Associate Professors: Lounsbury, Mintz, Paoletti, Parks, Sies

## The M ajor

American Studies offers an interdisciplinary approach to the study of American culture and society, past and present, with special attention to the ways in which Americans, in different historical or social contexts, make sense of their experience. Emphasizing analysis and synthesis of diverse cultural products, the major provides valuable preparation for graduate training in the professions as well as in business, government, and museum work. Undergraduate majors, with the help of faculty advisers, design a program that includes courses offered by the American Studies faculty, and sequences of courses in the disciplines usually associated with American Studies (i.e., history, literature, sociology, anthropology, art history, and others), or pertinent courses grouped thematically (e.g., AfroAmerican studies, women's studies, ethnic studies).

## Requirements for Major

Requirements for the American Studies major include a minimum of 45 upper-level credits completed and the foreign-language requirements of the College of Arts and Humanities. The major requires 45 hours, at least 24 of which must be at the 300-400 level. Of those 45 hours, 21 must be in AMST courses, with the remaining 24 in two 12 core areas outside the regular AMST departmental offerings. No grade lower than a $C$ may be applied toward the major.

## Advising

Departmental advising is mandatory every semester for all majors.

## Distribution of the 45 hours

## AM ST Courses (21 hours required)

1. AMST 201/ Introduction to American Studies (3): required of majors.
2. Three (3) or six (6) hours of additional lower-level course work.
3. AMST 330/Critics of American Culture (3): required of majors.
4. Six (6) or nine (9) hours of upper-level course work. No more than 6 hours of a repeatable number may be applied to the major. ***Students should take AMST 201 before taking any other AMST courses and will complete AMST 330 before taking 400 -level courses.
5. AMST 450/ Seminar in American Studies (3): required of majors.

## Core areas outside American Studies

(24 hours required)
Majors choose two outside core areas of 12 hours each. At least one of the cores must be in a discipline traditionally associated with American Studies. The other core may be thematic. Upon entering the major, students develop a plan of study for the core areas in consultation with an adviser; this plan will be kept in the student's file. All cores must be approved in writing by an adviser.

## Traditional Disciplinary Cores

History, Literature, Sociology/ Anthropology, Art/ Architectural History.

## Interdisciplinary or Thematic Cores

Afro-American Studies, Women's Studies, Urban Studies, Popular Culture, Personality and Culture, Comparative Culture, Material Culture, Ethnic Studies, Business and Economic History, Folklore, Government and Politics, Education, Philosophy, Journalism.

## Course Code: AMST

## ANIMAL SCIENCES (ANSC)

## College of Agriculture and Natural Resources

1413 Animal Sciences Center, (301) 405-1373
E-mail: gd38@umail.umd.edu, re13@umail.umd.edu
http:/ / www.agnr.umd.edu/ users/ ansc

## Department of Animal and Avian Sciences

Professor and Chair: Erdman
Professors: Douglass, Harrell, Mather, Ottinger, Peters, Russek-Cohen, Soares, Varner, Vijay, Westhoff
Associate Professors: Barao, Dahl, Doerr, Hartsock, Majeskie, Porter, Stricklin, Zimmermann
Assistant Professors: Angel, Christian, Estevez, Kohn, Rankin, Woods
Emeriti: Flyger, Foster, Heath, King, Leffel, Mattick, Morris, Vandersall, Wabeck, Williams, Young
Adjunct Professors: Glenn, Howard, Paape

## The Major

Animal Sciences prepares students for veterinary school, graduate school and careers in research, sales and marketing, aquaculture, and animal production. The curricula apply the principles of biology and technology to the care, management, and study of dairy and beef cattle, equine, fish, sheep, swine, and poultry. Students complete the Animal Sciences core courses and choose one of four specialization areas: Animal Management and Industry, Avian Business, Laboratory Animal Management, and Sciences that prepare for admission to graduate, veterinary, or medical school. A new Animal Sciences Center includes classrooms, lecture hall, social area, teaching labs, pilot processing plant, and animal rooms adjacent to a teaching farm where horses, sheep, swine, and cattle are maintained throughout the year.

## Requirements for Major

| Required of All Students | Semester Credit Hours |
| :---: | :---: |
| CORE Program Requirements* | ........ 40 |
| ANSC 101-Principles of Animal S | 3 |
| ANSC 211-Animal Anatomy | 4 |
| ANSC 212-Animal Physiology | 3 |
| ANSC 314-Comparative Animal Nutrition |  |
| BSCI 105-Principles of Biology I. | 4 |
| BSCI 106-Principles of Biology II | 4 |
| BSCI 222-Introductory Genetics | 4 |
| CHEM 103-General Chemistry I | 4 |
| CHEM 104-Fundamentals of Organic and Biochemistry. OR |  |
| CHEM 113 and CHEM 233-General Chemistry II and Organ MATH 140 OR MATH 220 | Chemistry I <br> ............... 3 |
| PHYS 121-Fundamentals of Physics |  |
| OR |  |
| ENBE 100-Basic Agricultural Engineering Techniques | 3 |
| ECON 201-Principles of Macroeconomics |  |
| OR |  |
| AREC 250-Elements of Agricultural and Resource Economics | 3 |
| BSCI 223-General Microbiology |  |
| * Includes 16 required credits listed below |  |
| All students must complete 23 or 24 credits of additional listed under one of the following areas of specialization: | course work |

## Combined Degree Curriculum: Animal <br> Sciences/ Veterinary Medicine <br> Colleges of Agriculture and Veterinary Medicine

Students enrolled in the College of Agriculture and Natural Resources who have completed at least 90 credit hours, including all university and college requirements, may qualify for the Bachelor of Science degree from the University of Maryland, College of Agriculture and Natural Resources, upon successful completion in an accredited college of veterinary medicine of at least 30 semester hours. It is strongly recommended that students do not enter this program until their sophomore year and consult with the animal sciences undergraduate program coordinator.

## Combined Degree Requirements

CORE Program requirements* .......................................................... 40
ANSC 220—Livestock Management ...................................................................... 4
ANSC 315-Applied Animal Nutrition .................................................... 3
BSCI 105-Principles of Biology I ........................................................ 4
BSCI 106—Principles of Biology II.......................................................... 4
BSCI 222-Principles of Genetics .......................................................... 4
Mathematics (must include 3 credits of calculus)................................... 6
CHEM 103-General Chemistry I ......................................................... 4
CHEM 113-General Chemistry II ......................................................... 4
CHEM 233-Organic Chemistry I .......................................................... 4
CHEM 243-Organic Chemistry II .......................................................... 4
PHYS 121-Fundamentals of Physics I................................................ 4
PHYS 122-Fundamentals of Physics II................................................ 4
Biochemistry ....................................................................................... 3
Electives ............................................................................................. 9

* Includes 11 required credits listed above

For additional information, please contact the Associate Dean, VMRCVM, 1203 Gudelsky Veterinary Center, University of Maryland, College Park, MD 20742, (301) 935-6083.

## Advising

Advising is mandatory. Each student will be assigned to a faculty adviser to assist in planning his or her academic program. For information or appointment: 1415A Animal Sciences Center, (301) 405-1373.

## Scholarships and Awards

American Society of Animal Sciences Scholastic Recognition and Department of Animal Sciences Scholastic Achievement Awards are presented each year at the College of Agriculture and Natural Resources Student Awards Convocation. The ANSC program administers several scholarships, including: C.W. England, Dairy Technology Society, the Kinghorne Fund Fellowship, the C.S. Shaffner Award, the Lillian Hildebrandt Rummel Scholarship, and the Owen P. Thomas Development Scholarship. For eligibility criteria, visit the ANSC Undergraduate Studies Office, 1415A Animal Sciences Center.

## Student Organizations

ANSC majors are encouraged to participate in one or more of the following social/ professional student organizations. The Animal Husbandry Club, the University of Maryland Equestrian Club, the Veterinary Science Club, and the Poultry Science Club. For more information, visit the ANSC Undergraduate Studies Office, 1415A Animal Sciences Center.

## Course Code: ANSC

## ANTHROPOLOGY (ANTH)

## College of Behavioral and Social Sciences

1111 Woods Hall, (301) 405-1423
http:/ / www.bsos.umd.edu/ anth
Professor and Chair: Leone
Professors: Agar (emeritus), Chambers, Gonzalez† (emerita), Jackson $\dagger$ Whitehead, Williams
Assistant Professors: Freidenberg, Paolisso, Shackel, Stuart
Research Associates: Blades, Reeves

Faculty Research Assistants: Buckler, Ernstein, Peterson
Affiliate Faculty: Bolles (WMST), Caughey (AMST), Harrison (CMLT), Kim (AMST), Robertson (MUSC)
Adjunct Faculty: Potter (Adjunct Professor, National Park Service), Fiske (Adjunct Professor, NOAA), Kryder-Reid (Adjunct Assistant Professor, National Gallery of Art)
$\dagger$ Distinguished Scholar-Teacher

## The Major

Anthropology, the holistic study of culture, seeks to understand humans as a whole-as social beings who are capable of symbolic communication through which they produce a rich cultural record. Anthropologists try to explain differences among cultures-differences in physical characteristics as well as in customary behavior. Anthropologists study how culture has changed through time as the human species has spread over the earth. Anthropology is the science of the biological evolution of human species, and of the cultural development of human beings' knowledge and customary behavior.

Anthropology at the University of Maryland offers rigorous training for many career options. A strong background in anthropology is a definite asset in preparing for a variety of academic and professional fields, ranging from the law and business, to comparative literature, philosophy and the fine arts. Whether one goes on to a Master's or a Ph.D., the anthropology B.A. prepares one for a wide range of non-academic employment, such as city and public health planning, development consulting, program evaluation, and public archaeology.

## Academic Programs and Departmental Facilities

The Anthropology department offers beginning and advanced course work in the four principal subdivisions of the discipline: cultural anthropology, archaeology, biological anthropology, and linguistics. Within each area, the department offers some degree of specialization and provides a variety of opportunities for research and independent study. Laboratory courses are offered in biological anthropology and archaeology. Field schools are offered in archaeology. The interrelationship of all branches of anthropology is emphasized.

The undergraduate curriculum is closely tied to the department's Master in Applied Anthropology (M.A.A.) program; accordingly, preparation for non-academic employment upon graduation is a primary educational goal of the department's undergraduate course work and internship and research components.

The Anthropology department has a total of four laboratories, located in Woods Hall, which are divided into teaching labs and research labs. The department's two archaeology labs, containing materials collected from field schools of the past several years, serve both teaching and research purposes. The other two laboratories are a teaching laboratory in biological anthropology and the Laboratory for Applied Ethnography and Community Action Research.

All students have access to a 20 -workstation IBM computer laboratory located at 1102 Woods Hall.

Cultural Systems Analysis Group (CUSAG), a research and program development arm of the department, is located in Woods Hall.

## Requirements for Major

Majors are required to take five courses in the core course sequence (three introductory courses and two advanced method and theory courses), for a total of 16-17 credit hours. They must also take 15 credit hours in anthropology electives and 18 supporting credit hours, courses that are primarily outside the major. Anthropology majors must also acquire a second language or complete a quantitative methods course.

Required Courses:
ANTH 220-Introduction to Biological Anthropology
ANTH 240-Introduction to Archaeology
ANTH 260-Introduction to Sociocultural Anthropology and Linguistics
At least two of the following (one must be in major's area of primary focus-i.e., cultural anthropology, archaeology, biological anthropology):

ANTH 320-Human Evolution
ANTH 340-Method and Theory in Archaeology
ANTH 360-Method and Theory in Sociocultural Anthropology

Quantitative Methods or Foreign Language Requirement:
A) a quantitative methods course: 3 credit hours required-for a list of classes recommended for this requirement, see the Director for Undergraduate Studies; or
B) Three or more terms of a foreign language, depending upon proficiency. Proficiency may be demonstrated in one of the following ways:

1) successful completion of high-school level 4 in one language, or 2) successful completion of a 12-credit sequence or of the intermediate level in college language courses, or
2) successful completion of a placement examination at the above levels in one of the campus language departments offering such examinations

Electives: 15 credit hours in anthropology electives, 9 at the 300 -level or above

Supporting: 18+ credit hours outside of the department (with your academic adviser's approval, 8 hours may be anthropology course work)

In addition to the above requirements, anthropology majors must meet the requirements of the College of Behavioral and Social Sciences, as well as the requirements of the university's general education program.

## Advising

Undergraduate advising is coordinated by the director of undergraduate studies who serves as the administrative adviser for all undergraduate majors and minors. All majors are required to meet with the director of undergraduate studies at least once per term, at the time of early registration. In addition, the Anthropology department encourages students to select an academic adviser who will work closely with the student to tailor the program to fit the student's particular interests and needs. All Anthropology faculty members serve as academic advisers (and should be contacted individually). Each major is expected to select an academic adviser from the faculty in the field of his/ her concentration (Biological Anthropology, Socio-Cultural Anthropology, or Archaeology), and to consult with him/ her on a regular basis. The student's choice of a quantitative methods course must be approved by the student's adviser. For additional information, students should contact the Director of Undergraduate Studies, Dr. William Taft Stuart, 0106 Woods Hall, (301) 405-1435; E-mail: wstuart@bss1.umd.edu.

## Honors

The Anthropology department also offers an Honors Program that provides the student an opportunity to pursue in-depth study of his or her interests. Acceptance is contingent upon a 3.5 GPA in anthropology courses and a 3.0 overall average. Members of this program are encouraged to take as many departmental honors courses (either as HONR or as "H" sections of ANTH courses) as possible. The Honors Citation is awarded upon completion and review of a thesis (usually based upon at least one term of research under the direction of an Anthropology faculty member) to be done within the field of anthropology. Details and applications are available in the Anthropology Office, or from your departmental adviser.

## Student Organizations

Anthropology Student Association (ASA). An anthropology student association meets regularly to plan student events and to help coordinate various student and faculty activities. Meeting times are posted outside 0100 Woods Hall.

The department and the ASA jointly sponsor a public lecture series.
Course Code: ANTH

## APPLIED MATHEM ATICS PROGRAM

## College of Computer, Mathematical and Physical Sciences

1104 Mathematics, (301) 405-5062
http:/ / www.math.umd.edu/ mapl
Director: Pego
Faculty: More than 100 members from 13 units.

The Applied Mathematics Program is a graduate program in which the students combine studies in mathematics and application areas. All MAPL courses carry credit in mathematics. An undergraduate program emphasizing applied mathematics is available to majors in mathematics. Appropriate courses carry the MATH and STAT prefixes, as well as the MAPL prefix.

Course Code: MAPL

## ARCHITECTURE

For information, see the School of Architecture entry in chapter 6.

## ART (ARTT)

## College of Arts and Humanities

1211-E Art/ Sociology Building
Undergraduate Program (301) 405-1445
Graduate Program (301) 405-7790
http:/ / www.inform.umd.edu/ ARHU/ Depts/ Art

## Chair: Ruppert

Undergraduate Director: Kehoe
Graduate Director: McCarty
Professor Emerita: Truitt $\dagger$
Professor Emeritus: Driskell $\dagger \dagger$
Professors: DeMonte†, Fabiano, Lapinski, Pogue
Associate Professors: Craig, Forbes, Gelman, Gips, Humphrey, Kehoe,
Klank, Lozner, McCarty, Richardson, Ruppert, Sham, Thorpe
Instructor: Jacobs
Part Time: Tacha
$\dagger$ Distinguished Scholar-Teacher
$\dagger \dagger$ Distinguished University Professor

## The Major

The Department of Art is a place where students transform ideas and concepts into objects and visual experiences. It is an environment rich in art theory, criticism, and awareness of diverse world culture. Students are taught to articulate and refine creative thought and apply knowledge and skill to the making of images, objects, and experimental works. Courses are meaningful to students with the highest degree of involvement in the program and those who take electives. Students majoring in Art take a focused program of courses folded into a general liberal arts education offered by the university.

The diverse faculty of artists in the department strive to foster a sense of community through the common experience of the creative process, sharing their professional experience freely with students.

The areas of concentration within the major are design, drawing, painting, printmaking, and sculpture. Areas of study include papermaking, photography, art theory, and digital imaging. Internships and independent studies are also available.

## Requirements for Major

Undergraduate students are offered a Bachelor of Arts (B.A.) in Art. The requirements consist of a curriculum of 36 credits of art studio and art theory courses, and 12 additional credits of art history and art theory courses as a supporting area for a total of 48 major required credits. No course with a grade less than C may be used to satisfy major or supporting area requirements.

## Citation in Interdisciplinary Multimedia and Technology

16 credit hours. ARTT 354, ENGL 479, ARTT 689B, and three courses from approved list of courses. Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

## Advising

The name of the adviser for each class is available in the department office. Each second-semester sophomore and first-semester senior is required to see his or her adviser within the department. Additionally, each student is strongly encouraged to see his or her adviser in the department each semester.

## Honors Program

The honors option is available to Art majors for the purpose of creating opportunities for in-depth study and enrichment in areas of special and creative interest. To qualify, students must be Art majors with junior or senior status, a major G.P.A of 3.2, and an overall G.P.A. of 3.0. The program requires a total of 12 credits in Honors course work. One course ( 3 credits) must be taken at the 300 -level, and three courses ( 3 credits each) at the 400-level. There is a thesis component in one of the 400-level courses. Please consult the Honors Adviser for additional information.

## Fieldwork and Internship Opportunities

Students in the past have worked in a variety of internship settings. These have included assisting professionals complete public commissions, commercial or cooperative gallery and exhibition duties, and working in professional artists' workshops in the Baltimore and Washington, D.C. metropolitan areas. Additional information is available in the Department of Art office.

## Scholarships and Awards

The Department of Art administers eight Creative and Performing Arts Scholarships (CAPAs) that are available to freshman and entering transfer students for the Fall semesters. This is a merit-based scholarship that is awarded on a one-year basis, and may be renewed. Additional information is available in the main office of the department. The James $P$. Wharton Prize is awarded to the outstanding Art major participating in the December or May graduation exhibition. The Van Crews Scholarship is designated for outstanding Art majors concentrating in design. It is awarded for one year and is renewable. The David C. Driskell Award for the Outstanding Graduating Graduate Student is awarded at the end of the academic year.

## Student Art Exhibitions

The West Gallery (1309 Art/ Sociology Building) is an exhibition space devoted primarily to showing students' art work, and is administered by undergraduate art majors assisted by a faculty adviser.

## Lecture Program

The Department of Art has a lecture program in which artists and critics are brought to the campus to explore ideas in contemporary art. A strong component of this program is devoted to the art ideas of women and minorities.

Course Code: ARTT

## ART HISTORY AND ARCHAEOLOGY (ARTH)

## College of Arts and Humanities

1211B Art/ Sociology Building, (301) 405-1479
http:/ / www.inform.umd.edu:8080/ EdRes/ Colleges/ ARHU/ Depts/ ArtHistory/
http:/ / www.inform.umd.edu/ Archaeology
Chair: Hargrove
Professors: Eyo, Farquhar, Hargrove, Miller, Pressly, Promey, Wheelock
Associate Professors: Colantuono, Gerstel, Kelly, Kuo, Promey, Spiro,
Venit, Withers
Assistant Professors: Kita, Kornbluth

## The M ajor

The faculty and students of the Department of Art History and Archaeology form a dynamic nucleus within a major research university. The program, leading to the B.A. degree in Art History and Archaeology, provides a diverse selection of courses in the art and archaeology of Africa, Asia,

Europe, and the Americas. The goal of the department is to develop the student's critical understanding of visual culture in both art historical and archaeological contexts. The numerous teaching awards won by faculty members indicate the department's concern for excellence in undergraduate education. In addition to its fine undergraduate program, the department offers graduate studies leading to the M.A. and Ph.D. degrees.

The department has strong coverage in Western art from the Classical period up to the present. In addition, by taking advantage of the unusual diversity of faculty interests, students can study in areas not traditionally offered in departments of art history and archaeology, such as art and archaeology of Africa, art of diaspora cultures, art and archaeology of the Americas, Eastern European art, Asian art, and feminist perspectives on art. Grounding in art historical and archaeological theory and method is provided in a number of courses. Students are encouraged to supplement their art historical and archaeological studies with courses in other fields. Studies in archaeology may be pursued in cooperation with other University departments. Faculty fieldwork in Greece, Israel, Mexico, Nigeria, and the United States affords undergraduates valuable first-hand experience in archaeological methods and practice.

In addition to the university's excellent libraries, students can use the resources of the Library of Congress and other major area archives. The department is in the forefront of exploring digital imaging technologies for art historical and archaeological teaching, research, and publication.

The location of the university between Washington and Baltimore gives students the opportunity to use some of the finest museum and archival collections in the world for their course work and independent research. The department encourages students to hold internships at a number of these institutions. Curator/ professors, exhibitions in the Art Gallery at the University of Maryland, interactive technologies, and the extensive use of study collections bring regional and distant museums into the classroom.

Close ties between the faculty and the undergraduate community are fostered through directed-study courses and undergraduate research assistantships. Selected students also gain valuable experience as undergraduate tutors for large lecture classes. The undergraduate Art History and Archaeology Association sponsors lectures, departmental gatherings, and field trips to museums on the East coast.

Requirements for the major in Art History are as follows: three ARTH courses ( 9 credits) at the 200 level; seven ARTH courses ( 21 credits) at the 300-400 level; either ART 100 or ARTT 110 (3 credits); a supporting area of four courses ( 12 credits) in coherently related subject matter outside the department of Art History and Archaeology at the 300-400 level. No credit toward the major can be received for ARTH 100 or 355 . No course with a grade lower than C may be used to satisfy major or supporting area requirements.

## Citation in Archaeology

15 credit hours. ARTH 484 and four courses approved list of courses. Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

## Advising

Departmental advising is mandatory for all majors.

## Honors Program

Qualified majors may participate in the department's honors program, which requires the completion of ARTH 496 (Methods of Art History) and ARTH 497 (Honors Thesis). Consult a departmental adviser for details.

## Awards

The Department of Art History and Archaeology offers three undergraduate awards each year: the J.K. Reed Fellowship Award to an upper-level major and the George Levitine and Frank DiFederico Book Awards to seniors nearing graduation.

Course Code: ARTH

# ASIAN AND EAST EUROPEAN LANGUAGES AND CULTURES (CHIN, EALL, HEBR, JAPN, KORA, RUSS, SLAV) 

College of Arts and Humanities
2106 Jimenez Hall, (301) 405-4239
http:/ / www.inform.umd.edu/ ARHU/ Depts/ AsianEastEuropean
Professor: Brecht, Ramsey
Adjunct Professor: Li
Associate Professors: Chin, Hitchcock, Kerkham, Lekic, Martin,

## Supporting Courses for Chinese or Japanese

Students are strongly urged to take additional courses in a discipline relating to their particular field of interest, such as art, history, linguistics, literary criticism, or comparative literature. The range of supporting courses can be decided upon in consultation with the student's adviser.

## Business Option

Courses: JAPN 201-202; 301-302; 403-404; HIST 284-483 or 285-482 ( 36 credits). An additional six credits at the 300-400 level in electives in Japanese literature and linguistics are required.

## Citations

Citation in Business M anagement for Japanese Majors (1108B)
15 credit hours. ECON 200 and four courses from approved list of BMGT courses.

Citation in Business Japanese
15 credit hours. Five courses in Japanese from approved list of courses.
Students who fulfill Citation requirements will receive a Citation on the official transcript. Contact Business, Culture and Languages Program at (301) 405-2621 for more information.

## Russian Language and Literature

The undergraduate major in Russian Language and Literature consists of 39 hours beyond the basic language acquisition sequence (RUSS 101, 102, 201, 202). No course grade lower than C may be used to satisfy the major requirements. A common set of core courses is required of all majors, as well as nine hours of related course work. Students may want to consider a double major in Russian language and literature and another discipline, such as business, international relations, economics, or journalism. Russian students have the option of applying to live in St. Mary's Hall (Language House), and the majority of Russian majors participate in a study abroad program.

## Russian Course Requirements

Eight Courses (24 credits) from the following:
RUSS 210-Structural Description of Russian (3)
RUSS 211-Applied Russian Phonetics (3)
RUSS 301-Advanced Russian I (3)
RUSS 302-Advanced Russian II (3)
RUSS 303-Russian Conversation: Functional Skills (3)
RUSS 307-Commercial Russian I (3)
RUSS 321-Survey of Russian Literature I (3)
RUSS 322-Survey of Russian Literature II (3)
RUSS 401-Advanced Russian Composition (3)
RUSS 402-Practicum in Written Russian (3)
RUSS 403-Russian Conversation: Advanced Skills (3)
RUSS 404-Practicum in Spoken Russian (3)
Two Courses ( 6 credits) of all content-based courses taught in Russian:
RUSS 407-Commercial Russian II (3)
RUSS 409-Selected Topics in Russian Language Study (3)
RUSS 431-Russian Literature of the 19th Centuryl (3)
RUSS 432-Russian Literature of the 19th Century II (3)
RUSS 433-Russian Literature of the 20th Century (3)
RUSS 434-Soviet Russian Literature (3)
RUSS 439-Selected Topics in Russian Literature (3)

## Supporting Courses

An additional 9 credits from among the following to be chosen in consultation with an advisor; 6 credits must be at 300-400 level:

RUSS 221, 222, 281, 282, 298, 307, 327, 328, 329, 381, 382, 398, 405, 406, 407, 409, 410, 411, 439, 473. SLAV 469, 475, 479, 499.

## Business Option

Courses: RUSS 210 or 211; 301-302; 303; 401; 403; 405-406; 307-407; 381-382; 467, for a total of 39 credits. It is strongly recommended that the student earn eight credits (such as RUSS 301,
$303,403,467$ ) in the Summer Programs in the Plekhanov Institute in Moscow or the Moscow Institute of Finance.

## Citations

Citation in Russian Language
15 credit hours. (For non-native students). Five courses from approved list of courses. Contact the Director of Undergraduate Studies for more information.

Citation in Russian Language and Culture
15 credit hours. Requirements for non-native students: five courses from approved list of courses. Requirements for heritage/ native speakers: five courses from approved list of courses. Contact the Director of Undergraduate Studies for more information.

Citation in Business M anagement for Russian Majors (1106B)
15 credit hours. ECON 200 and four courses from approved list of BMGT courses. Contact Business, Culture and Language Program at (301) 4052621 for more information.

Citation in Business Russian
15 credit hours. Five courses in Russian from approved list of courses. Contact Business, Culture and Languages Program at (301) 405-2621 for more information.

Students who fulfill Citation requirements will receive a Citation on the official transcript.

## Hebrew Language

The Hebrew Language Program provides, both to beginners and to those with previous background, an opportunity to acquire knowledge and skills in Hebrew language, culture, and thought. Elementary and Intermediate level language courses develop effective communication skills in modern Hebrew. Upper-level language courses emphasize reading comprehension, vocabulary enrichment, and writing skills. More advanced students focus on the analytical study of major classical and modern Hebrew texts.

While there is no Hebrew major, students wishing to focus on Hebrew language as a primary subject may do so through a concentration on Hebrew within the Jewish Studies major (see Jewish Studies Program).

The University of Maryland sponsors a semester program at Tel Aviv University. Scholarships for study in Israel are available through the Meyerhoff Center for Jewish Studies. Hebrew students have the option of applying to live in St. Mary's Hall (Language House) and participating in a study-abroad program.

## Korean

At present, the department offers two courses in Korean, designed for students who have a speaking knowledge of the language, but who need to learn reading, composition, and aspects of Korean culture related to educated language use.

Citation in Korean Studies
15 credit hours. Five courses from approved list of courses. Students who fulfill Citation requirements will receive a Citation on the official transcript Please contact the Director of Undergraduate Studies for more information.

Course Codes: CHIN, EALL, HEBR, JAPN, KORA, RUSS, SLAV

## ASTRONOMY DEPARTMENT (ASTR)

## College of Computer, Mathematical, and Physical Sciences

 1204 Computer and Space Sciences Bldg., (301)405-3001E-mail: astrgrad@deans.umd.edu
http:/ / www.astro.umd.edu
Chair: Leventhal
Associate Director: Trasco
Professors: A'Hearn, Harrington, Kundu, Mundy, Papadopoulous, Rose, Trimble, Vogel, Wilson
Professor Emeriti: Bell, Erickson, Kerr, Wentzel
Associate Professors: Harris, Stone
Assistant Professor: Hamilton, McGaugh, Miller, Ostriker, Veilleux,

Adjunct Professors: Holt
Associate Research Scientists: Arnaud, Balachandran, McFadden, Milikh, Schmahl, White
Assistant Research Scientists: Golla, Hewagama, Lisse, Loewenstein, Madjeski, Wolfire
Senior Research Scientists: Goodrich, Sharma

## The M ajor

The Astronomy Department offers courses leading to a Bachelor of Science in Astronomy as well as a series of courses of general interest to nonmajors. Astronomy majors are given a strong undergraduate preparation in astronomy, mathematics, and physics. The degree program is designed to prepare students for positions in government and industry laboratories or for graduate work in astronomy or related fields. A degree in astronomy has also proven valuable as preparation for non-astronomical careers.

## Requirements for Major

Astronomy majors are required to take a two-semester introductory astronomy sequence: ASTR 120-121, an observing course ASTR 310 and an introductory astrophysics course ASTR 320. Two additional upper level astronomy course are also required.

Student majoring in astronomy are also required to obtain a good background in physics and in mathematics. The normal required sequence is PHYS 171, 272, 273 and the associated labs PHYS 174, 275 276. With the permission of the advisor, PHYS 161, 262, 263 and 174 can be substituted for this sequence. PHYS 374 and two additional 400 -level Physics courses are required. Astronomy majors are also required to take a series of supporting courses in Mathematics. These are MATH 140, 141, 240, 241 and 246.

The program requires that a grade of $C$ or better be obtained in all courses required for the major. Because of the similarities in the programs, it is relatively easy to obtain a double major in Physics and Astronomy. This route is strongly recommended for students planning to go on for graduate work in astronomy.

Detailed information on typical programs and alternatives to the standard program can be found in the pamphlet entitled, "Department Requirements for a Bachelor of Science Degree in Astronomy" which is a available from the Astronomy Department office in.

## Facilities

The Department of Astronomy has joined with two other universities in upgrading and operating a mm wavelength array located at Hat Creek in California. Observations can be made remotely from the College Park campus. Several undergraduate students have been involved in projects associated with this array. The Department also operates a small observatory on campus. There are four fixed telescopes ranging in aperture from 20" to 7". There are also six portable 8" telescopes. Most of the telescopes now have CCD cameras and several are computer controlled.. This facility is used extensively for undergraduate classes. An Open House Program for the public is also run. Details are available from the Astronomy Department office.

## Courses for Non-Science Majors

There are variety of astronomy courses offered for those who are interested in learning about the subject but do not wish to major in it. These courses are designed especially for the non- science major. ASTR 100 and 101 are general survey courses in Astronomy. They covered (briefly) all the major topics in the field. ASTR 220 is an introductory course dealing with the topic, "Collisions in Space." Several 300 -level courses are offered primarily for non-science students who want to learn about a particular field in depth, such as the Solar System, Stellar Evolution, the Origin of the Universe or Life in the Universe.

## Honors

The Honors Program offers student of exceptional ability and interest in Astronomy opportunities for part-time research participation which may develop into full-time summer projects. Honors students work with a faculty advisor on a research project for which academic credit may be earned. Certain graduate courses are open for credit toward the bachelor's degree. (Students are accepted into the Honors Program by the Department's Honors Committee on the basis of grade point average or recommendation
of faculty.) Honors candidates submit a written proposal on their research project and enroll in ASTR 399 for at least 3 credits. In their senior year, students complete a research project, write a thesis and do an oral presentation before a committee. Satisfactory grades lead to graduation "with honors (or high honors) in Astronomy."

## For Additional Information

Further information about advising and the Honor Program can be obtained by calling the Department of Astronomy office on (301) 405-3001.
ions in Space." Several 300-level courses are offered primarily for nonscience students who want to learn about a particular field in depth, such as the Solar System, Stellar Evolution, the Orclusive of registration for master's research. At least 12 credits must be in the major area and at least 12 must be at the 600 level (not necessarily the same 12). In addition, at least six credits must be in a related field (supporting area).

The non-thesis option of the M.S. degree requires six credits in the major at the 600 level in addition to the general requirements described above. That is, a total of 30 credits are required of which 18 must be in the major and at least 18 at the 600 level. The student must also pass a written examination, usually consisting of the written part of the Ph.D. qualifying examination with appropriately chosen passing requirements.

## Doctoral Degree Requirements

The graduate curriculum in Astronomy is in the process of being revised. The new requirements aim to be more flexible and more closely aligned with student interests. There will be five required Astronomy core courses. These will consist of two courses currently in the catalog -

Course Code: ASTR

## BIOLOGICAL RESOURCES ENGINEERING (ENBE)

College of Agriculture and Natural Resources and A. James Clark School of Engineering 1457 An. Sci./ Biological Resources Engr. Building, (301) 405-1198 E-mail ts167@umail.umd.edu<br>http:/ / www.bre.umd.edu<br>Chair: Wheaton<br>Professors: Johnson, Shirmohammadi, Wheaton<br>Associate Professors: Kangas, Ross<br>Assistant Professors: Baldwin, Becker, Felton, Montas, Schreuders<br>Emeriti: Brodie, Grant, Harris, Krewatch, Merrick, Stewart

## The Major

This program is for students who wish to become engineers but who also have serious interest in biological systems and how the physical and biological sciences interrelate. The biological and the engineering aspects of plant, animal, genetic, microbial, medical, food processing, and environmental systems are studied. Graduates are prepared to apply engineering, mathematical, and computer skills to the design of biological systems and facilities. Graduates find employment in design, management, research, education, sales, consulting, or international service.

## Requirements for Major

Biological Resources Engineers can prepare themselves for a wide variety of careers. Each student has the opportunity specialize by taking technical electives in their interest area. Biological and engineering technical electives are chosen in consultation with their Departmental Advisor. While individuals have chosen to specialize in areas ranging from aquacultural engineering to biomedical engineering to food engineering, four specific focus areas are supported by the Department.

## Bioenvironmental and Ecosystem Engineering

Bioenvironmental and Ecosystem Engineering is a focus area that concentrates on using principles of biological, environmental and engineering sciences to study the interacting processes necessary for a
healthy environment. Students interested in this focus area need to strengthen their background in soils, ecosystem biology, natural resources, chemistry, fluids, hydrology, and pollution processes.

## Biomedical Engineering

Biomedical engineering is a focus area that examines the wide range of activities in which the disciplines of engineering and biological or medical science intersect. Representative areas include: design of diagnostic and therapeutic devices for clinical use; development of biologically compatible materials; physiological modeling; and many others.

## Biotechnological Engineering

Biotechnological Engineering is a focus area that applies scientific and engineering principles to the processing of materials by biological agents. Examples of products available as a result of biotechnology include antibiotics, vaccines, fuels such as ethanol, dairy products, and microbial pesticides.

## Pre-medicine/ Pre-veterinary

The pre-professional program for pre-medical and pre-veterinary students advises students preparing to apply to graduate programs in these areas. The Departmental Advisors assist students in setting career objectives, selecting undergraduate course work to meet the admissions criteria of the professional schools.

## Educational Objectives

The objective of the undergraduate Biological Resources Engineering program is to produce engineers with:

1. The ability to design products and processes related to biological systems.
2. The ability to communicate well, especially with engineers and nonengineering biological specialists.
3. The ability to work successfully in teams.
4. The ability to conceptually categorize information, especially biological information, in order to deal effectively with technical advances coming at a rapid pace.
5. Provide engineering education with a solid grounding in fundamentals that will have lifelong value.
6. Provide understanding of human behavior, societal needs and forces, and the dynamics of human efforts and their effects on the environment.

## Biological Resources Engineering Curriculum

Freshman Year
ENES 100 - Introduction to Engineering Design ..................................... 3
*MATH 140-Calculus I..................................................................... 4
*CHEM 133-General Chemistry I ...................................................... 4

* BSCl 105—Principles of Biology I ....................................................................... 4

ENBE 110-Intro. to Bio. Res. Engineering ................................................ 1
Total............................................................................................. 16
ENES 102-Statics ........................................................................... 3

* MATH 141-Calculus II .................................................................... 4
* CHEM 233-Organic Chemistry ............................................................. 4
* PHYS 161-General Physics ............................................................. 4

ENGL 101-Introduction to Writing ....................................................... 3
Total ............................................................................................. 18

Sophomore Year

MATH 241-Calculus III...................................................................... 4

BSCl 223-General Microbiology ............................................................ 4
ENES 220-Mechanics of Materials ...................................................... 3
*PHYS 262-General Physics ............................................................. 4
Total.............................................................................................. 15
MATH 246 - Differential Equations for Scientists and Engineers ............... 3
ENME 232-Thermodynamics ............................................................. 3
ENBE 241 - Computer Use in Bioresource Engineering............................ 3
BSCl 230-Cell Biology and Physiology ........................................................... 4
*CORE1 ......................................................................................... 3
Total ............................................................................................. 16
Junior Year2 .....  3
ENBE 455-Basic Electronic Design
ENME 331-Fluid Mechanics .....  .3
or ENCE 330 - Basic Fluid Mechanics .....  3
*CORE1 .....  3
Total ..... 15
ECON 201-Principles of Economics .....  3
or (approved substitute)
ENBE 454-Biological Process Engineering .....  4
[BIOL SCI: Technical Elective]3 .....  3
ENGR SCI: Technical Elective 3 .....  3
*CORE116
Senior Year
ENBE 471-Biological Systems Control .....  3
ENBE 422- Water Resources Engineering. ..... $\ldots 3$
or ENBE 456-Biomedical Instrumentation .....  3
ENBE 485-Capstone Design I. .....  1
[BIOL SCI: Technical Elective]3 .....  3
ENGL 393-Technical Writing ..... 3
*CORE1 .....  3
Total ..... 16
ENBE 482-Dynamics of Biological Systems .....  1
ENBE 484-Biological Responses to Environmental Stimuli .....  3
ENBE 486-Capstone Design II .....  2
[ENGR SCI: Technical Elective]3 .....  3
*CORE1 .....  3
Total ..... 12
Total ..... 124
*Satisfies General Education Requirements${ }^{1}$ Students must consult with an advisor on selection of appropriate coursesfor their particular area of study.
${ }^{2}$ No 300 -level and above courses may be attempted until 56 credits have been earned.
${ }^{3}$ Technical electives, related to field of concentration, must be selected from a departmentally approved list.

Biological Sciences (BIOL SCI) technical electives may be chosen, depending on students' interests, from an approved list of courses in the following programs: Animal Sciences, Chemistry/ Biochemistry, Entomology, Nutrition and Food Science, Geography, Geology, Hearing and Speech, Health, Horticulture, Kinesiology, Meteorology, Microbiology, Natural Resources Management, Natural Resources Sciences, Plant Biology, Psychology, and Zoology.

Engineering Sciences (ENGR SCI) technical electives may be chosen, also depending on students' interests, from among the following programs: Aerospace Engineering, Biological Resources Engineering, Civil Engineering, Chemical Engineering, Electrical Engineering, Fire Protection Engineering, Mechanical Engineering, and Nuclear Engineering.

Students not qualifying for CHEM 133 must take CHEM 103 and CHEM 113.

## Admission/ Advising

All Biological Resources Engineering majors must meet admission, progress, and retention standards of the Clark College of Engineering, but may enroll through either the College of Agriculture and Natural Resources or the School of Engineering.

Advising is mandatory; call (301) 405-1198 to schedule an appointment.
Contact departmental academic advisors to arrange teaching or research internships.

## Financial Assistance

The department offers two scholarships specifically for biological Resources Engineering majors. Cooperative education (work study) programs are available through the Clark School of Engineering. Part-time employment is available in the department, in USDA laboratories located near campus, and at other locations.

## Honors and Awards

Outstanding students are recognized each year for scholastic achievement and for their contribution to the department, college, and university. Top students are selected for Alpha Epsilon, the Honor Society of Biological Resources Engineering, and Tau Beta Pi, the engineering honor society.

## Student Organization

Join BRES, the Biological Resources Engineering Society. Academic advisors will tell you how to become a participant.

Course Code: ENBE

## BIOLOGICAL SCIENCES PROGRAM

## College of Life Sciences

1302 Symons Hall, (301) 405-6892
Director: Margaret Palmer
Assistant Director: Joelle Presson

## The M ajor

The Biological Sciences major is an interdepartmental program sponsored by the Departments of Entomology, Cell Biology and Molecular Genetics, and Biology. All Biological Sciences majors complete a common sequence of introductory and supporting courses referred to as the Basic Program. In addition, students must complete an Advanced Program within one of the following specialization areas:

```
Plant Biology (PLNT)
Entomology (ENTM)
Microbiology (MICB)
Zoology (ZOOL)
Cell and Molecular Biology and Genetics (CMBG)
Physiology and Neurobiology (PHNB)
Marine Biology (MARB)
Behavior, Ecology, Evolution \& Systematics (BEES)
General Biology (GENB)
Individualized Studies (BIVS)
```

A complete list of Specialization Area requirements is available from the Biological Sciences Program Office, (301) 405-6892, and on our website at www.life.umd.edu.

The undergraduate curriculum in Biological Sciences at the university emphasizes active learning through student participation in a variety of quality classroom and laboratory experiences. The well-equipped teaching laboratories train students in modern research technologies. The program requires supporting course work in chemistry, mathematics, and physics, yet allows time for exploration of other academic disciplines.

Each participating department offers research opportunities that may be completed either in a faculty member's research laboratory or field site or at one of the many nearby research facilities. The National Institutes of Health, the Patuxent Wildlife Refuge, the National Zoo, and the Chesapeake Bay Laboratory are just a few of the many sites utilized by University of Maryland students.

Many of our graduates pursue advanced degrees in master's or doctoral programs or in medical, dental, or other professional schools. Some elect to seek employment as skilled technical personnel in government or industry research laboratories. Others pursue careers in fish and wildlife programs, zoos, and museums. Other recent graduates are now science writers, sales representatives for the biotechnology industry, and lawyers specializing in environmental and biotechnology related issues.

Requirements for M ajor
Semester Credit Hours
CORE Program Requirements .30

## Basic Program in Biological Sciences

BSCI 105-Principles of Biology I .4

BSCI 106—Principles of Biology II .......................................................................... 4
BSCl 222-Principles of Genetics 4
One or two courses in Organismal Diversity .....  .4
Supporting courses ..... 30-32
ATHMATH 221 or 141-Calculus IICHEM 103-General Chemistry I
HEM 113-General Chemistry IICHEM 233-Organic Chemistry ICHEM 243-Organic Chemistry IIPHYS 122 or 142-Physics II
Total Credits in Basic Program ..... $.42-44$
Advanced Program ..... 21-24
Electives ..... 16-19

A grade of C or better is required for $\mathrm{BSCl} 105,106,222$, the diversity course, all courses in the Advanced Program and all supporting courses (math, chemistry, and physics). Majors in Biological Sciences cannot use any Life Sciences course to fulfill CORE Advanced Studies requirements, including courses in CHEM or BCHM.

## Advising

Advising is mandatory during each pre-registration period for all Biological Sciences majors. All freshmen and new transfer students will be assigned an adviser from the College of Life Sciences advising staff. Students will be assigned to a departmental faculty adviser once a basic sequence of courses has been successfully completed. The departmental faculty advisers are coordinated by the following persons for the indicated specialization areas. These coordinating advising offices can be contacted for making appointments with an adviser or for any other information regarding that specialization area.

| Smith | 1219 H.J. Patterson | (301) 405-1597 | CMBG, MICB |
| :--- | :--- | :--- | :--- |
| PLNT GENB |  |  |  |
| Compton | 2227 Bio.Psych. Bldg. | (301) 405-6904 | ZOOL, PHNB, |
| MARB, BEES |  |  |  |
| Kent | 3142 Plant Sciences Bldg. | (301) 405-3911 | ENTM, GENB |
| Presson | 1326A Symons Hall | (301) 405-6892 | BIVS |
|  |  |  |  |

## Honors

Outstanding students are encouraged to apply to departmental Honors Programs. Through the Honors Programs students will become actively involved in the ongoing scientific research at the university. Information about these honors programs may be obtained from the Assistant Director.

Course Code: BSCI

## BIOLOGY (BIOL)

## College of Life Sciences

2227 Biology-Psychology Building, (301) 405-6904
E-mail: biolugrad@umail.umd.edu
Professor and Chair: Jeffery
Associate Chair: Infantino
Professors: Borgia, Carr, Carter-Porges, Colombini, Gill, Palmer, Popper, Reaka-Kudla, Sebens, Via, Wilkinson
Associate Professors: Cohen, Dietz, Dudash, Fenster, Forseth, Goode, Higgins, Imberski, Inouye, Payne, Racusen, Shaw, Small
Assistant Professors: Davenport, Hare, Sukharev, Tishkoff
Lecturers: Compton, Infantino, Jensen, Koines, Opoku-Edusei, Perrino
Jointly Appointed Faculty: Costanza, Mount, Poeppel
Professors Emeriti: Anastos, Clark, Corliss, Haley, Highton
Director of Graduate Studies: Forseth
Director of Undergraduate Studies: Compton
The Department of Biology (comprised of former Zoology and some former Plant Biology department faculty) participates in teaching and advising in the inter-departmental undergraduate Biological Sciences Progam (see separate listing). Faculty interest and expertise span levels of organization from molecules to ecosystems in animals and plants.

## Requirements for Specialization

See Biological Sciences Program elsewhere in this chapter, or contact the Department of Biology Undergraduate Office.

## Advising

Advising in the Biological Sciences program is mandatory. Students are assigned an advisor based on their area of specialization. The Department of Biology faculty coordinate and advise students who specialize in Physiology and Neurobiology (PHNB), Marine Biology (MARB), Zoology (ZOOL), and Behavior, Ecology, Evolution and Systematics (BEES). Contact the Department of Biology Undergraduate Office, 405-6904, for information about advising or to schedule an appointment. For advising in other Biological Sciences Specialization areas, see the Biological Sciences Program listing in this catalog.

## Honors

The Department of Biology Honors Program offers highly motivated and academically qualified students the opportunity to work closely with a faculty mentor on an original, independent research project. Students are required to participate in the program for at least three semesters, and need not have been admitted University Honors program in order to participate. Contact the undergraduate office for more information.

Course Code: BSCI

## BUSINESS AND MANAGEMENT, GENERAL

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## CELL BIOLOGY AND M OLECULAR GENETICS

Note: The Department of Microbiology has merged with the Department of Plant Biology. The new name of the expanded department is the Department of Cell Biology and Molecular Genetics.

## College of Life Sciences

Microbiology Building, (301) 405-5435
http:/ / www.life.umd.edu/ CBM G
Chair: Ades
Professors: Bean, Cooke, Gantt†† Joseph, Simon, Sze, Weiner, Wolniak, Yuan
Associate Professors: Benson, Bottino, Destefano, Hutcheson, Mount, Stein, Stewart, Straney
Assistant Professors: Chang, deQuevas, Delwiche, Farber, Liu, Pontzer, Song
Instructors: Gdovin, Smith
Lecturer: Caines
Professors Emeriti: Cook, Dienert $\dagger$, Doetsch, Hetrick $\dagger$, Patterson, Pelczar, Reveal, Roberson
Adjunct Professors: Cohen, Tsokos
Adjunct Associate Professor: Culver
Adjunct Assistant Professors: Baehrecke, Trun

## The Majors

The department participates in the teaching and advising of three specialization areas of the interdepartmental major in Biological Sciences. They are Microbiology (MICB), Plant Biology (PLNT), and Cell, Molecular Biology, and Genetics (CMBG).

Microbiology is a field fundamental to all of biology. Specialization in the field encompasses not only study of the fundamental processes of bacteria, but also the examination of animal, plant, and bacterial viruses, as well as animal and plant defense systems that counter infection and invasion of microorganisms. Microbiology, including the sub-fields of virology and immunology, continues to be at the forefront. Microbiological principles are being applied in ecology, biotechnology, medicine, agriculture, and the food industry.
The Plant Biology specialization area is designed with a diverse range of career possibilities for students in plant biology and plant protection. The
department offers instruction in the fields of physiology, molecular biology, pathology, ecology, taxonomy, genetics, mycology, nematology, virology, and evolutionary plant biology.

Cell, Molecular Biology, and Genetics are combined into one specialization area due to their inter-relatedness and overlap. The combined areas will allow focus on the internal working of the cell and the interactions between cells, as well as the techniques used to understand cellular processes at the molecular level.

These areas of the biological sciences program will allow students to find opportunities in academia, industry, government, medicine, law, biotechnology, and public health.

## Requirements for the Specialization Areas

See the Biological Sciences entry in this catalog or contact an adviser for specific program requirements.

## Advising

Advising is mandatory. Students are assigned to faculty advisers based upon their area of specialization. The Department of Cell Biology and Molecular Genetics faculty coordinate and advise students who specialize in Microbiology (MICB), Plant Biology (PLNT), and Cell, Molecular Biology, and Genetics (CMBG). Contact the undergraduate program for information. Advising web page: http:/ / www.life.umd.edu/ advising/ advisor.htm. 1219 H.J. Patters on Bldg., Phone: (301) 405-1597.

## Research Experience and Internships

Students may gain research experience in off-campus laboratories or in oncampus faculty laboratories. Contact the undergraduate program office, (301) 405-1597, for more information.

## Honors and Awards

The Departmental Honors Program involves an independent research undertaken with a faculty adviser. For information, contact the Honors Coordinator, S. Hutcheson, 3123 Microbiology Building. The P. Arne Hansen Award may be awarded to an outstanding departmental honors student. The Sigma Alpha Omicron Award is given annually to the graduating senior selected by the faculty as the outstanding student in Microbiology.

## Student Organizations

All students interested in microbiology are encouraged to join the University of Maryland student chapter of the American Society for Microbiology, the professional scientific society for microbiologists. Information on this organization may be obtained from the ASM website, http:// www.asmusa.org.

Course codes: MICB, PLNT, CMBG

## CHEMICAL ENGINEERING (ENCH)

## A. James Clark School of Engineering

2113 Chemical and Nuclear Engineering Bldg., (301) 405-1935
http:/ / www.ench.umd.edu/
Professor and Chair: Barbari
Associate Chair and Undergraduate Director: Wang
Director of Graduate Studies: Gentry
Professors: Barbari, Bentley, Calabrese, Choi, DiMarzio**, Gentry, Greer,
McAvoy, Panagiotopoulos, Pereira**, Regan, Weigand, Yang**
Associate Professors: Harris, Ranade**, Wang, Zafiriou
Assistant Professors: Adomaitis, Ehrman, Pulliam-Holoman
Emeriti: Beckmann, Gomezplata, Sengers, Smith
**Adjunct

## The Major

The Chemical Engineering major is intended to equip students to function as effective citizens and engineers in an increasingly technological world as well as in science and engineering subjects. Depth as well as breadth is
required in the humanities and social sciences to understand the economic, ecological, and human factors involved in reaching the best technological solutions to today's problems.

The basic foundation in mathematical, chemical, physical, and engineering sciences is established in the first two years of the curriculum. A core of required chemistry and chemical engineering courses is followed by a flexible structure of electives that allows either breadth or specialization. Appropriate choices of electives can prepare a Chemical Engineering major for a career as an engineer and/or for graduate study. It is also an attractive major for those seeking a professional degree in medicine or law.

Areas stressed in the major include biochemical engineering, environmental engineering, polymer engineering, systems engineering, and engineering science. Project courses allow undergraduates to undertake independent study under the guidance of a faculty member in an area of mutual interest.

## Requirements for Major

Requirements for the Chemical Engineering major include a thorough preparation in mathematics, physics, chemistry, and engineering science. Elective courses must include both Chemical Engineering courses and technical courses outside the department. A sample program is shown below.


Minimum Degree Credits: 128 credits and fulfillment of all departmental, school, and university requirements with a cumulative grade point average of 2.0 .
*Students must consult with an adviser on selection of appropriate courses for their particular course of study.

## Technical Electives Guidelines

Nine credits of technical electives and three credits of advanced chemistry electives are required. It is recommended that they be taken during the senior year.

Additional guidelines are as follows:
The senior technical electives are 400 -level chemical engineering courses, including ENCH468x, and a limited number of approved 400 -level technical courses from outside chemical engineering. Students should select electives with the help of an academic advisor. In general, at least two of the three technical electives should be ENCH4XX; the third one may be chosen from ENCH or from an approved list of non-ENCH technical courses. Business or non-technical courses are normally not approved. The advanced chemistry elective is normally a 400 -level chemistry course.

Upon the approval of the academic advisor and written permission of the department, a limited amount of substitution may be permitted. Substitutes, including ENCH468 Research (1-3 credits), must fit into an overall plan of study emphasis and ensure that the plan fulfills accreditation design requirements. Students may elect to specialize in a specific area such as Biochemical Engineering, Environmental Engineering, Polymer Engineering, or Systems Engineering; or they may sample a variety of elective courses. Upon graduation, those who specialize in a particular technical area will receive a letter in recognition of their accomplishment from the Chair and the Director of Undergraduate Studies of the Chemical Engineering Department.

## Technical Electives

Biochemical Engineering
ENCH 482-Biochemical Engineering (3)
ENCH 485-Biochemical Engineering Laboratory (3). Recommended only if ENCH 482 is taken.

Polymer Engineering
ENCH 490-Introduction to Polymer Science (3)
ENCH 494 - Polymer Technology Laboratory (3). Recommended if ENCH 490 is taken.
ENCH 496 - Processing of Polymer Materials (3)
Chemical Processing
ENCH 450-Chemical Process Development (3)
Systems Engineering
ENCH 452 -Advanced Chemical Engineering Analys is (3)
ENCH 453-Applied Mathematics in Chemical Engineering (3)
ENCH 454-Chemical Process Analysis and Optimization (3)

## Admission

All Chemical Engineering majors must meet admission, progress, and retention standards of the Clark School of Engineering.

## Advising

All students choosing Chemical Engineering as their primary field must see an undergraduate adviser each semester. Appointments for advising can be made at 2113 Chemical and Nuclear Engineering Building, (301) 405-1935.

## Co-op Program

The Chemical Engineering program works within the Clark School of Engineering Cooperative Engineering Education Program. For information on this program consult the Clark School of Engineering entry in chapter 6 of this catalog or call (301) 405-3863.

## Financial Assistance

Financial aid based upon need is available through the Office of Student Financial Aid. A number of scholarships are available through the Clark School of Engineering. Part-time employment is available in the department.

## Honors and Awards

Annual awards are given to recognize scholarship and outstanding service to the department, college and University. These awards include the David Arthur Berman Memorial Award, the Engineering Society of Baltimore Award, and the American Institute of Chemical Engineers Award for the outstanding senior in chemical engineering. AIChE awards are given to the junior with the highest cumulative GPA as well as to the outstanding junior and outstanding senior in chemical engineering.

## Student Organization

Students operate a campus student chapter of the professional organization, the American Institute of Chemical Engineers. Omegi Chi Episilon is the honorary Chemical Engineering Society.

Course Code: ENCH

## CHEMISTRY AND BIOCHEMISTRY

(CHEM, BCHM)

## College of Life Sciences

1320 Chemistry Building, (301) 405-1788
Student Information: 1309 Chemistry Building, (301) 405-1791
Professor and Chair: Vacant
Associate Chairs: Blough, DeVoe
Director, Undergraduate Programs: Berkowitz
Professors: Alexander, Ammon, Blough, DeShongt, Fenselau, Grim, Hansen, Helz, Jarvist, Khanna, Lorimer, P. Mazzocchi, Mignereyt, G. Miller, Moore, Munn, Thirumalai, Tossell, Walters, Weeks $\dagger \dagger$, Weiner
Associate Professors: Boyd, DeVoe, Eichhorn, Falvey, Hu, Julin, Lee, Murphy, Ondov, Reutt-Robey, Rokita, Sita
Assistant Professors: Arias, Bond, Davis, Evans, Forbes, Isaacs, Jollie, Kahn, McDermott-Jones, Morehead, Walker
Instructors: D. Mazzocchi, Ebrahimian, Rebbert
Emeriti: Bellama, Freeman, Henery-Logan, Holmlund, Huheey, Jaquith, Kasler, McNesby, Munn, O'Haver, Pratt, Sampugna, Stewart, Stuntz, Vanderslice, Veitch
$\dagger$ Distinguished Scholar-Teacher
$\dagger \dagger$ Distinguished University Professor
Adjunct Professors: Kearney, Mazzola

## The Majors

The Department of Chemistry and Biochemistry offers the B.S. Degree in both chemistry and biochemistry. The programs are designed with the maximum amount of flexibility to prepare students for graduate or professional school, career opportunities in chemical and pharmaceutical industries, and basic research positions in government and academic laboratories.

Chemistry courses for majors in chemistry or biochemistry begin with the three-semester General Chemistry sequence for majors: CHEM 143-153227. Students who transfer into the chemistry or biochemistry programs and do not have the equivalent of CHEM 143-153-227 must take a threesemester sequence: CHEM 103-113-227. Additional courses common to both biochemistry and chemistry majors are the two-semester sequence in organic chemistry (CHEM 237-247), the one-credit seminar in professional issues (CHEM 395), the instrumental analysis course (CHEM 425), the twosemester lecture sequence in physical chemistry (CHEM 481-482) the first semester (CHEM 483) of the physical chemistry laboratory sequence, and EDCP 108-0.

Supporting courses for majors in both programs include MATH 140, MATH 141, PHYS 141, and PHYS 142.

## Requirements for Chemistry Majors

Departmental requirements for chemistry majors include 18 credits of lower-level and 23 credits of upper-level courses. In addition to the specific courses mentioned above, chemistry majors take the inorganic chemistry course (CHEM 401), the second semester of physical chemistry laboratory (CHEM 484), and six credits of electives selected from approved chemistry and biochemistry courses. In order to meet requirements for a degree to be certified by the American Chemical Society, students must select certain specific courses, as explained by the undergraduate office.

Each required chemistry course must be passed with a minimum grade of C. Required supporting courses must be passed with a C average.

Semester Credit Hours
University CORE Requirements ............................................................ 30

Departmental Requirements .................................................................. 41
Supporting Courses ............................................................................. 16
Electives .............................................................................................. 28
Total 120

## Requirements for Biochemistry Majors

Departmental requirements for biochemistry majors include 30 credits of specific chemistry courses and BCHM 461, 462, and 464. In addition to the College of Life Sciences Core Requirement of BSCI 105 (4), biochemistry majors must take two additional approved biological science courses; certain specific courses, as explained by the undergraduate office.

Each required chemistry and biochemistry course must be passed with a minimum grade of $C$. Required supporting courses must be passed with a C average.

|  | Semester Credit Hours |
| :---: | :---: |
| University CORE Requirements | ... 30 |
| College of Life Sciences Core Requirements | .........4* |
| Departmental Requirements .............. | . 39 |
| Supporting Courses | . 22 |
| Electives ............... | . 25 |
| Total | 120 |

* Other College of Life Sciences Core Requirements are satisfied by the departmental requirements.


## Advising

Advising is mandatory. Appointments for advising can be made by contacting the secretary in the Office of Undergraduate Studies, Room 1309 Chemistry Building, (301) 405-1791.

## Financial Assistance

Two scholarships are available for majors: the Isidore and Annie Adler Scholarship of $\$ 500$ to an outstanding major with financial need and the Leidy Foundation Scholarships of $\$ 600$ to two outstanding junior majors. No application is necessary, as all majors are automatically reviewed by the Awards Committee.

## Honors and Awards

Students with a GPA of 3.0 or better who have completed two semesters of CHEM 399 (Introduction to Chemical Research) have an opportunity to sign up for CHEM 398 (Honors Research) in their senior year and be considered for departmental honors. After successful completion of a senior honors thesis and seminar, graduation "with honors" or "with high honors" in chemistry or biochemistry can be attained.

## Student Organizations

Alpha Chi Sigma Chemistry Fraternity is a professional fraternity which recruits men and women students from chemistry, biochemistry, and related science majors during each fall and spring semester. The fraternity holds weekly meetings and provides tutoring for students in lower-level chemistry courses. The office is in Room 1403 Chemistry Building. Dr. Boyd (1206 Chemistry Building, 301-405-1805) is the faculty adviser.

Course Codes: CHEM, BCHM

# CIVIL AND ENVIRONMENTAL ENGINEERING (ENCE) 

A. James Clark School of Engineering<br>1179 Engineering Classroom Building, (301) 405-1974<br>http:/ / www.ence.umd.edu

## Professor and Chair: Baecher

Professors: Aggour, Albrecht, Amde, Ayyub, Birkner, G. Chang, Colville, Donaldson, Golden (Affiliate), Hao, McCuen, Schelling, Schonfeld, Sternberg, Vannoy
Associate Professors: Austin, P. Chang, Davis, Goodings, Haghani, Schwartz, Sircar (Affiliate), Torrents
Assistant Professors: Brubaker, Lovell, Moglen, Seagren, Sermons, Tseng

## The Major

Civil and Environmental Engineering is a people-serving profession, concerned with the planning, design, construction and operation of large complex systems such as buildings and bridges, water purification and distribution systems, highways, rapid transit and rail systems, ports and harbors, airports, tunnels and underground construction, dams, powergenerating systems, and structural components of aircraft and ships. Civil and environmental engineering also includes urban and city planning, water and land pollution and treatment problems, and disposal of hazardous wastes and chemicals. The design and construction of these systems are only part of the many challenges and opportunities for civil and environmental engineers. The recent revolution in computers, communications, and data management has provided new resources that are widely used by the professional civil and environmental engineer in providing safe, economical, and functional facilities to serve our society.

## Requirements for Major

At both the undergraduate and graduate levels, the department offers programs of study in six major areas in civil engineering: engineering management, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources and remote sensing. A total of 122 credit hours is required for a bachelor of science (B.S.) degree with emphasis in basic science (mathematics, chemistry, and physics), engineering science (mechanics of materials, statics, and dynamics), basic civil and environmental engineering core courses; and 18 credits of technical electives that may be selected from a combination of the six areas of civil engineering specialization and other approved courses. The curriculum provides a sensible blend of required courses and electives, which permits students to pursue their interests without the risk of overs pecialization.

## Program Learning Objectives

The faculty of the Department of Civil Engineering has established the following Program Educational Objectives:

1. Prepare all of our BSCE graduates with competitive skills and a comprehensive training in civil engineering, including opportunities for specialized training in the major discipline areas of civil engineering. The program should be competitive with the top civil engineering programs in the nation with respect to degree requirements, educational facilities, and faculty expertise.
2. The program should seek to attract and retain the best possible students, from a diverse population, including historically underrepresented groups, including women.
3. The program should be structured with a common engineering Freshman year, and a Sophomore year with relatively few specialized civil engineering courses. The focus in these first two years should be primarily on basic engineering and physical sciences and fundamentals, to accommodate undecided students in the Department and throughout the School of Engineering, and allow for the articulated entry of students from the State Community College System.
4. The program should provide exposure to the broad spectrum of civil engineering practice in the Junior year to assist students in selecting an area of concentration within civil engineering that can provide focus and depth in the Senior year.
5. Prepare all of our graduates for successful careers in industry, government service, and future private practice, while seeking to qualify as many of our students as possible for admission to advanced study in the nation's best graduate schools in either engineering, business, or other areas of study where a first class civil engineering education is an excellent source of preparation.
6. The program should seek to instill in all students an appreciation and commitment to self-study, lifelong learning, and ensure that all students have an understanding of the context and ethical responsibilities within which the engineering profession is practiced. The program should also provide opportunities for students to work in teams, develop communication skills, and engage in a comprehensive multidisciplinary capstone design experience.
7. Decisions are to be based on assessments of the quality of our graduates and alumni, feedback from employers of our graduates, and self assessment of the faculty and program in meeting our objectives and learning outcomes goals.

## Program Outcomes

In addition to ensuring technical competency of all graduates in the broad discipline areas of civil engineering, the Department must encourage the development of skills and abilities that will enhance the marketability of its graduates and provide them with the best possible opportunity for success in the work place. As a result, the faculty has agreed to develop the following abilities and skills within each graduate and has approved the following Program Outcomes:

1. Technical competence in mathematics, physical science, and engineering science.
2. Technical competence in basic civil engineering sciences.
3. Technical competence in at least one major area of specialization within civil and environmental engineering.
4. Ability to use computers, software, and experimentation as tools to solve engineering problems.
5. Ability to communicate and defend ideas effectively, including oral, written, and technical reports writing skills.
6. Ability to identify engineering problems and propose alternate solutions, including the step-by-step analysis and design of a system, component, or process.
7. Teamwork skills as applied to interdisciplinary design projects.
8. Understanding and appreciation of both the societal context of the civil engineering profession, and the ethical responsibilities of practicing engineers.
9. Appreciation of the need to seek further specialization within civil engineering and commit to life-long learning.
10. Awareness of the impact of technology and engineering on society, including life safety and environmental issues.
11. Interest in comtemporary issues, both nationally and internationally, and the awareness of the impact of engineering in these areas.
12. Understanding of the importance of active participation in professional societies and the organizations in professional practice.

Technical competence is measured by the ability to apply knowledge and fundamental principles to the solution of problems in each area noted. The students' perceptions of their abilities and growth in the above areas, and their opinions of the effectiveness of the program in meeting the program objectives, will be surveyed each semester and compared to faculty assessments to provide a solid basis for determining the actions needed to enhance the program and improve the quality and abilities of all graduates.

|  | Semeste Credit Hours I |
| :---: | :---: |
| Freshman Year |  |
| ATH 140-Calcu | 4 |
| ATH 141-Calculus |  |
| CHEM 133-General Chemistry for Enginee | 4 |
| ENES 100-Introduction to Engineering Design | 3 |
| ENES 102-Statics |  |
| ENGL 101-Introduction to Writing ................................................ 3 |  |
| PHYS 161-General Physics ................................................ ......... 3 |  |
| CORE Program Requirements ............................................................ 6 |  |
|  |  |
| Sophomore Year |  |
| MATH 241-Calculus III..................................................... 4 |  |
| MATH 246-Differential Equations for Scientists and Engineers |  |
| PHYS 262, 263-General Physics II, II.................................. |  |
| ENES 220-Mechanics of Materials .................................... 3 |  |
| ENES 221-Dynamics |  |
| ENCE 202-Computational Methods in Civil Engineering I ........ 3 |  |
| ENCE 203-Computational Methods in Civil Engineering II ..................... 3 |  |
| CORE Program Requirements .............................................. 3 ......... 3 |  |
| Total.......................................................................... $17 . . . . . . . .16$ |  |
| Junior Year |  |
| ENCE 300-Fundamentals of Engineering Materials OR ............ 3 |  |
| CHEM 233-Organic Chemistry+......................................... 4 |  |
| ENCE 302-Probability \& Statistics for Civil Engineers ................ ......... 3 |  |
| ENCE 315-Introduction to Environmental Engineering................ ......... 3 |  |
| ENCE 320-Construction Engineering and Management.............. ......... 3 |  |
| ENCE 330-Basic Fluid Mechanics ....................................... 3 |  |
| ENCE 340-Fundamentals of Soil Mechanics ........................... 3 |  |
| ENCE 353-Introduction to Structural Analysis or |  |
| ENCE 355-Introduction to Structural Design++...................... 3 |  |
| ENCE 370-Fundamentals of Transportation Engineering.......... 3 |  |
| ENGL 393-Technical Writing................................................ ......... 3 |  |
| CORE Program Requirements ................................................ ......... 3 |  |
| Total ....................................................................15-16....... 15 |  |
| Senior Year |  |
| ENCE Technical Electives (Group A, B, C, D, E, F, G, and H)* ..... $9 . . . . . . . . .9$ |  |
| ENCE 320-Thermodynamics ............................................ 3 |  |
| ENCE 466-Design of Civil Engineering Systems ................................ 3 |  |
| CORE Program Requirements .............................................3.......... 3 |  |
| Total |  |

Minimum Degree Requirements: 123 credits and the fulfillment of all departmental, school and University requirements with a cumulative grade point average of at least 2.0. Additional semester credits will be involved to the extent that courses carrying more than three credits are selected.

+ Depending on student's 400-level electives, either one or both courses may be needed.
++ Only one structures course is required at the junior level (either ENCE 353 or 355). If student completes both courses, one course will count as the required structures course and the other course will count as an elective.
* See below, Notes Concerning Technical Electives.


## Notes Concerning Technical Electives in Civil Engineering

A minimum of 18 credit hours of technical electives are required as follows:
ENCE 4XX—Electives* 3
ENCE 4XX—Electives* 3
ENCE 4XX—Electives** 3
ENCE 4XX—Electives** 3
ENCE 4XX—Electives*** 3
ENCE 4XX—Electives*** 3

* Two electives from any one category A, B, C, D, E, or F.
** Any two electives from categories A-G.
*** Any two electives from categories A-H, or one technical elective such as CHEM 4XX, or any ENXX 400- level course.

Category A: ENCE 423, ENCE 425
Category B: ENCE 430, ENCE 431, ENCE 432
Category C: ENCE 435, ENCE 436
Category D: ENCE 441, ENCE 442
Category E: ENCE 355, ENCE 454, ENCE 455
Category F: ENCE 470, ENCE 471, ENCE 472
Category G: ENCE 353, ENCE 463, ENCE 465
Category H: ENCE 410, ENCE 420, ENCE 433, ENCE 440,
ENCE 453, ENCE 488, ENCE 489

## Admission/ Advising

See A. James Clark School of Engineering entrance requirements in chapter 6.

All students are advised by Dr. Bruce Donaldson who assists in course selection and scheduling throughout the student's entire undergraduate program. For advising, contact Dr. Donaldson, (301) 405-1127, 1182 Engineering Classroom Building.

## Fieldwork and Internship Opportunities

Several excellent co-op opportunities are available for Civil Engineering students. See the A. James Clark School of Engineering entry in chapter 6 of this catalog for a full description of the Engineering co-op program, or contact Ms. Heidi Sauber, (301) 405-3863.

## Financial Assistance

The Department of Civil Engineering awards a number of academic scholarships. These awards are designated primarily for junior and senior students. A department scholarship committee solicits and evaluates applications each year.

## Honors and Awards

See A. James Clark School of Engineering Honors Program. The Department of Civil Engineering offers the following awards: 1) The Civil Engineering Outstanding Senior Award; 2) The ASCE Outstanding Senior Award; 3) The Woodward-Clyde Consultants Award; 4) The Bechtel Award; 5) The Chi Epsilon Outstanding Senior Award; 6) The Ben Dyer Award; 7) The ASCE Maryland Section Award; and 8) The Department Chairman's Award.

## Student Organizations

Student organizations include the American Society of Civil Engineers and Institute of Transportation Engineers student chapters which are open to all civil engineering students. The Civil Engineering Honor Society, Chi Epsilon, elects members semi-annually. Information on membership and eligibility for these student organizations may be obtained from the president of each organization, 0401 Engineering Classroom Building.

Course Code: ENCE

## CLASSICS (CLAS)

## College of Arts and Humanities

2407 Marie Mount Hall, (301) 405-2014
E-mail: jh10@umail.umd.edu
http:/ / www.inform.umd.edu/ EdRes/ Colleges/ ARHU/ Depts/ Classics
Professors: Hallett $\dagger$ (Chair)
Associate Professors: Doherty, Lee, Staley, Stehle
Assistant Professor: Dietrich, Rutledge
$\dagger$ Distinguished Scholar-Teacher

## The Major

Classics is the study of the languages, literature, culture and thought of ancient Greece and Rome. Students at the University of Maryland may major in Classical Languages and Literatures with four options and may enroll in a variety of courses on the classical world. These options include Latin, Greek, Greek and Latin, and Classical Humanities.

## Advising

Departmental advising is mandatory for all majors every semester.

## Requirements for M ajor

Requirements for the Classics major include the College of Arts and Humanities requirement of 45 upper-level credits completed.

The College foreign-language requirement will be automatically fulfilled in the process of taking language courses in the major.

Option A: Latin
Thirty credits of Latin at the 200 -level or higher, at least 12 of which must be at the 400 -level or higher, plus nine credits of supporting courses (for example, CLAS 170, HIST 110, and one 300 - or 400 -level course in Roman history).

Option B: Greek
Thirty credits of Greek at the 200 -level or higher, at least 12 of which must be at the 400 -level or higher, plus nine hours of supporting courses (for example, CLAS 170, HIST 110, and a 300-or 400 -level course in Greek history).

Option C: Latin and Greek
Thirty credits of either Greek or Latin and 12 hours of the other classical language, plus nine hours of supporting courses (for example, CLAS 170, HIST 110, and a 300-or 400 -level course in Greek or Roman history). Students with no previous training in the second language may count introductory level courses as part of the 12-hour requirement.

Option D: Classics in Translation (Classical Humanities)
Eighteen credits in CLAS courses; 12 credits in Greek or Latin courses; 12 credits in upper-level supporting courses (normally in Art History, Archaeology, Architecture, Government, History, Linguistics, or Philosophy). Note: Students are encouraged to substitute 300-and 400-level courses in LATN and GREK for some of the 18 required hours in CLAS.

Students must take language acquisition courses sequentially, i.e., 101, 102, 201. Once credit has been received in a higher-level language acquisition or grammar course, a lower-level course may not be taken for credit. The student should begin the sequence at the appropriate level.

## Citations

Citations in Ancient Greek Language and Literature
16 credit hours. GREK 201, CLAS 270, GREK 301, and two courses from approved list of courses.

Citation in Classical Language and Mythology
15-16 credit hours. CLAS 170, 470, and three courses from approved list of courses.

Citation in Latin Language and Literature
16 credit hours. LATN 201 or 220, CLAS 271, and three courses from approved list of courses.

Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

Course Codes: CLAS, GREK, LATN

## COMM UNICATION (COMM) (FORMERLY SPEECH COM MUNICATION)

## College of Arts and Humanities

2130 Skinner Building, (301) 405-8979 (main office), 405-6519 (undergraduate office)
http:/ / www.inform.umd.edu/ ARHU/ Depts/ Communication
Professor and Chair: Fink ${ }^{\dagger}$
Professors: J. Grunig, Wolvin
Associate Professors: Gaines, L. Grunig, Klumpp, McCaleb
Assistant Professors: Aldoory, D. Cai, Drake, Garst, McComas, Meffert, S. Parry-Giles

Director of Undergraduate Studies and Lecturer: Waks
Lecturers: Altschul, J. Cai, Eadie, Falk, Gring-Pemble, Mason, Morrison, Reuter
Affiliate Professors: Brown (SOCY), Fahnestock (ENGL), Gurevitch (JOUR), Kruglanski (PSYC)
Affiliate Assistant Professors: Gelfand (PSYC), McDaniel (KNES)
Visiting Assistant Professors: T. Parry-Giles, Lawrence
${ }^{\dagger}$ Distinguished Scholar-Teacher
Communication takes as its subject matter the history, processes, and effects of human communication through speech and its extensions. The departmental curriculum is designed to provide a liberal education in the arts and sciences of human communication as well as preparation for career opportunities in business, government, education, and related fields. Within the curriculum, students may pursue academic programs that emphasize many disciplinary areas, including intercultural communication, political communication, public relations, negotiation and conflict management, cognition and persuasion, rhetorical theory, history of rhetoric, and criticism of public discourse. Departmental advising is mandatory for new majors, second semester sophomores, and seniors.

## The Major

Requirements for the Communication major include a minimum of 45 upper-level credits and the foreign language requirement of the College of Arts and Humanities. No course with a grade less than C may be used to satisfy major requirements.

## Requirements for Major

The course of study for a Communication major must satisfy all of the following requirements.

1. One course from the following list: COMM 107, 200, or 230.
2. COMM 250, 400, and 401 .
3. Completion of one of the following tracks: Communication Research, Communication Studies, Public Relations, or Rhetoric and Public Discourse.
a. Communication Research COMM 402

Five courses from the following: COMM 420, 424, 425, 426, $435,470,475,477,482.6$ semester hours in COMM at least three of which are at the 300-400 level. One course from the
following (Statistical Analysis): PSYC 200, SOCY 201, BMGT 230, EDMS 451 or an equivalent course. One course from the following (Structural Analysis of Language): LING 200, HESP 120, ANTH 380 or an equivalent course. 9 semester hours in courses related to Communication Research in one department other than COMM
b. Communication Studies COMM 402

One course from the following: COMM 420, 424, 425, 426, 435, 470, 475, 477, 482. One course from the following: COMM 330, 360, 450, 451, 453, 455, 460, 461, 469, 471, 476. 15 semester hours in COMM courses at least 12 of which must be at the 300-400 level. One course from the following (Statistical Analysis): PSYC 200, SOCY 201, BMGT 230, EDMS 451 or an equivalent course. One course from the following (Structural Analysis of Language): LING 200, HESP 120, ANTH 380 or an equivalent course. 9 semester hours in courses related to Communication Studies in one department other than COMM
c. Public Relations JOUR 201 and 202; COMM 350, 351, 352 386, and 483. 3 semester hours in COMM at the 300-400 level One course from the following (Statistical Analysis): PSYC 200, SOCY 201, BMGT 230, EDMS 451 or an equivalent course One course from the following (Economics): ECON 200 or 201 9 semester hours in courses related to Public Relations in one department other than COMM or JOUR
d. Rhetoric and Public Discourse COMM 450 Five courses from the following: COMM 330, 360, 451, 453, $455,460,461,469,471,476.6$ semester hours in COMM at least three of which must be at the 300-400 level One course from the following (Critical Analysis of Discourse): AMST 432, CMLT 488, ENGL 453, JWST 263, PHIL 233 One course from the following (Structural Analysis of Language): LING 200, HESP 120, ANTH 380 or an equivalent course 9 semester hours in course related to Rhetoric and Public Discourse in one department other than COMM

Because the department's curriculum changes over time, the department's Undergraduate Director may approve other appropriate Communication courses to meet the requirements for each track.

Courses required for the Communication major but taken outside COMM may be used to satisfy CORE requirements.

Communication offers special opportunities for majors. Superior students may participate in an Honors Program; contact the Honors Director. The department sponsors a chapter of Lambda Pi Eta National Honor Society. An internship program is also available to students doing work related to the major; contact the outreach coordinator.

Course Code: COMM

## COM PARATIVE LITERATURE PROGRAM (CMLT)

## College of Arts and Humanities

2107 Susquehanna Hall, 405-2853

## Core Faculty

Professor and Director: Harrison* (Spanish and Portuguese)
Professors: Berlin* (English and Jewish Studies), Collins* (English), Fuegi,
Hage *(French), Lansert* English), Lifton, Peterson* (English)
Associate Professor: Wang* (English)
Instructor: Robinson
Visiting Assistant Professor: Conroy* (American Studies)

* Joint appointment with unit indicated
†Distinguished Scholar-Teacher
Affiliate Faculty
Professors: Alford, Auchard, Barry, Beck, Bedos-Rezak, Bolles, R. Brown, Caramello, Caughey, Chambers, Coogan, Cross, Cypess, Donawerth, Fahnestock, Fink, Flieger, Gillespie, Grossman, Hallett, Handelman, Holton, Kauffman, Kelly, Kolker, Leinwand, Leonardi, Mossman, M. Smith, Pearson, Robertson, Trousdale, Turner

Associate Professors: Brami, J. Brown, Cate, Coustaut, Doherty, Falvo, Greene-Gantzberg, Igel, Kerkham, King, Kuo, Mintz, Norman, Peres, Phaf, Ray, Richardson, Sargent, Strauch, Withers, Zilfi
Assistant Professors: Cohen, Sherman, Upton, Williams

## The Major

A pre-structured Individual Studies major is available through Undergraduate Studies. This major requires competence in a second language and may emphasize either literature or media. Undergraduates may also emphasize comparative studies in literature, culture, and/or media as they work toward a degree in another department associated with the Comparative Literature Program.

## Citation in Comparative Studies

A student who specializes in 15-16 hours of concentrated study in the courses of the Comparative Literature Program will receive a citation on the official transcript. Please contact the Director of Undergraduate Studies for approval of courses.

## Course Code: CMLT

Revised 1/12/00

## COMPUTER ENGINEERING (ENCP)

## A. James Clark School of Engineering Department of Electrical and Computer Engineering 2429 A.V. Williams Building, (301) 405-3685 <br> E-mail: eceadvis@deans.umd.edu <br> http:// www.ece.umd.edu

## Chair: Farvardin

Professors: Agrawala, Aloimonos, Basili, Chu (Emeritus), Davis, DeClaris, Edmunson (Emeritus), Elman, Gasarch, Gligor, Kanal (Emeritus), Ja'J a', Ligomenides (Emeritus), Miller, Minker (Emeritus), Nakajima, Nau, O'Leary, Oruc, Perlis, Reggia, Rosenfield, Roussopoulos, Saltz, Samet, Shankar, Shneiderman, Smith, G. W. Stewart, Tripathi, Vishkin, Zelkowitz
Associate Professors: Dorr, Faloutsos, Gerber, Hendler, Kruskal, Khuller, Mount, Porter, Pugh, Pugsley (Emeritus), Purtilo, Silio, Subrahmanian
Assistant Professors: Barua, Bederson, Bhattacharyya, Chawathe, M.J. Franklin, M. Franklin, Golubchik, Hollingsworth, Jacob, Keleher, Salem, D. Stewart, Tseng, Yeung
Lecturers: Glenn, Golub, Herman, Kaye, Lin, Plane, Postow, Maybury

## The Major

The computer engineering major combines the strengths of both the Department of Electrical and Computer Engineering and the Department of Computer Science to prepare students for careers in the computer industry. The program encompasses the study of hardware, software, and systems questions that arise in the design development, and application of computers and embedded systems. Specifically, computer engineering students will have a knowledge of hardware systems (electrical networks, electronics, and VLSI); a knowledge of software systems (algorithms, data structures, and operating systems); and a knowledge of how these two domains interact (digital logic, signal and system theory, computer architectural and performance analysis). Computer Engineering students will learn about everything that goes into digital and computing systems, from solid state physics to CMOS VLSI design, to computer architecture to programming, and from operating systems to compiler and language theory.

The following are the objectives of the Computer Engineering Degree Program:

1. Provide all students with basic training in computer engineering, as well as opportunities for specialized training in several technical areas;
2. Prepare students for study in the nation's top graduate schools and/ or employment in a variety of positions in government and industry;
3. Through such tools as honors courses, research programs and financial aid packages, facilitate the recruitment and retention of a diverse student body, with particular emphasis on historically underrepresented groups;
4. Provide students with an understanding of the social context of the computer engineering profession;
5. Provide students with an understanding of the ethical responsibilities of practicing engineers, as stipulated in the IEEE Code of Ethics;
6. Provide students with an ability to communicate and defend their ideas effectively;
7. Provide students with the skills necessary for successful participation in interdisciplinary projects;
8. Provide students with an ability to identify engineering problems and propose appropriate solutions, including the step-by-step design of a system, component or process;
9. Provide students with a strong foundation in mathematics, sciences and engineering, and the ability to apply said knowledge to solving engineering problems;
10. Provide students with an ability to design and conduct experiments, interpret empirical observations and analyze data;
11. Provide students with opportunities to engage in structured research activities;
12. Maintain technological relevance by introducing students to current applications in the field, as well as to state-of-the art laboratory equipment and computer simulation tools;
13. Provide students with a motivation to seek further specialization in the field of computer engineering, and to continue learning, whether in a formal academic setting or through self-instruction.

## Requirements for M ajor

As in all engineering degrees, the student starts out with a core curriculum in mathematics and basic science. Subsequent years of study involve courses covering a balanced mixture of hardware, software, hardwaresoftware trade-offs, and basic modeling techniques used to represent the computing process. Courses covering algorithms, data structures, digital systems, computer organization and architecture, software and hardware design and testing, operating systems, and programming languages will be included. Elective courses must include electrical engineering and computer science courses and technical courses outside the departments. A sample program is shown below.


- One engineering Capstone course (minimum 2 credits)
- At least one CMSC and ENEE course from the Approved Computer Engineering Course list.

See the GENERAL EDUCATION REQUIREMENTS (CORE) for details about CORE program requirements.

## Admission

Admission requirements are the same as those of other departments in the School of Engineering. (See A. James Clark School of Engineering section on Entrance Requirements.) Computer Engineering is a highly selective program and only a limited number of students are admitted each academic year.

## Advising

In addition to the ECE Office, faculty in Computer Engineering function as undergraduate advisers. Departmental approval is required
for registration in all upper-division courses in the major. The department's Undergraduate Office (2429 A.V. Williams Building, 301-405-3685) is the contact point for undergraduate advising questions.

## Cooperative Education Program

Participation in the Cooperative Education Program is encouraged. See A. James Clark School of Engineering entry for details.

## Financial Assistance

Several corporate scholarships are administered through the Department. Information and scholarship applications are available from either the Department of Electrical and Computer Engineering Undergraduate Office, 2429 A.V. Williams Building, (301) 405-3685, or the Clark School of Engineering Student Affairs Office, 1124 Engineering Classroom Building, (301) 405-3855.

## Job Opportunities

Computer Engineers have virtually unlimited employment opportunities in both industry and government. Some of the specific jobs that students of computer engineering might acquire are: computer designer, application specialist, embedded system designer, interfacing and telecommunication designer, data logging and control, industrial systems design, hardware design, biomedical device design, real-time software design and development, instrumentation analysis and control, computerintegrated manufacturing.

## Research Labs

The Department of Electrical and Computer Engineering is affiliated with more than 40 specialized laboratories, supporting activities including: speech and image processing, high performance systems, mobile computing and multimedia, communication networks, robotics, control systems, neural systems, systems integration, VLSI design and testing, experimental software engineering, semiconductor materials and devices, photonics, fiber optics, ion beam lithography, real-time systems, humancomputer interaction, and virtual reality.

## Student Organizations

Please see listing for ENEE
Courses (see full descriptions in chapter 8)
CMSC 114-Computer Science I (4)
CMSC 150-Introduction to Discrete Structures (4)
CMSC 214-Computer Science II (4)
CMSC 251-Algorithms (3)
CMSC 330-Organization of Programming Languages (3)
CMSC 412-Operating Systems (4)
ENEE 204- Basic Circuit Theory (3)
ENEE 206- Fundamental Electric and Digital Circuit Laboratory (2)
ENEE 241- Numerical Techniques in Engineering (3)
ENEE 244 - Digital Logic Design (3)
ENEE 302- Digital Electronics (3)
ENEE 322- Signal and System Theory (3)

## ENEE 324- Engineering Probability (3)

ENEE 350- Computer Organization (3)
ENEE 446- Digital Computer Design (3)
Course Codes: ENEE, CMSC

## COM PUTER SCIENCE (CMSC)

College of Computer, M athematical and Physical Sciences
1109 A.V.Williams Building, (301) 405-2672
E-mail: ugrad@cs.umd.edu
http:// www.cs.umd.edu

## Professor and Chair: Davis

Professors: Agrawala, Aloimonos, Basili, Elman, Gasarch, Miller, Nau, O'Leary, Perlis, Reggia, Rosenfeld, Roussopoulos, Saltz, Samet, Shankar, Shneiderman, Smith, Stewart, Subrahmanian, Tripathi, Zelkowitz
Associate Professors: Dorr, Faloutsos, Gerber, Hendler, Hollingsworth, Kruskal, Mount, Porter, Pugh, Purtilo
Assistant Professors: Bederson, Bhattacharjee, Chawathe, Franklin, Golubchik, Hollingsworth, Keleher, Khuller, Tseng
Instructor: Plane
Lecturers: Glenn, Golub, Herman, Hugue, Kaye, Lin, Maybury, Postow
Professors Emeriti: Atchison, Chu, Edmundson, Kanal, Minker

## The M ajor

Computer science is the study of computers and computational systems: their theory, design, development, and application. Principal areas within computer science include artificial intelligence, computer systems, database systems, human factors, numerical analysis, programming languages, software engineering, and theory of computing. A computer scientist is concerned with problem solving. Problems range from abstract determinations of what problems can be solved with computers and the complexity of the algorithms that solve them) to practical matters (design of computer systems which are easy for people to use). Computer scientists build computational models of systems including physical phenomena (weather forecasting), human behavior (expert systems, robotics), and computer systems themselves (performance evaluation). Such models often require extensive numeric or symbolic computation.

## Requirements for Major

Note: Changes in major requirements are under review. Students should check with a departmental adviser for updated information.

The course of study for a Computer Science major must satisfy all of the following requirements:

1. A grade of C or better in the following courses:
a. CMSC 106 or an acceptable score on the Computer Science Advanced Placement examination or acceptable score on the appropriate Department exemption examination.
b. CMSC 114 or acceptable score on the Computer Science Advanced Placement examination or acceptable score on the appropriate Department exemption examination.
c. CMSC 214 or an acceptable score on the appropriate Department exemption examination.
d. CMSC 250 or an acceptable score on the appropriate Department exemption examination.
e. At least 24 credit hours at the 300-400 levels, including CMSC 311, CMSC 330 and at least 15 credit hours of the following CMSC courses:
Computer Systems: Any two of 411; 412; 417
Information Processing: 420; one of 421, 424, 426; or 427
Software Engineering/Programming Languages: Any two of 430; 433; 434; 435;
Theory of Computation: 451; 452;
Numerical Analys is: one of 460 or 466; 467.
Note: CMSC 451 and 452 require CMSC 251 as an additional prerequisite. Courses in Numerical Analysis require MATH 240 or 241 as additional prerequisites. Students without either of these prerequisites must choose their 15 credit hours from the remaining courses in the other three areas.
2. MATH 140 and 141 (or MATH 350 and MATH 351). A STAT course which has MATH 141 (or a more advanced mathematics course) as a prerequisite, and one other MATH, STAT, or MAPL course which
has MATH 141 (or a more advanced mathematics course) as a prerequisite. A grade of C or better must be earned in each of the courses. No course that is cross-listed as CMSC may be counted in this requirement.
3. A minimum of 12 additional credit hours of $300-400$ level courses in one discipline outside of computer science with an average grade of C or better. No course that is cross-listed as CMSC may be counted in this requirement.

## Advising

Computer science majors may obtain advising at room 1109 A.V. Williams Building. Interested students should call (301) 405-2672 to receive further information about the program.

## Financial Assistance

Students may find employment as tutors, as undergraduate teaching assistants, or as members of the department's laboratory staff. Professors may also have funds to hire undergraduates to assist in research. Many students also participate in internship or cooperative education programs, working in the computer industry for a semester during their junior or senior years.

## Honors

A departmental honors program provides an opportunity for outstanding undergraduates to take graduate-level courses or to begin scholarly research in independent study with a faculty member. Students are accepted into the program after their sophomore year based on their academic performance.

## Student Organizations

Computer-related extracurricular activities are arranged by our student chapter of the ACM, a professional group for computer sciences, and by the Society of Women in Computer Science. Meetings include technical lectures and career information.

Course Code: CMSC

## COUNSELING AND PERSONNEL SERVICES (EDCP)

## College of Education <br> 3214 Benjamin Building, (301) 405-2858

Professor and Chair: Power
Professors: Birk (Emeritus), Byrne (Emeritus), Hershenson, Lent, Magoon (Emeritus), Marx, Pumroy (Emeritus), Rosenfield, Schlossberg (Emeritus), Hoffman, Sedlacek (Affiliate)
Associate Professors: Boyd, Clement (Affiliate), Fassinger, Greenberg, Jacoby (Affiliate), Komives, McEwen, Pope-Davis, Scales (Affiliate), Strein, Teglasi, Westbrook (Affiliate)
Assistant Professors: Bagwell (Affiliate), Freeman (Affiliate), Gast (Affiliate), Holcomb-McCoy, Kandell (Affiliate), Lucas, Mielke (Affiliate), Milem, Osteen (Affiliate), Phillips, Schmidt (Affiliate), Stewart (Affiliate), Stimpson (Affiliate), Thomas (Affiliate)

The Department of Counseling and Personnel Services offers programs of preparation at the master's degree, advanced graduate specialist, and doctoral degree levels for counselors in elementary and secondary schools, rehabilitation agencies, business and industry, and college and university counseling centers. Additional graduate programs of preparation are provided for college student personnel administrators and school psychologists. The department also offers a joint doctoral program with the Department of Psychology in counseling psychology.

While the department does not have an undergraduate major, it does offer a number of courses which are open to undergraduates and are suggested for students considering graduate work in counseling or other human service fields. Specific courses in peer counseling, leadership, and diversity are provided.

## CRIMINOLOGY AND CRIMINAL JUSTICE (CCJS)

## College of Behavioral and Social Sciences <br> 2220 LeFrak Hall, (301) 405-4699

Distinguished University Professor and Chair: Sherman
Professors: Farrington (Research), Gottfredson, Laub, MacKenzie, Paternoster ${ }^{\dagger}$, Reuter, Smith, Wellford
Associate Professors: Russell, Simpson, Taxman (Research), Wish
Assistant Professors: Bass, Brame, Bushway, Li (Research), Tseloni, Wilson (Research)
Lecturers: Chapman, Cosper, Gaston, Johnston, Mauriello, Zumbrun
Professor Emeritus: Lejins* (Sociology)

## Instructor: Brooks

${ }^{\dagger}$ Distinguished Scholar-Teacher.

* Joint Appointment with unit indicated.

The purpose of the Department of Criminology and Criminal Justice is to promote study and teaching concerning the problems of crime, deliquency, law and social control. The department comprises as its component parts:

1. The Criminology and Criminal Justice Program, leading to a Bachelor of Arts degree
2. The Graduate Program, offering M.A. and Ph.D. degrees in Criminology and Criminal Justice
3. The Graduate Program, offering a Professional M.A. in Criminal Justice

## The Criminology and Criminal Justice Major

The major in criminology and criminal justice comprises 30 hours of coursework in Criminology and Criminal Justice. Eighteen (18) hours of supporting sequence selected from a list of social and behavioral science courses (list is available in the department) are required. No grade lower than a C may be used toward the major. An average of C is required in the supporting sequence. Nine hours of the supporting sequence must be at the $300 / 400$ level. In addition, CCJS 200 or an approved course in social statistics must be completed with a grade of C or better. A " C " or better is required in Math 111 as a prerequisite to CCJS 200.


Electives for CCJS Majors (all courses are 3 credits):
CCJS 234, CCJS 320, CCJS 330, CCJS 331, CCJS 352, CCJS 357, CCJS 359, CCJS 360, CCJS 398, CCJS 399, CCJS 400, CCJS 432, CCJS 444, CCJS 450, CCJS 451, CCJS 452 , CCJS 453 , CCJS 454, CCJS 455, CCJS 456, CCJS 457, CCJS 461, CCJS 462, and CCJS 498.

Note: Criminal Justice (CJUS) majors and Criminology (CRIM) majors, which existed prior to 1992, have requirements different from the ones outlined here for Criminology and Criminal Justice (CCJS) majors. CJUS and CRIM majors are strongly urged to speak to a CCJS academic adviser regarding their requirements.

## Internships

Internships are available through CCJS 398 and CCJS 359 in a variety of federal, state, local, and private agencies. A GPA of 2.5 and 56 credit hours required for internships.

## Honors

Each semester the department selects the outstanding graduating senior for the Peter P. Lejins award.

The Honors Program provides superior students the opportunity for advanced study in both a seminar format and independent study under the direction of the faculty. The Honors Program is a three-semester (12-credit-hour) sequence that a student begins in the spring semester, three or four semesters prior to graduation. CCJS 388 H , the first course in the sequence, is offered only during the spring semester. The second and third courses in the sequence consist of a year-long research project (six credits, at least three each semester) or an honors thesis (one semester, six credits) followed by a graduate seminar in the department (one semester, three credits). Honors students may count their Honors courses toward satisfaction of the basic 30 -hour requirement. Requirements for admission to the Honors Program include a cumulative grade-point average of at least 3.25, no grade lower than B for any criminology and criminal justice course, and evidence of satisfactory writing ability.

## Advising

All majors are strongly encouraged to see an adviser at least once each semester. Call (301) 405-4729.

Course Code: CCJS

## CURRICULUM AND INSTRUCTION (EDCI)

## College of Education

2311 Benjamin Building, (301) 405-3324
Professors: Afflerbach, Dreher, Fey*(Mathematics), Folstrom* (Music), Hammer* (Physics), Holliday, Jantz, Saracho, Weible
Associate Professors: P. Campbell, Cirrincione* (Geography), Graeber, McCaleb* (Speech), McGinnis, O’Flahavan, Slater, Sullivan, Valli, Van Sledright
Assistant Professors: Chambliss, Comas, Cooper* (Mathematics), Cozart, Ivey, McKillop, Price, Strutchens, van Zee
Emeriti: Amershek, Blough, De Lorenzo, Duffey, Eley, Heidelbach, Henkelman, Layman, Lockard, Roderick, Schindler, Stant, Weaver, Wilson,
*Joint appointment with unit indicated

## The Major

The Department of Curriculum and Instruction offers two undergraduate curricula leading to the Bachelor of Science or Bachelor of Arts degree:

1. Elementary Education: for the preparation of teachers of grades 1-8, and
2. Secondary Education: for the preparation of teachers in various subject areas for teaching in middle schools and secondary schools, grades 5-12.

Graduates of the Elementary or Secondary Education programs meet the requirements for certification in Maryland and most other states.

## Requirements for Major Including Program Options

All Teacher Education Programs have designated pre-professional courses and a specified sequence of professional courses. Before students may enroll in courses identified as part of the professional sequence, they must first gain admission to the College of Education's Teacher Education Program.

## Admission

Application for admission to the Teacher Education Professional Program must be made early in the semester prior to beginning professional courses. Admission procedures and criteria are explained in "Entrance Requirements" in the College of Education entry in chapter 6.

## Advising

Advising is mandatory for all students desiring acceptance into the Teacher Education Program. Students will receive advising through individual appointments or walk-in hours during the pre-registration period. Information regarding advising schedules will be available each semester. Walk-in advising hours are also posted each semester. Check in the department office, 2311 Benjamin Building.

## ELEM ENTARY EDUCATION

Students who complete the elementary curriculum will receive the Bachelor of Science degree and will meet the Maryland State Department of Education requirements for the Standard Professional Certificate in Elementary Education. Students admitted to Elementary Education must complete the following program which includes an area of emphasis.

Required Courses: Courses which may satisfy the university's general education requirements (CORE) and which are required in the Elementary Education program of studies are as follows:
HIST 156 (3) Social and Political History
Biological Science/ Lab (4) and Physical Science/ Lab (4)
Social Science: ANTH, ECON, GVPT, GEOG, SOCY
Beginning with Fall 2001 all Elementary Education majors will be required to take twelve (12) credits of reading as mandated by the Maryland State Department of Education. These changes may result in additional classes for undergraduate elementary education majors.

Other Pre-Professional Requirements:
MATH 210 (4), MATH 211 (4)
Communications requirement (3) Any communications course or HESP 202.
Biological Science/ Lab (4) and Physical Science/ Lab (4)
EDCI 301 or ARTT 100 or ARTT 110 (3)
EDCI 443 (3)
MUSC 155 (3)
EDCI 280 (3)
EDMS 410 (3)
Course work to complete the Area of Emphasis (18 semester hours) can be chosen from the following areas: Communications, Foreign Language, Literature, Math, Science, Social Studies. The EDCI Advising Office has detailed information regarding each area of emphasis. All pre-professional course work must be completed with a C or better prior to entering Professional Semester 2.

Professional Courses:
All professional courses must be completed with a grade of C or better. All pre-professional and professional course work must be completed with a $C$ or better prior to student teaching.

Professional course work to be taken prior to Professional Semester 2
EDCI 397-Principles and Methods of Teaching (3)
EDHD300E—Human Development and Learning (6)
EDCI 385-Computer Education for Teachers (3)
EDPA 301-Foundations of Education (3)
Professional Semester 2
EDCI 322-Curriculum and Instruction in Elementary Education: Social Studies (3)
EDCI 342-Curriculum and Instruction in Elementary Education: Language Arts (3)
EDCI 352-Curriculum and Instruction in Elementary Education: Mathematics (3)
EDCI 362-Curriculum and Instruction in Elementary Education: Reading (3)
EDCI 372-Curriculum and Instruction in Elementary Education: Science (3)
Professional Semester 3
EDCI 481-Student Teaching: Elementary (12)
EDCI 464-Clinical Practices in Reading Diagnosis and Instruction (3)

## SECONDARY EDUCATION

The Bachelor of Arts degree is offered in the teaching fields of art, English, foreign languages, mathematics, social studies, speech/ English, and theatre/ English. The Bachelor of Science degree is offered in art, mathematics, music, science, social studies and speech/English, and theatre/ English. In the areas of art and music, teachers are prepared to teach in both elementary and secondary schools. All other programs prepare teachers for grades five through twelve.

It is anticipated that by Fall 2000 all secondary education majors will be required to also declare a major within their field of study.

All freshmen entering after Fall 2001 will be required to take six credits (6) of reading as mandated by the Maryland State Department of Education. These changes may result in additional classes for secondary education majors.

All pre-professional and professional courses must be completed with a grade of C or better prior to student teaching.

The Maryland State Department of Education (MSDE) now requires that teachers seeking certification for all areas of secondary education must take a total of two reading classes. MSDE is currently working on the required content of these two classes before implementation can begin in the College of Education. These changes may result in additional classes for all undergraduate secondary education majors.

## Foreign-Language Requirement, Bachelor of Arts Degree

All students who pursue the Bachelor of Arts degree in secondary education are required to complete two years ( 12 semester hours) or the equivalent of an intermediate level of a foreign language at the college level. If students have had three years of one foreign language or two years of each of two foreign languages as recorded on their high school transcripts, they are not required to take any foreign languages in the College, although they may elect to do so.

If students are not exempt from the foreign-language requirements, they must complete courses through the 104-level of a modern language or the 204-level of a classical language.

In the modern languages: French, German, and Spanish students should take the placement test in the language in which they have had work if they wish to continue the same language; their language instruction would start at the level indicated by the test. With classical languages, students would start at the level indicated in this catalog.

For students who come under the provisions above, the placement test may also serve as a proficiency test and may be taken by a student any time (once a semester) to try to fulfill the language requirement.

Students who have studied languages other than French, German, or Spanish, or who have lived for two or more years in a foreign country where a language other than English prevails, shall be placed by the chair of the respective language section, if feasible, or by the chairs of the foreign language departments. Native speakers of a foreign language shall satisfy the foreign language requirements by taking 12 semester hours of English.

## English Education

## Three Options

(Effective Summer, 1995. Students in the current English Education program may elect to complete that program or transfer to one of the three options.)

OPTION I: Double M ajor: English Education and English

## Freshman Year

CORE Program Requirements (13 credits)
MATH 110-Introduction to Mathematics (3)
COMM 107-Speech Communication, or COMM 125-Introduction to Interpersonal Communication, or COMM 220-Small Group Discussion (3)
Foreign Language (Intermediate mastery of a modern or classical language is required) (8 credits)
ENGL 101-Introduction to Writing or ENGL 101 H -Honors Composition (3) (If exempt from ENGL 101, majors are required to take ENGL 291Intermediate Writing or ENGL 294-Introduction to Creative Writing.)

## Sophomore Year

CORE Program Requirements (9 credits)
ENGL 201-World Literature, Homer to the Renaissance or ENGL 202World Literature, Shakespeare to the Present (3)
ENGL 301-Critical Methods in the Study of Literature (3)
British and American Literature: one upper-level course in five out of the following six areas to be taken during the sophomore and junior years (one of these five courses must be in American Literature):
a. Medieval Literature
b. Renaissance Literature other than Shakespeare
c. Restoration or 18th-Century Literature
d. 19th-Century British Literature
e. American Literature before 1900
f. 20th-Century British or American Literature ( 15 credits)

LING 200—Introductory Linguistics (3) OR ENG 280
*EDPA 301-Foundations of Education (3)
EDHD 413 and 420
Junior/ Senior Years
CORE Program Requirements (3 credits)
British and American Literature (remaining requirements)
COMM 230-Argumentation and Debate or COMM 330-Argumentation in Society or COMM 383-Urban Communication or COMM 402Communication Theory and Process (3)
ENGL 384-Concepts of Grammar or ENGL 383-The Uses of Language or ENGL 385-English Semantics or ENGL 482-History of the English Language or ENGL 483-American English or ENGL 484-Advanced English Grammar or ENGL 486-Introduction to Old English or ENGL 489-Special Topics in English Language (3)
ENGL 304-The Major Works of Shakespeare or ENGL 403-Shakespeare: The Early Works or ENGL 404-Shakespeare: The Late Works (3)
ENGL 487-Foundations of Rhetoric or COMM 360-The Rhetoric of Black America or COMM 401-Interpreting Strategic Discourse or COMM 453- The Power of Discourse in American Life (3)
ENGL Elective-Woman or minority course (3)
ENGL 391-Advanced Composition or ENGL 393-Technical Writing or ENGL 493-Advanced Expository Writing (3)
*EDCI 390-Principles and Methods of Secondary Instruction (3)
*EDCI 466-Literature for Adolescents (3)
*EDCI 463-The Teaching of Reading in the Secondary School (3)
*EDCI 467-Teaching Writing (3)
Senior Year
ENGL 399-Senior Seminar (3)
*EDCI 340-Curriculum, Instruction and Observation: English, Speech, Theater Methods (3) (Fall only)
*EDCI 447—Field Experience in English Teaching (concurrent with EDCI 340) (1)
*EDCI 441- Student Teaching: English (12)
*EDCI 440-Student Teaching Seminar in Secondary Education: English (concurrent with EDCI 441) (1)

* Must be admitted to Professional Education to take these courses.

OPTION II: B.A. Degree in English Education
The B.A. Degree in English Education is an additional route leading to the baccalaureate and certification for teaching secondary English language arts. The education and English requirements are exactly the same for all three options.

Option II is primarily for students who have already earned a bachelor's degree. It is also available to students working on their initial degree, but the double major is the recommended option since the requirements for both are identical. In Option II, completion of the English and professional education courses and field experiences will result in the awarding of a B.A. degree in English Education.

## OPTION III: Double Degree

Option III is a third route leading to certification for teaching secondary English language arts. It is designed for students who have earned a bachelor's degree in another field (for example, history) and seek secondary teacher certification via a University of Maryland, College Parkapproved teacher education program and a second bachelor's degree in English Education (EDCI). In addition to successful completion of the College of Education teacher education admissions requirements listed above, students must apply for admission to the approved teacher education program in secondary English Education. If the student's academic background does not include sufficient course work in composition; introductory and advanced English language and linguistics; rhetoric; world, British, and American literature; literary criticism; and literature by women and minorities, those courses must be part of the course of study leading to completion of the approved teacher education program. In Option III, completion of the English and professional education courses and field experiences will result in the awarding of a B.A. degree in English Education.

## Art Education, K-12

* Under revision- please check with department.

Pre-Professional/ Subject Area Course Work
Note: Course sequencing is under review.
ARTT 150-Introduction to Art Theory (3)
ARTT 100-Elements of Design (3)
ARTT 110-Elements of Drawing (3)
COMM 107-Speech Communication or COMM 125 or COMM 220 (3)
ARTH 200-Art of the Western World I (3)
ARTH 201-Art of the Western World II (3)
ARTT 200-Three-Dimensional Art Fundamentals (3)
ARTT 210-Elements of Drawing II (3)
ARTT 320-Elements of Painting (3)
EDCI 273-Practicum in Ceramics (3) (Spring only)
ARTT 428-Painting II (3)
EDCI 406-Chaos and the Arts (3) (Fall only)
EDCI 407-Practicum in Art Education: Three Dimensional (3) (Spring only)
ARTT 340-ART 341-ARTT 342—ARTT 343—Elements of Printmaking: Intaglio (3)

## Professional Courses

These requirements are being revised.
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDSP 470-Introduction to Special Education (3)
EDCI 403-Teaching of Art Criticism in Public Schools (3) (Spring only)
EDPA 301-Foundations of Education (3)
EDCI 300-Discipline Based Art Education (C\&I Art Methods) (3) (Fall only)
EDCI 401-Student Teaching in Elementary Schools: Art (4-8)
EDCI 402-Student Teaching in Secondary Schools: Art (2-8)

## Foreign Language Education

The Foreign Language (FL) Education curriculum is designed for prospective foreign language teachers in middle through senior high schools who have been admitted to the EDCI Teacher Education Program. Currently, admission is open to qualified students seeking teacher certification in Spanish, French, Russian, and German only.

A minimum of six hours of intermediate-level language course work in the student's major language must precede the required 300-400 level courses. The latter are comprised of a minimum of 30 hours of prescribed course work which includes the areas of grammar and composition, conversation, literature, civilization and culture, and linguistics. Students must also take a minimum of nine hours (three courses) of electives in a related area. Students are strongly advised to utilize these nine hours to begin or continue the study of another language as soon as possible after entering the university. The second area of concentration must be approved by a FL adviser and may be in any foreign language regardless of whether it is a Maryland State Department of Education approved FL certification program.

The following requirements must be met with the FL Education program:
Pre-Professional/ Subject Area Course Work
COMM 100, 125, or 220-Basic Principles of Speech Communication (3)
Primary FL Area- Intermediate (200 level) $(3,3)$
Primary FL Area-Grammar and Composition (300-400 levels) $(3,3)$
Primary FL Area-Survey of Literature $(300-400$ levels) $(3,3)$
Primary FL Area-Conversation (300-400 levels) $(3,3)$
Primary FL Area-Literature (400-above levels) $(3,3)$
Primary FL Area-Culture and Civilization (3)
Applied Linguistics (In the Primary FL Area if available; otherwise,
LING 200 or ANTH 371) - FL Phonetics does not satisfy this requirement). (3)
Electives in FL-Related Courses (9 hours-minimum of three courses). It is strongly recommended that these hours be utilized to begin or continue the study of another foreign language as soon as possible.

All Primary FL Area courses must have been completed prior to the Student Teaching semester. Any substitutions for the above must be preapproved by a FL Education adviser.

Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420 - Cognitive Development and Learning (3)
EDPA 301-Foundations of Education (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 400-Level FL Education Elective only in consultation with FL Education. Adviser (3)

EDCI 330-Curriculum and Instruction in Secondary Education: Foreign Language (3) Pre-requisites: EDCI 413 and 420 and EDCI 390 (fall only), All Primary FL Area course work
EDCI 430-Seminar in Student Teaching (3) (Taken concurrently with EDCI 431. only) Pre-requisite: EDCI 330.

EDCI 431-Student Teaching in the Secondary Schools (12) (Taken concurrently with EDCI 430 only). Pre-requisites: EDCI 330 and 301.

## M athematics Education

A major in mathematics education requires the completion of MATH 241 or its equivalent, and a minimum of 15 semester hours of mathematics at the 400 -level (excluding MATH 490); 400-level courses beyond those prescribed (402 or $403 ; 430$ ) should be selected in consultation with a mathematics education adviser. The mathematics education major must be supported by one of the following science sequences: CHEM 103 and 113 or CHEM 103 and 104; PHYS 221 and 222 or PHYS 161 and 262 or PHYS 141 and 142; BSCI 105 and 106; ASTR 200 and three additional hours in ASTR (none of which include ASTR 100, 101, 110 or 111). Also CMSC 104,105 , or 106 is required.

Students majoring in mathematics may prepare to teach mathematics by pursuing a special sequence of professional courses in the College of Education. Early contact should be made with either Dr. James Fey or Dr. Duane Cooper.

The mathematics education major must be supported by one of the following science sequences: CHEM 103 and 113, or CHEM 103 and CHEM 104; PHYS 221 and 222 or PHYS 161 and 262 or PHYS 141 and 142; BSCl 105 and 106; ASTR 200 and three additional hours in ASTR (none of which includes either ASTR 100, 101, 110 or 111). Also CMSC 104,105 or 106 is required.

Pre-Professional/ Subject Area Course Work
COMM 107, 125 or 220 (3)
MATH 140, 141-Calculus I, II $(4,4)$
Science Requirement (7-10) (See above)
MATH 240, 241-Linear Algebra, Calculus III $(4,4)$
CMSC 104 - Introduction to FORTRAN Programming or
CMSC 105 - Introduction to Pascal Programming $(4,3)$
CMSC 106 - Introduction to C Programming (4)
MATH 430-Euclidean and Non-Euclidean Geometries (3)
MATH 402- Algebraic Structures or
MATH 403- Introduction to Abstract Algebra (3)
MATH Electives (400-level) (6)
STAT 400-(3)
Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 350 - Curriculum and Instruction in Secondary Education: Mathematics (3) (fall only)
EDCI 355-Field Experience: Secondary Mathematics
EDPA 301-Foundations of Education (3)
EDCI 457-Teaching Secondary Students with Difficulties in Learning Mathematics (3)
EDCI 451-Student Teaching in Secondary Schools: Mathematics (12)
EDCI 450-Student Teaching Seminar in Secondary Education:
Mathematics Education (3)

## Music Education, K-12

The curriculum in music leads to a Bachelor of Science degree in education with a major in music education. It is planned to meet the demand for specialists, supervisors, and resource teachers in music in the schools. The program provides training in the teaching of general music/ choral and instrumental music and leads to certification to teach music at both elementary and secondary school levels in Maryland and most other states. There are two options. The general music/ choral option is for students whose principal instrument is voice or piano; the instrumental option is for students whose principal instrument is an orchestral or band instrument. Students are able to develop proficiency in both options by taking additional courses.

Auditions are required for admission to the program. All students teach and are carefully observed in clinical settings by members of the music education faculty. This is intended to ensure the maximum development and growth of each student's professional and personal competencies. Each student is assigned to an adviser who guides him or her through the various stages of the program in music and music education.

## Instrumental

Pre-Professional/ Subject Area Course Work
MUSP 109, 110-Applied Music (Principal Instrument) $(2,2)$
MUSC 150, 151-Theory of Music I, II $(3,3)$
MUSC 102, 103-Beginning Class Piano I, II $(2,2)$
MUSC 116, 117-Study of Instruments $(2,2)$
COMM 100, 125, or 220 (3)
MUED 197-Pre-Professional Experiences (1)
MUSP 207, 208-Applied Music (Principal Instrument) $(2,2)$
MUSC 250, 251-Advanced Theory of Music I, II $(4,4)$
MUSC 113, 121-Class Study of Instruments $(2,2)$
MUSC 230-History of Music I (3)
MUSP 305, 306-Applied Music (Principal Instrument) $(2,2)$
MUSC 490, 491-Conducting (2)
MUSC 120, 114-Class Study of Instruments $(2,2)$
MUED 470-General Concepts for Teaching Music (1)
MUED 411—Instrumental Music: Elementary (3)
MUED 420-Instrumental Music: Secondary (2)
MUED 410-Instrumental Arranging (2)
MUED 472-Choral Techniques and Repertoire (2)
MUSC 330, 331-History of Music $(3,3)$
MUSP 409-Applied Music (Principal Instrument) (2)
MUSC 229—Ensemble (7)
Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDPA 301-Foundations of Education (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 484/ 494-Student Teaching: Music (4) (4)

## General Music/ Choral

Pre-Professional/ Subject Area Course Work
MUSP 109, 110-Applied Music (Principal Instrument) $(2,2)$
MUSC 150, 151-Theory of Music I, II $(3,3)$
MUSC 100- Class Voice, MUSC 200 Advanced Class Voice $(2,2)$ or MUSC
102, 103-Class Piano $(2,2)$
MUSC 110, 111-Class Strings $(2,2)$
MUED 197-Pre-Professional Experiences (1)
COMM 100, 125, or 220 (3)
MUSP 207, 208-Applied Music (Principal Instrument) $(2,2)$
MUSC 230-Music History (3)
MUSC 202, 203-Advanced Class Piano $(2,2)$
MUSC 250, 251-Advanced Theory of Music $(4,4)$
MUSP 305, 306-Applied Music (Principal Instrument) $(2,2)$
MUSC 453-Guitar-Recorder Methods (2)
MUED 472-Choral Techniques and Repertoire (2)
MUSC 490, 491-Conducting $(2,2)$
MUED 478-Special Topics in Music Education (1)
MUED 470-General Concepts for Teaching Music (1)
MUED 471-Elementary General Music Methods (3)
MUSC 330, 331-History of Music $(3,3)$
MUSP 409-Applied Music (Principal Instrument) (2)
MUSC 329-Major Ensemble (7)
Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDPA 301-Foundations of Education (3)
EDCI 484/ 494-Student Teaching: Music (4) (4)
*Varies according to incoming placement

## Physical Education and Health Education

This curriculum is designed to prepare students for teaching physical education and health in elementary and secondary schools. To obtain full particulars on course requirements, the student should refer to the sections on the Department of Kinesiology and the Department of Health Education.

## Science Education

A science major consists of a minimum of 60 semester hours' study in the academic sciences and mathematics.

The following courses are required for all science education majors: BIOL 105 and 106; CHEM 103 and CHEM 104 (except chemistry, physics, and earth science education majors who take CHEM 113); GEOL 100-110;

PHYS 121-122 or 141-142; and six semester hours of mathematics. Science education majors must achieve a minimum of grade C in all required mathematics, science, and education course work.

An area of specialization planned with the approval of the student's adviser must be completed in biology, chemistry, earth science and physics as noted below.

The following courses are required for all science education majors: BSCl 105 and BSCl 106 ;

## Biology Education

Pre-Professional/ Subject Area Course Work
MATH 110 - Elementary Mathematical Models (3)
BSCI 105 - Principles of Biology (4)
BSCI 106 - Principles of Biology II (4)
MATH 111 - Introduction to Probability (3)
CHEM 103 - General Chemistry I (4)
CHEM 104 - Fundamentals of Organic and Biochemistry (4) OR
CHEM 113 - General Chemistry II (4)
BSCI 201 or 202 - Human Anatomy and Physiology I and II (4)
BSCl 225 or BSCI 224 - Plant or Animal Diversity (4)
BSCI 223 - General Microbiology (4)
PHYS 121 - Fundamentals of Physics I (4)
PHYS 122 - Fundamentals of Physics II (4)
GEOL 110/110 - Physical Geology and Laboratory (4)
COMM 107, 125, or HESP 202 (3)
BSCI 222 - Principles of Genetics (4)
BSCI 443 - Plant Physiology (4)
BSCI 462/463 or BSCI 227 - Advanced Animal Ecology or Principles of Entomology (4)
BSCI 460/461 OR BSCI 373 - Plant Ecology (4) (3)
Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDPA 301-Foundations of Education (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 370-Curriculum and Instruction in Secondary Education: Science (3) (fall only)
EDCI 471-Student Teaching in Secondary Schools: Science (12)
EDCI 371-Computers in the Science Classroom and Laboratory (2)
EDCI 470-Student Teaching Seminar in Secondary Education: Science (1)

## Chemistry Education

Pre-Professional/ Subject Area Course Work
BSCI 105—Principles of Biology I (4)
BSCl 106—Principles of Biology II (4)
CHEM 103-General Chemistry I or 105 (4)
CHEM 113-General Chemistry II or 104 (4)
MATH 140, 141-Calculus I and II $(4,4)$
COMM 107, 125 or HESP 202 (3)
CHEM 233, 243-Organic Chemistry I and II $(4,4)$
PHYS 141, 142-Principles in Physics (4, 4)
GEOL 100, 110-Physical Geology and Lab (4)
CHEM 321-Quantitative Analysis (4)
CHEM 481, 482-Physical Chemistry I and II $(3,3)$
CHEM 483-Physical Chemistry Laboratory I (2)
CHEM Elective (3)

## Professional Courses

EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDPA 301-Foundations of Education (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 370-Curriculum and Instruction in Secondary Education: Science (3) (fall only)
EDCI 471-Student Teaching in Secondary Schools: Science (12)
EDCI 371-Computers in the Science Classroom and Laboratory (2)
EDCI 470 - Student Teaching Seminar in Secondary Education: Science (1)

## Earth Science Education

Pre-Professional/ Subject Area Course Work
GEOL 100/ 110 - Physical Geology, Lab (4)
GEOL 102 - Historical Geology and Lab (4)
BSCI 105 - Principles of Biology I (4)
BSCI 106 - Principles of Biology II (4)
MATH 110 or 140-Elementary Mathematical Models (3)
or

Calculus I (3)
MATH 111 or 141-Introduction to Probability (3)
or
Calculus II (3)
COMM 107 or 125 or HESP 202 (3)
GEOL 322-Mineralogy (4)
GEOL 340-Geomorphology (4)
GEOL 341-Structural Geology (4)
CHEM 103, 113-General Chemistry I and II $(4,4)$
ASTR 101-General Astronomy (4)
PHYS 121, 122-Fundamentals of Physics I and II $(4,4)$

## Professional Courses

EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 370-Curriculum and Instruction in Secondary Education: Science (3) (fall only)
EDPA 301-Foundations of Education (3)
EDCI 471-Student Teaching in Secondary Schools: Science (12)
EDCI 371-Computers in the Science Classroom and Laboratory (2)
EDCI 470 - Student Teaching Seminar in Secondary Education: Science (1)

## Physics Education

Pre-Professional/ Subject Area Course Work
CHEM 103, 113 - General Chemistry I and II $(4,4)$
MATH 140, 141 - Calculus I and II $(4,4)$
PHYS 141/ 142 - Principles of General Physics I and II $(4,4)$ OR
Engineering or Physics Majors Sequence
COMM 107, 125 or HESP 202 (3)
BSCI 105 - Principles of Biology I (4)
BSCI 106 (Principles of Biology II (4)
PHYS 275-Experimental Physics I (1)
PHYS 276-Experimental Physics II (2)
PHYS 375-Experimental Physics III (2)
ASTR 101-General Astronomy (4)
MATH 240-Linear Algebra (4)
PHYS 410 - Intermediate Theoretical Physics (3)
PHYS 420-Principles of Modern Physics (3)
PHYS 305-Physics Shop Techniques (1)
GEOL 100 - Physical Geology (3)
GEOL 110—Physical Geology Laboratory (1)
PHYS 406-Optics (3)
PHYS 499-Special Problems in Physics (2)
Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDPA 301-Foundations of Education (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 370-Curriculum and Instruction in Secondary Education: Science (3) (fall only)
EDCI 471-Student Teaching in Secondary Schools: Science (12)
EDCI 470-Student Teaching Seminar in Secondary Education: Science (1)
EDCI 371-Computers in the Science Classroom and Laboratory (2)

## Social Studies Education

Option I: HISTORY: Requires 54 semester hours of which at least 27 must be in history, usually at least six hours in American history; three hours of non-American history; three hours of non-Western history; three hours in Pro-Seminar in Historical Writing; and 12 hours of electives, nine of which must be 300-400 level. One course in Ethnic and Minority Studies must be included.

Pre-Professional/ Subject Area Course Work
COMM 107, 125, or 220 (3)
HIST 156, 157 (US) (6)
HIST (non U.S. with one course non-Western) (6)
SOCY 100 or ANTH 220 (3)
GEOG 100 - Introduction to Geography (3)
GEOG 201/211 or 202 (3) - Environmental or Cultural Perspective
ECON 200 - Fundamentals of Economics (4)
ECON - UL Course
GVPT 100, 240, 260, or 280 (3)
GVPT 170 - American Government (3)
Social Science Electives, upper level (6)
History Electives - (12) at least 9 credits upper level - one area (U.S.,
European, etc)

Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 320-Curriculum and Instruction in Secondary Education-Social Studies (3)*
EDCI 428-Field Experience in Social Studies (1); co-requirement EDCI 320
EDCI 421-Student Teaching in Secondary Education: Social Studies (12)
EDCI 420-Student Teaching Seminar in Secondary Education: Social Studies (3)
EDCI 463-Teaching Reading in Secondary Schools (3)
EDPA 301-Foundations of Education (3)
Option II: GEOGRAPHY: Requires 56 semester hours of which 29 hours must be in geography. GEOG 201, 211, 212 are required. Nine hours of 300-level Gateway courses must be taken in physical geography, human geography, and geographic techniques. The remaining 12 hours in geography must be in upper-level systematic geography courses. One course in Ethnic and Minority studies must be included.

Pre-Professional/ Subject Area Course Work
COMM 107, 125, or 220 (3)
GEOG 201 - Geography of Environmental Systems (3)
GEOG 211 - Geography of Environmental Systems Laboratory (1)
GEOG 212 - Human Geography Laboratory
GEOG 202 - World in Cultural Perspective
GEOG Gateway - Physical Geography (3)
GEOG Gateway - Human Geography (3)
GEOG Systematic Electives (12)
HIST 156 or 157 (3)
HIST (non-Western) (non-US) (lower level) 6
SOCY or ANTH (3)
ECON 200 (4)
ECON - UL (3)
GVPT 100, 240, or 280
GVPT 100 - American Government (3)
History/ Social Science Electives(3)

## Professional Courses

EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDCI 320-Curriculum and Instruction in Secondary Education-Social Studies (3)*
EDCI 421-Student Teaching in Secondary Education: Social Studies (12)
EDCI 420-Student Teaching Seminar in Secondary Education: Social Studies (3)
EDCI 428-Field Experience in Social Studies (1); co-requirement EDCI 320
EDCI 463-Teaching Reading in Secondary Schools (3)
EDPA 301-Foundations of Education (3)

## Speech/ English Education

Students interested in teaching speech in secondary schools complete a minimum of 30 credits in speech and speech-related courses. Because most speech teachers also teach English classes, the program includes another 30 credits in English and English education. Upon selection of this major, students should meet with an adviser to carefully plan their programs.

In addition, intermediate mastery of a modern or classical language is required for a B.A.

Pre-Professional/ Subject Area Course Work
Speech Area (6): COMM 107-Speech Communication, COMM 125Interpersonal Communication. COMM 220-Group Discussion, COMM 230-Argumentation and Debate, COMM 340-Oral Interpretation COMM 470-Listening (3)
COMM 200—Advanced Public Speaking (3)
Film elective
HESP 202-Introduction to Hearing and Speech Sciences or HESP 305 or HESP 400 (3)
THET 110-Introduction to Theatre (3)
COMM 401-Foundations of Rhetoric (3)
COMM 402-Communication Theory and Process (3)
COMM Upper-level electives (6)
ENGL 101 - Introduction to Writing (3)
LING 200-Introduction to Linguistics (3) or ENG 280
ENGL 201-or 202 World Literature (3)
ENGL 281-Standard English Grammar, Usage, and Diction or ENGL 383 or ENGL 384 or ENGL 385 or ENGL 482 or ENGL 484 (3)
ENGL 301-Critical Methods in the Study of Literature or ENGL 453 (3)

ENGL 310, 311 or 312 - English Literature (3)
ENGL 313-American Literature (3)
ENGL 391 or 393-Advanced Composition or Technical Writing (3)
Professional Courses
EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles and Methods of Secondary Education (3)
EDPA 301-Foundations of Education (3)
EDCI 340-Curriculum \& Instruction in Secondary Education: Eng/ Spch/ Drama (3)
EDCI 440-Student Teaching Seminar (1)
EDCI 442-Student Teaching in Speech/English (12)
EDCI 447-Field Experiences (1)
EDCI 463-Teaching of Reading (3)
EDCI 466—Literature for Adolescents (3)
EDCI 467-Teaching Writing (3)

## Theatre/ English Education

Students interested in teaching theatre in secondary schools complete a minimum of 30 credits in theatre and theatre-related courses. Because most theatre teachers also teach English classes, the program includes another 30 credits in English and English education. Upon selection of this major, students should meet with an adviser to carefully plan their programs.

In addition, intermediate mastery of a modern or classical language is required for a B.A.

Pre-Professional/ Subject Area Course Work
THET 120-Acting I Fundamentals (3)
THET 170-Stagecraft (3)
THET 273-Scenographic Techniques or THET 476 or THET 480 (3)
THET 330-Play Directing (3)
THET 460-Theatre Management (3)
THET 479-Theatre Workshop (3)
THET 490-History of Theatre I (3)
THET 491-History of Theatre II (3)
THET electives (3)
COMM 107 or COMM 200-Speech Communications: Principles and Practices or COMM 230 (3)
ENGL 101-Introduction to Writing (3)
LING 200-Introduction to Linguistics (3)
ENGL 201 or 202-World Literature (3)
ENGL 281-Standard English Grammar, Usage, and Diction or ENGL 383
or ENGL 384 or ENGL 385 or ENGL 482 or ENGL 484 (3)
ENGL 310, 311, or 312-English Literature (3)
ENGL 313-American Literature (3)
ENGL 301-Critical Methods in the Study of Literature or ENGL 453 (3)
ENGL 391 or 393-Advanced Composition or Technical Writing (3)

## Professional Courses

EDHD 413-Adolescent Development (3)
EDHD 420-Cognitive Development and Learning (3)
EDCI 390-Principles \& Methods of Secondary Education (3)
EDPA 301-Foundations of Education (3)
EDCI 340-Curriculum \& Instruction in Secondary Education: Eng/ Spch/ Drama (3)
EDCI 463-Teaching of Reading (3)
EDCI 467-Teaching Writing (3)
EDCI 466- Literature for Adolescents (3)
EDCI 447—Field Experience (1)
EDCI 448-Student Teaching in Theatre/ English (12)
EDCI 440—Student Teaching Seminar (1)
Course Code: EDCI

## DANCE (DANC)

## College of Arts and Humanities

Dance Building, (301) 405-3180
Professor and Chair: Wiltz
Professors: Rosen, A. Warren
Associate Professor: K. Bradley
Instructors: Mayes, Wright
Emeriti: Madden, L. Warren

Lecturers: Druker, Jackson, Perez, Tyler
Accompanists: Freivogel, Johnson

## The Major

Recognizing that dance combines both athleticism and artistry, the dance program offers comprehensive technique and theory courses as a foundation for the dance professions. By developing an increasing awareness of the physical, emotional, and intellectual aspects of movement in general, the student eventually is able to integrate his or her own particular mind-body consciousness into a more meaningful whole. To facilitate the acquisition of new movement skills, as well as creative and scholarly insights in dance, the curriculum provides a structured breadth of experience at the lowerlevel. At the upper level students may either involve themselves in various general university electives, or they may concentrate their energies in a particular area of emphasis in dance. Although an area of emphasis is not mandatory, many third-and fourth-year students are interested in studying a singular aspect of dance in depth, such as performance, choreography, production/ management, or general studies (encompassing dance history, literature and criticism).

The dance faculty is composed of a number of distinguished teachers, choreographers, and performers, each one a specialist in his or her own field. Visiting artists throughout the year make additional contributions to the program. There are several performance and choreographic opportunities for all dance students, ranging from informal workshops to fully mounted concerts both on and off campus.

## Requirements for Major

Requirements for the Dance major include a minimum of 45 upper-level credits completed and the foreign language requirement of the College of Arts and Humanities. Students must complete 57 semester hours of dance credits. Of these, 18 hours of modern technique and four hours of ballet technique are required. Majors may not use more than 72 DANC credits toward the total of 120 needed for graduation. In addition to the 22 technique credits required, students must distribute the remaining 35 credits as follows:

$$
\begin{aligned}
& \text { DANC 208, 308, 388-Choreography I, II, III ............................................. } 9 \\
& \text { DANC 102-Rhythmic Training .................................................................................. } 2 \\
& \text { DANC 109-Improvisation....................................................................... } 2 \\
& \text { DANC 365—Dance Notation........................................................................... } 3 \\
& \text { DANC 200-Introduction to Dance............................................................................. } 3 \\
& \text { DANC 305—Principles of Teaching .......................................................... } 3 \\
& \text { DANC 483-Dance History II ................................................................... } 3 \\
& \text { DANC 370-Kinesiology for Dancers ........................................................... } 4 \\
& \text { DANC 210—Dance Production ............................................................... } 3 \\
& \text { DANC 485—Seminar in Dance } \\
& . .3 \\
& \text { A grade of } \mathrm{C} \text { or higher must be attained in all dance courses. } \\
& \text { New, re-entering, and transfer students are expected to contact the } \\
& \text { department following admission to the university for instructions regarding } \\
& \text { advising and registration procedures. Although entrance auditions are not } \\
& \text { required, some previous dance experience is highly desirable. }
\end{aligned}
$$

Departmental advising is mandatory each semester.

## Dance Concentration

The Department of Dance offers a Concentration in Dance of 22-24 credits. Students take 14-15 hours of specified core courses and 8-9 hours of courses in an emphasis of the student's choice.

Course Code: DANC

## DECISION AND INFORMATION SCIENCES

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## ECONOMICS (ECON)

## College of Behavioral and Social Sciences

Undergraduate Studies: 3105 Tydings, (301) 405-3505
Undergraduate Adviser: 3127A Tydings, (301) 405-3503
Professor and Chair: Straszheim
Professors: Almon, Ausubel, Betancourt, Calvo†t, Crampton, Cropper, Dorsey, Drazen, Evans, Haltiwanger, Hulten, Kelejian, Montgomery, Murrell, Oates, Panagariya, Prucha, Schelling* (Public Affairs), Schwab, Wallis
Associate Professors: Coughlin, Lyon, Sakellaris, Shea, Vincent
Assistant Professors: Binder, Chao, Gelbach, Hellerstein, Kranton, Rodriguez, Sen, Swamy
Emeriti: Bennett, Bergmann, Brechling, Clague, Cumberland, Dardis, Harris,
McGuire, Meyer, O'Connell, Polakoff, Ulmer, Wonnacott

* Joint appointment with unit indicated
$\dagger \dagger$ Distinguished University Professor


## The Major

Economics is the study of the production, pricing, and distribution of goods and services within societies. Economists study such problems as inflation, unemployment, technical change, poverty, environmental quality, and foreign trade. Economists also apply economics to such diverse areas as crime, health care and the elderly, discrimination, urban development, and developing nation problems.

Two characteristics of modern economics receive special attention in the department's program. Government policies have profound effects on how our economic system performs. Government expenditures, regulations, and taxation either directly or indirectly affect both households and firms. Second, there is a growing interdependency among economies throughout the world. Extensive worldwide markets exist in which goods and services are traded, and capital and investments move across national boundaries. Economic events in one nation are often quickly transmitted to other nations.

Economists study these phenomena through the development of systematic principles and analytic models which describe how economic agents behave and interact. These models are the subject of empirical testing, often using computers and extensive data sets.

The interests of the faculty, as reflected in the course offerings, are both theoretical and applied. As a large, diverse department, the economics department offers courses in all of the major fields of economic study. The department's program stresses the application of economic theory and econometrics to current problems in a large number of fields. Many courses in the department's program analyze the role of the government and public policies on the economy.

The program is designed to serve both majors and non-majors. The department offers a wide variety of upper-level courses on particular economic issues which can be taken after one or two semesters of basic principles. These courses can be especially useful for those planning careers in law, business, or the public sector. The program for majors is designed to serve those who will seek employment immediately after college as well as those who will pursue graduate study.

Economics majors have a wide variety of career options in both the private and public sectors. These include careers in state and local government, federal and international agencies, business, finance and banking, journalism, teaching, politics and law. Many economics majors pursue graduate work in economics or another social science, law, business or public administration (public policy, health, urban and regional planning, education, and industrial relations).

## Requirements for Major

In addition to the university's general education (CORE) requirements, the requirements for the Economics major are as follows:
(1) Economics (and Mathematics) Courses (36 hours)

Economics majors must earn 33 credit hours in Economics, and 3 credit hours in Calculus (MATH 220 or 140), with a grade of C or better in each course. All majors must complete 12 hours of core requirements. The core requirements include ECON 200, ECON 201, ECON 305 and ECON 306.

Students must also complete 21 hours in upper level Economics courses:
a) three hours in statistics; ECON 321 or STAT 400 (check with adviser). Majors who declared after January 1, 1998, must take ECON 321 or STAT 400.
b) three hours in economic history or comparative systems; ECON 310, ECON 311, ECON 315, ECON 380, or ECON 410;
c) nine hours in courses with at least one semester of intermediate theory (ECON 301 or 306) or economic statistics (ECON 321) as a prerequisite. As of September 1, 1999, all 400 level Economics classes meet this requirement. ECON $430,449,450,451,465$, and 490 taken before that date do not fulfill the requirement;
d) six other hours in any upper-division economics course except ECON 386.
(2) Additional Supporting Courses (15 hours)

Students must earn 15 hours of credit in upper-division courses in addition to the 36 hours of Economics (and Mathematics) courses listed above and the university's CORE requirements. Upper division courses include all courses with a 300 number and above except the Junior English writing class. Additional mathematics courses beyond the required mathematics course (MATH 220 or 140), and computer programming courses at the 200 -level and above may be counted as fulfilling the Additional Support Course Requirement. Additional economics courses may be included among the 15 hours of supporting courses.

All courses meeting this Additional Support Course requirement must be completed with a grade of $C$ or better and may not be taken pass-fail except ECON 386, which can only be taken pass-fail.

## Study Sequences and Plans of Study

Economics is an analytic discipline, building on a core of principles, analytic models, and statistical techniques. Students must begin with a foundation in mathematics and economic principles (ECON 200 and ECON 201). A more advanced, analytic treatment of economics is presented in intermediate theory (ECON 305 and ECON 306), which is a necessary background for in-depth study by economics majors.

The department urges that the student take ECON 200 and 201 and MATH 140 or 220 as soon as possible. Honors versions of ECON 200 and 201 are offered for students seeking a more rigorous analysis of principles, departmental honors candidates, and those intending to attend graduate school. Admission is granted by the department's Office of Undergraduate Advising or the University Honors Program.

Courses in applied areas at the 300 -level may be taken at any point after principles. However, majors will benefit by completing ECON 305, ECON 306, and ECON 321 or its equivalent immediately upon completion of principles. While most students take ECON 305 and 306 in sequence, they may be taken concurrently. Courses at the 400 -level are generally more demanding, particularly those courses with intermediate theory as a prerequisite.

Empirical research and the use of computers are becoming increasingly important in economics. All students are well advised to include as many statistics, econometrics, and computer programming courses in their curriculum as possible.

Those students planning to pursue graduate study in economics must begin to prepare themselves analytically for graduate work by focusing on theory, statistics, and mathematics in their undergraduate curriculum. These students should consider the advanced theory courses (ECON 407 and ECON 417) and the econometrics sequence (ECON 422 and ECON 423). Mastery of the calculus and linear algebra is essential for success in many of the top graduate schools. Students should consider MATH 140, MATH 141, MATH 240 (or MATH 400), MATH 241 and MATH 246 as very useful preparation.

## Advising

The department has academic advisers providing advising on a walk-in basis in the Office of Undergraduate Advising, 3127A \& B Tydings Hall.

## Honors

The Economics Honors Program provides economics majors with the opportunity for advanced study in a seminar format, with faculty supervision of seminar papers and an honors thesis. The Honors Program is designed for students intending to attend graduate school or those seeking an indepth study of economic theory and its application to economic problems.

The Honors Program is a 12 -hour sequence, culminating in the completion of a senior thesis. Students must complete ECON 396 (Honors Workshop) and ECON 397 (Honors Thesis) in their senior year, as well as two of the following five courses: ECON 407, 414, 417, 422, 423, 425. Students must complete these 12 hours with a GPA of 3.5 . ECON 396 is offered only in the fall term.

To be eligible for admission, a student must have completed 15 hours of economics with a GPA of 3.25. Interested students should meet with the Director of Undergraduate Studies at the earliest possible date to review their curriculum plans and to apply for admission to the program.

## Awards

The Dudley and Louisa Dillard Prize, currently $\$ 1,000$, is awarded to the outstanding Economics junior and senior with a broad liberal arts program.

The Sujon Guha Prize, currently $\$ 500$, is awarded to the best Honors Thesis in Economics.

The Martin Moskowitz Awards provides scholarships to students based on academic excellence, financial need, and a demonstrated commitment to and philosophy of public service.

## Student Organizations

Omicron Delta Epsilon, the economics honorary society, meets regularly to discuss graduate study in economics and other fields, employment opportunities, and recent economic trends. Please see the Undergraduate Economics Secretary, 3105 Tydings Hall, for membership information.

## Course Code: ECON

## EDUCATION POLICY AND LEADERSHIP (EDPL)

## College of Education

2110 Benjamin Building, (301) 405-3574
Associate Professor and Acting Chair: Schmidtlein
Professors: Birnbaum, Cibulka, Finkelstein, Hawley, Hultgren, Klees, Selden Associate Professors: Goldman, Herschbach, Lin, Mawhinney, Splaine Assistant Professors: Cossentino, Croninger, Fries-Britt, Mintrop, Rice
Emeriti: Berdahl* Berman, Carbone, Clague, Dudley, Newell, Male, Stephens, McLoone

* Distinguished Scholar-Teacher


## Master's and Doctoral Programs in EDPL

M.A. in Education Leadership and Policy Studies: specializations in elementary/ secondary education leadership; higher education; education policy studies; and curriculum policy. M.A. in Social Foundations of Education; M.A. or M.Ed. in Curriculum Theory and Development; Ph.D in Education Policy: specializations in curriculum theory and development; education leadership; education policy analysis; higher education; international education studies; and social foundations of education. Ed.D. in Education Leadership and Policy Studies: specializations in elementary/ secondary education leadership; curriculum theory and development; and higher education.

Course Code: EDPL

## ELECTRICAL ENGINEERING (ENEE)

## A. James Clark School of Engineering

Department of Electrical and Computer Engineering
2429 A.V. Williams Building, (301) 405-3683
E-mail: eceadris@deans.umd.edu
http:/ / www.ece.umd.edu
Professor and Chair: Farvardin
Associate Chairs: Blankenship (External Relations), Papamarcou (Undergraduate Program), Striffler (Facilities and Services); Tits (Graduate Program)
Professors: Abed, Antonsen, Baras (Martin-Marietta Chair in Systems Engineering), Barbe, Blankenship, Chellappa, Dagenais, Davis $\dagger$, DeClaris, Destlert, Ephremides, Frey, Geraniotis, Gligor, Goldhar, Goldsman,

Granatstein, Ho, Ja'Ja', Krisnaprasad, Langenberg, Lawson, Lee, Levine, Makowski, Marcus, Mayergoyz†, Melngailis, Nakajima, Narayan, Newcomb, Orloff, Oruc, Ott† $\dagger$, Peckerar (part-time), Rabin, Rhee, Shamma, Shayman, Striffler, Tits, Venkatesan, Vishkin, Yang, Zaki
Associate Professors: Iliadis, Liu, O'Shea, Papamarcou, Silio, Tassiulas, Tretter, Yang
Assistant Professors: Barau, Bhattachayya, Franklin, Gansmen, Ghossi, Gomez, Jacob, Papadopoulos, Stewart, Yeung
Emeriti: Davisson, Emad, Harger, Hochuli, Ligomenides, Lin, Pugsley, Reiser,Taylor, Wagner, Young
$\dagger$ Distinguished Scholar-Teacher
$\dagger \dagger$ Distinguished University Professor

## The Major

The Electrical Engineering major is intended to prepare students to function as effective citizens and engineers in an increasingly technological world as well as in science and engineering subjects. Depth as well as breadth is required in the humanities and social sciences to understand the economic, ecologic, and human factors involved in reaching the best solutions to today's problems.

The basic foundation in mathematical, physical, and engineering sciences is established in the first two years of the curriculum. A core of required Electrical Engineering courses is followed by a flexible structure of electives that allows either breadth or specialization. Appropriate choices of electives can prepare an Electrical Engineering major for a career as a practicing engineer and/ or for graduate study.

Areas stressed in the major include communication systems, computer systems, control systems, engineering electromagnetics, microelectronics, and power systems. Within these areas are courses in such topics as solid state electronics, integrated circuits, lasers, communications engineering, computer design, power engineering, digital signal processing, antenna design, and many others. Project courses allow undergraduates to undertake independent study under the guidance of a faculty member in an area of mutual interest.

The following are the objectives of the Electrical Engineering degree program:

1. Provide all students with basic training in electrical engineering, as well as opportunities for specialized training in several technical areas;
2. Prepare students for study in the nation's top graduate schools and/ or employment in a variety of positions in government and industry;
3. Through such tools as honors courses, research programs and financial aid packages, facilitate the recruitment and retention of a diverse student body, with particular emphasis on historically underrepresented groups;
4. Provide students with an understanding of the social context of the electrical engineering profession;
5. Provide students with an understanding of the ethical responsibilities of practicing engineers, as stipulated in the IEEE Code of Ethics;
6. Provide students with an ability to communicate and defend their ideas effectively;
7. Provide students with the skills necessary for successful participation in interdisciplinary projects;
8. Provide students with an ability to identify engineering problems and propose appropriate solutions, including the step-by-step design of a system, component or process;
9. Provide students with a strong foundation in mathematics, sciences and engineering, and the ability to apply said knowledge to solving engineering problems;
10. Provide students with an ability to design and conduct experiments, interpret empirical observations and analyze data;
11. Provide students with opportunities to engage in structured research activities;
12. Maintain technological relevance by introducing students to current applications in the field, as well as to state-of-the art laboratory equipment and computer simulation tools;
13. Provide students with a motivation to seek further specialization in the field of electrical engineering, and to continue learning, whether in a formal academic setting or through self-instruction.

## Requirements for M ajor

Requirements for the Electrical Engineering major include thorough preparation in mathematics, physics, chemistry, and engineering science. Elective courses must include both Electrical Engineering courses and technical courses outside the department. A sample program is shown below.

|  | Semester |
| :---: | :---: |
| First Year |  |
| CHEM 133-General Chemistry........................................... 4 |  |
| PHYS 161-General Physics |  |
| MATH 140, 141-Analysis I,II ............................................. 4 |  |
| ENES 100-Intro./ Engr. Design........................................... 3 |  |
| ENEE 114-Programming Concepts for Engineers |  |
| CORE-General Education Courses |  |
| Total.......................................................................... 14 | 4 ....... 14 |
| Sophomore Year |  |
| MATH 241-Calculus III .................................................... 4 |  |
| MATH 246-Differential Equations | 3 |
| PHYS 262, 263-General Physics ....................................... 4 |  |
| ENEE 241-Numerical Techniques in Engineering.................... 3 |  |
| ENEE 244-Digital Logic Design ......................................... 3 |  |
| ENEE 204-Basic Circuit Theory | 3 |
| ENEE 206-Digital and Circuits Lab | 2 |
| CORE-General education courses ...................................... 3 |  |
| Total.......................................................................... 17 |  |
| Junior Year |  |
| MATH 4xx* - Advanced Elective Math | 3 |
| ENEE 302-Digital Electronics ........................................... 3 |  |
| ENEE 306-Electronic Circuits Design Lab | . 2 |
| ENEE 312-Devices and Analog Circuits |  |
| ENEE 322-Signal and System Theory.................................. 3 |  |
| ENEE 324-Engineering Probability |  |
| ENEE 350-Computer Organization ...................................... 3 |  |
| ENEE 380-Electromagnetic Theory..................................... 3 |  |
| ENEE 381-Electromagnetic Wave Propagation | 3 |
| CORE-General education courses ...................................... 3 | ......... 3 |
| Total.......................................................................... 15 | ........ 17 |
| Senior Year |  |
| CORE-General education courses ...................................... 6 | 6 ......... 3 |
| ENEE 4xx** - Advanced Elective Lab ..................................... 2 | ......... 2 |
| Technical Electives* (Non-EE technical electives) .................... 3 | ......... 6 |
| Technical Electives** (EE electives) .................................... 6 | ......... 3 |
| Total.......................................................................... 17 | 7 ........ 14 |
| * From approved Non-EE Technical Elective List |  |
| ** Must include a Capstone Design Course (minimum 2 credits) | s), as well |
| as 7 design credits. |  |

## Admission

Admission requirements are the same as those of other departments. (See A. James Clark School of Engineering section on Entrance Requirements.)

## Advising

In addition to the associate chair and the academic coordinator, faculty in Electrical and Computer Engineering function as undergraduate advisers. Departmental approval is required for registration in all upper-division courses in the major. The department's Undergraduate Office (2429 A.V. Williams Building, 301-405-3685) is the contact point for undergraduate advising questions.

## Financial Assistance

Several corporate scholarships are administered through the department. Information and scholarship applications are available from either the Electrical Engineering Undergraduate Office, 2429 A.V. Williams Building, 405-3685, or the A. James Clark School of Engineering Student Affairs Office, 1131 Engineering Classroom Building, 405-3860.

## Honors and Awards

The Electrical and Computer Engineering department annually gives a variety of academic performance and service awards. Information on criteria and eligibility is available from the department's Undergraduate Office. Majors in Electrical Engineering participate in the Engineering Honors Program. See the A. James Clark School of Engineering entry in this catalog for further information.

## Department Honors Program

The Electrical and Computer Engineering Honors Program is intended to provide a more challenging and rewarding undergraduate experience for the best students pursuing the baccalaureate in Electrical Engineering. Honors sections are offered in almost all technical courses in the freshmen, sophomore, and junior years, and a capstone honors design project is taken during the senior year. Students completing the program with at least a 3.0 average on a 4.0 scale will have their participation in the program indicated on their B.S. diploma.

## Student Organizations

There is an active Student Chapter of the Institute of Electrical and Electronics Engineers (IEEE). Information and membership applications are available in the Electrical and Computer Engineering undergraduate lounge, 0107 Engineering Classroom Building. Equally active is the chapter of Eta Kappa Nu, the nationwide Electrical Engineering honorary society.

Information on eligibility can be obtained from the EE Undergraduate lounge, from the departmental Undergraduate Office, or from the College Student Affairs Office. Harmonics Coalition is a student-run group, assisting new students as they become acclimated to the University.
Course Code: ENEE

## ENGINEERING, BACHELOR OF SCIENCE, DEGREE IN

## A. James Clark School of Engineering

1124 Glenn L. Martin Hall (formerly Engineering Classroom Building), (301) 405-3855

## General Regulations for the B.S. Engineering Degree

All undergraduates in engineering will typically select their major field sponsoring department by the end of their second year regardless of whether they plan to proceed to a designated or an undesignated degree. A student wishing to elect the B.S. Engineering degree program may do so at any time following the completion of the sophomore year, or a minimum of 50 earned credits towards any engineering degree, and at least one semester prior to the time the student expects to receive the baccalaureate. As soon as the student elects to seek a B.S. Engineering degree, the student's curriculum planning, guidance, and counseling will be the responsibility of the "B.S. Engineering Degree Program Adviser" in the primary field department. The student must file an "Application for Admission to Candidacy for the Degree of Bachelor of Science in Engineering" with the student affairs office of the A. James Clark School of Engineering. The candidacy form must be approved by the chair of the primary field department, the primary engineering, and the secondary field advisers and the college faculty committee on "B.S. Engineering Degree Programs." This committee has the responsibility for implementing all approved policies pertaining to this program and reviewing and acting on the candidacy forms filed by the student.

Specific university and school academic regulations apply to this B.S. Engineering degree program in the same manner as they apply to the conventional designated degree programs. For example, the academic regulations of the university apply and the school requirement of an overall average of an overall average of 2.0 GPA or better and a grade of $C$ or better in all engineering courses. For the purpose of implementation of such academic rules, the credits in the primary engineering field and the credits in the secondary field are considered to count as the "major" for such academic purposes.

## Options of the "B.S. Engineering" Program

The "B.S. Engineering" program is designed to serve three primary functions: (1) to prepare those students who wish to use the breadth and depth of their engineering education as preparation for entry into postbaccalaureate study in such fields as medicine, law, or business administration; (2) to provide the basic professional training for those students who wish to continue their engineering studies on the graduate level in one of the new interdisciplinary fields of engineering such as
environmental engineering, bio-medical engineering, systems engineering, and many others; and finally (3) to educate those students who do not plan a normal professional career in a designated engineering field but wish to use a broad engineering education so as to be better able to serve in one or more of the many auxiliary or management positions of engineering related industries. The program is designed to give the maximum flexibility for tailoring a program to the specific future career plans of the student. To accomplish these objectives, the program has two optional paths: an engineering option and an applied science option.

The engineering option, which is ABET-accredited, should be particularly attractive to those students contemplating graduate study or professional employment in the interdisciplinary engineering fields, such as environmental engineering, bio-engineering, bio-medical, systems and control engineering, and manufacturing engineering, or for preparatory entry into a variety of newer or interdisciplinary areas of graduate study. For example, a student contemplating graduate work in environmental engineering might combine chemical and civil engineering for his or her program; a student interested in systems and control engineering graduate work might combine electrical engineering with aerospace, chemical, or mechanical engineering.

The applied science option, which is not ABET-accredited, should be particularly attractive to those students who do not plan to pursue a professional engineering career but wish to use the rational and developmental abilities fostered by an engineering education as a means of furthering career objectives. Graduates of the applied science option may aspire to graduate work and an ultimate career in a field of science, law, medicine, business, or a variety of other attractive opportunities which build on a combination of engineering and a field of science. Entrance requirements for law and medical schools can be met readily under the format of this program. In the applied science program, any field in the university in which the student may earn a B.S. degree is an acceptable secondary science field, thus affording the student a maximum flexibility of choice for personal career planning.

## Minimum Requirements

Listed below are the minimum requirements for the B.S. Engineering degree with either an engineering option or an applied science option. Students completing the B.S. Engineering degree are required to complete the freshman and sophomore requirements in the chosen primary engineering field and the general education requirements as outlined by the university and the Clark School of Engineering. The student, thus, does not make a decision whether to take the designated or the undesignated degree in an engineering field until the beginning of the junior year. In fact, the student can probably delay the decision until the spring term of the junior year with little or no sacrifice, thus affording ample time for decisionmaking. Either program may be taken on the regular four-year format or under the Maryland Plan for Cooperative Engineering Education.

## Junior-Senior Year Requirements

## Engineering Option

Mathematics/ Physical Science Requirements ${ }^{4}$............................................ 3
Engineering Sciences ${ }^{2,4}$....................................................................... 3
Primary Field ${ }^{1,7}$.................................................................................. 24
Secondary Field ${ }^{1,7}$................................................................................ 12
Major Field or related electives ${ }^{4}$............................................................. 3
Approved electives ${ }^{3,4}$.............................................................................. 6
Total credits ...................................................................................... 51

## Applied Science Option

Mathematics/ Physical Science Requirements ${ }^{4}$....................................... 3
Engineering Sciences ${ }^{2,4}$........................................................................ 3
Primary Field ${ }^{1}$...................................................................................... 18
Secondary Field ${ }^{1}$............................................................................... 12
Major Field or related electives ${ }^{4}$.............................................................. 3
Approved electives ${ }^{4,6}$............................................................................... 9
Senior research project5 ${ }^{5}$....................................................................... 3
Total credits....................................................................................... 51
Engineering fields of concentration available under the B.S. Engineering program as primary field within either the engineering option or the applied science option are: aerospace engineering, biological resources engineering, chemical engineering, civil engineering, computer engineering, electrical engineering, fire protection engineering, materials engineering, mechanical engineering, and nuclear engineering. There is also an environmental engineering option. All engineering fields of concentration may be used as a secondary field within the engineering option.
${ }^{1}$ All courses used to fulfill the primary and secondary fields of concentration must be at the 300 - and 400 -level.
${ }^{2}$ Engineering Science courses are courses offered by the Clark School of Engineering which have a prefix beginning with EN (e.g., ENES, ENME, ENEE, etc.). These elective courses may be in a student's primary or secondary field of concentration.
${ }^{3}$ Approved electives must be technical (mathematics, physical sciences, or engineering sciences) but may not be in the primary or secondary fields of concentration.
${ }^{4}$ At least 50 percent of the elective courses (mathematics, physical sciences, engineering sciences, approved electives) must be at the 300-or 400 -level.
${ }^{5}$ Students are required to complete 15 credits of approved electives which include a senior-level project or research assignment relating the engineering and science fields of concentration, unless specifically excused.
${ }^{6}$ In the applied science option, the approved electives should be selected to strengthen the student's program consistent with career objectives. Courses in the primary or secondary fields of concentration may be used to satisfy the approved electives requirement.
${ }^{7}$ For the engineering option, the program must contain the proper design component, as specified by ABET requirements. It is the responsibility of students and their advisers to ensure that the requirements are satisfied by the appropriate selection of courses in the primary and secondary fields of concentration.

## ENGLISH LANGUAGE AND LITERATURE (ENGL)

College of Arts and Humanities
3101 Susquehanna Hall (SQH), (301) 405-3809
Undergraduate Advisers: 2115 Susquehanna Hall, (301) 405-3825
Freshman English Office: 2101 Susquehanna Hall, (301) 405-3771
Professional Writing Program: 3119 Susquehanna' Hall, (301) 405-3762
Professor and Chair: Caramello
Professors: Auchard, Auerbach, Barry, Bryer, Caramello, Caretta, Cartwright, Coletti, Collier, Collins, Coogan, Cross, Donawerth*, Fahnestock, Flieger, Fraistat, Grossman, D. Hamilton, Handelman*, Howard, Isaacs, Kauffman, Kolker, Kornblatt, Lanser*, Leinwand, Leonardi, Levine, Mack, McKnight, Norbrook, Pearson, C. Peterson, W. Peterson, Plumly\#, Smith, Turner, Washington, Wyatt*
Associate Professors: Achinstein, Cate, Cohen, Coleman, G. Hamilton, Hammond, Kleine, Levin, Lindemann, Logan, Loizeaux, Marcuse, McDowell, Moser, Norman, Ray, Richardson, Sherman, Van Egmond, Wang
Assistant Professors: Bauer, Chuh, Grady, King, Nunes, Rutherford Instructor: Terchek
Lecturers: Miller, Ryan
Professors Emeriti: Beauchamp, Freedman, Fry, Jellema, Lawson, Lutwack, Miller, Myers, Panichas, Salamanca, Trousdale, Vitzhum, Whittemore, Winton
\#Distinguished University Professor

* Distinguished Scholar-Teacher


## Advising

Departmental advising is mandatory for all majors each semester.

## The M ajor

The English major has been designed by the English Department faculty with three purposes in mind: 1) to give students a sense of the history and variety of literature written in English, 2) to introduce students to the debates about literature and language that shape our intellectual lives, and 3 ) to use the critical study of literature and language to help students think carefully and express themselves well. An English major is good professional preparation for a career in the law, government, journalism, business, communication, teaching, or any field that requires strong analytical and communication skills.

## Requirements for Major

Requirements for the English major include a minimum of 45 upper-level credits completed and the foreign language requirement of the College of Arts and Humanities. The English major requires 39 credits in English beyond the two required University writing courses.

The English major has three parts. The CORE Requirements assure that students read widely and become aware of the questions an inquiring reader might ask of a text. The specialization offers students the opportunity to read more deeply in an area of special interest. The Electives allow students to explore other areas of interest.

CORE Requirements ( 18 credits)
All to be taken at the 300 - or 400 -level

1. English 301: Critical Methods in the Study of Literature. For all majors, a pre- or co-requisite for other 300-or 400-level English courses. We recommend it be taken during the sophomore year.
2. A course in British Literature emphasizing literature written before 1670
3. A second course in British Literature emphasizing literature before 1900
4. A course in American Literature
5. A course in a) African-American literature, b) literature of peoples of color, c) literature by women, or d) gay, lesbian and bisexual literature
6. A senior seminar, to be taken after 86 credits and after the completion of at least two upper-level English courses

Specializations (12 credits)
(Four courses beyond the 6 CORE Requirements above)
Students choose one of the following:

1. British and American Literature
2. American Literature
3. British, Postcolonial, and International Anglophone Literature
4. Language, Writing, and Rhetoric
5. Creative Writing
6. Literature of the African Diaspora
7. Mythology and Folklore
8. Literature by Women
9. Film and Visual Studies
10. Student Specified Concentration

Electives ( 9 credits): Chosen in consultation with an adviser.
Only two 200-level courses may be counted toward the major. No course with a grade less than C may be used to satisfy the major. For further details on requirements, contact the English Department's Office of Undergraduate Studies (2115 SQH, 301-405-3825).

## English and English Education Double Major

In conjunction with the College of Education, the English Department offers a special 125-credit program for students wishing to double major in English and English Education, allowing them to earn a certificate to teach English at the secondary level. For a list of requirements, contact the Office of Undergraduate Studies (2115 SQH, 301-405-3825).

## Honors

The English Department offers an extensive Honors Program, primarily for majors but open to others with the approval of the departmental Honors Committee. Interested students should ask for detailed information from an English Department adviser as early as possible in their college careers.

## The Writing Center

The Writing Center, 0125 Taliaferro, (301) 405-3785, provides free tutorial assistance to students with writing assignments. English 101 students generally work with student tutors. English 391/2/3/4/5 students usually work with tutors who are retired professionals. Appointments are recommended, but walk-ins are welcome based on availability of tutors. Students, faculty, and staff with questions about punctuation, sentence structure, word choice, or documentation can call the Writing Center's Grammar Hotline at (301) 405-3787.

## Citation in Renaissance Studies

15 credit hours. At least one course each in History, Literature and Visual and Performing Arts from approved list of courses; at least four courses at the 300 or 400 level. Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

Course Code: ENGL

## ENTOM OLOGY (ENTM)

## College of Life Sciences

4112 Plant Sciences Bldg., (301) 405-3911
Professor and Chair: Raupp
Professors: Barbosa, Bickley (Emeritus), Bottrell, Davidson (Emeritus), Denno, Harrison (Emeritus), Hellman, Jones (Emeritus), Ma, Menzer (Emeritus), Messersmith (Emeritus), Raupp, Steinhauer (Emeritus), Via, Wood (Emeritus)
Associate Professors: Armstrong, Brown, Dively, Lamp, Linduska, Mitter, Nelson, Regier, St. Leger
Assistant Professors: Hawthorne, Richman, Shultz, Thorne
Instructor: Kent
Assistant Research Scientist: Sina
Director of Undergraduate Studies: Kent

## The Major

Entomology is an Advanced Program Specialization in the area of Biological Sciences. This specialization area prepares students for careers or graduate work in any of the specialized areas of entomology. Professional entomologists are engaged in fundamental and applied research in university, government, and private laboratories; regulatory and control activities with Federal and State agencies; commercial pest management services; sales and development programs with chemical companies and other commercial organizations; consulting, extension work, and teaching.

Advising is mandatory. Students should work closely with their advisers in choosing electives.

## Requirements for Specialization

See Biological Sciences elsewhere in this chapter and Entomology adviser for specific program requirements.

## Course Code: ENTM

## ENVIRONM ENTAL SCIENCE AND POLICY PROGRAM (ENSP)

0207 Symons Hall, (301) 405-8571
E-mail: bj5@umail.umd.edu

## Director: James

Environmental Science and Policy is a new broadly interdisciplinary major, drawing courses and faculty from 20 departments and 4 Colleges (Agriculture and Natural Resources; Behavioral and Social Sciences; Computer, Mathematical, and Physical Sciences; and Life Sciences). There are 13 areas of concentration within the major, most of which are also cross-disciplinary. Students will choose a particular area of concentration and will be assigned an adviser from among the faculty who are responsible for the particular area. Students will have the opportunity to change area of concentration from that originally selected as they learn about the diversity of the major and its offerings. The degree (B.A. or B.S.) earned will be in Environmental Science and Policy and in the area of concentration chosen. For some administrative purposes, the students will be associated with the Colleges of their academic advisers.

## The Major

Environmental Science and Policy students will a take a core of 10 courses, including 9 lower-division courses chosen from restricted lists and a Capstone course required of all majors during their senior year, and upper-division courses defined by the area of concentration. After accounting for prerequisites, CORE courses, and upper-division requirements, any area of concentration may be completed while allowing approximately 24 hours of free electives in a normal 120 -hour program leading to the B.S. or B.A. degree. Some areas of concentration require an internship, and students will be encouraged to pursue practical work and volunteer opportunities as part of their undergraduate programs.

## Requirements for Major

## ENSP CORE

1. A one-year introductory course sequence (ENSP 101-102) for three credits each semester, emphasizing Environmental Science in the first semester and Environmental Policy in the second.
2. At least one course each from five of the following six groups: a) Biology (BIOL 106); b) Chemistry (CHEM 103); c) Earth Sciences (GEOL 103, GEOL 107, GEOL 100-110, GEOG 201-211, NRSC 200, AGRO 202, METO 200); d) Economics (AREC 240, ECON 200); e) Geography (GEOG 100, GEOG 170, GEOG 202); f) Government \& Politics (GVPT 273, AREC 332).
3. One semester of Calculus (MATH 140 or MATH 220)
4. One semester of Statistics (BIOM 301, BIOM 401, ECON 321, PSYC 200, SOCY 201, STAT 400)
5. The Capstone course (a 400-level ENSP course in the senior year)

## Areas of Concentration

Agroecology; Biodiversity and Conservation Biology; Earth Surface Processes; Environmental Economics; Environmental Management; Environmental Mapping and Data Management; Environmental Plant Protection; Environmental Politics and Policy; Land Use; Landscape Ecology; Society and Environmental Issues; Soil, Water, and Land Resources; Wildlife Resources and Conservation

## Advising

Advising is mandatory. Before registering, students should contact the Director of ENSP to discuss the program requirements and options, and to explore their interests in possible areas of concentration.

## Course Code: ENSP

## FAMILY STUDIES (FMST)

## College of Health and Human Performance <br> 1204 Marie Mount Hall, (301) 405-3672 <br> http:/ / www.wam.umd.edu/ ~fmst

Professor and Chair: Koblinsky
Professors: Epstein, Gaylin, Hampton
Associate Professors: Anderson, Leslie, Mokhtari, Myricks, Randolph, Rubin, Wallen
Instructors: Letiecq, Werlinich
Lecturer: Davis

## The Major

The major in Family Studies emphasizes an understanding of the family as the primary social institution linking individuals to their world. The program has three interrelated foci: 1) the family as a unique and dynamic social unit, 2) the development and functioning of individuals within the family, and 3) the relationship of the family to its larger socio-cultural, historical, political and economic context. Students develop a working knowledge of individual and family development throughout the life span, interpersonal relations, and resource use. Courses examine family dynamics, changing family structures, ethnic families, intergenerational relations, family crises, family violence, family policy, legal problems, and family economics.

Students study prevention and intervention strategies for combatting family problems. The reciprocal relationships between families and the social policies, practices and management of institutions and organizations are examined. The curriculum prepares students for careers in human services, human resource management, family life education, public policy and related positions emphasizing the family. Opportunities exist in public, private and non-profit agencies and institutions working with family members, entire family units or family issues. Graduates are also prepared for graduate study in the family sciences, family therapy, human services administration, health, law, social work, human resource management and other social and behavioral science disciplines and professions.

## Curriculum

(a) Major subject area: A grade of C or better is required in these courses.
FMST 302-Research Methods (3)
FMST 330-Family Theories and Patterns (3)
FMST 332-Children in Families (3)
FMST 381-Poverty, Affluence, and Families (3)
FMST 383-Delivery of Human Services to Families (3)
FMST 432-Intergenerational Aspects of Family Living (3)
FMST 477-Internship and Analysis in Family Studies (3)
FMST 487-Legal Aspects of Family Problems (3)
(b) Six additional departmental credits must be selected from any other FMST courses, with the exception of independent study (FMST 399, FMST 498) and field work (FMST 386, FMST 387). Must receive a grade of $C$ or better.
(c) Additional courses. Required of all majors. All students must earn a grade of $C$ or better in all courses applied toward completion of the major.

FMST 290-Family Economics (3)
or ECON 200-Principles of Microeconomics (4)
or ECON 201-Principles of Macroeconomics (4)
EDMS 451-Introduction to Educational Statistics (3) or STAT 100-Elementary Statistics and Probability (3)
SOCY 100-Introduction to Sociology (3) or SOCY 105-Introduction to Contemporary Social Problems (3)
PSYC 100- Introduction to Psychology (3)
COMM 100-Foundations of Speech Communication (3) or COMM 107-Speech Communication: Principles and Practices (3) or COMM 125-Introduction to Interpersonal Communication (3)

Course Code: FMST

## FINANCE

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## FIRE PROTECTION ENGINEERING (ENFP)

## A. James Clark School of Engineering

0151 Engineering Classroom Building, (301) 405-3992
http:/ / www.enfp.umd.edu
Professor and Chair: Spivak
Professors: Brannigan, Quintiere
Associate Professors: Milke, Mowrer
Assistant Professor: Torero
Lecturers (part-time): Gagnon, Koffel, Simone
Emeritus: Bryan
Affiliate Professor: diMarzo

## The M ajor

Fire Protection Engineering is concerned with the applications of scientific and technical principles to the growth, mitigation, and suppression of fire. This includes the effects of fire on people, on structures, on commodities, and on operations. The identification of fire hazards and their risk, relative to the cost of protection, is an important aspect of fire safety design.

The practice of fire protection engineering has developed from the implementation and interpretation of codes and standards directed at fire safety. These safety codes contain technical information and prescriptions derived from experience and research. Research has also led to quantitative methods to assess aspects of fire and fire safety. Thus, fire protection engineers need to be versed in the current technical requirements for fire safety and in the scientific principles that underlie fire and its interactions.

The fire protection engineering student receives a fundamental engineering education involving the subjects of mathematics, physics, and chemistry. The program builds on other core engineering subjects of materials, fluid mechanics, thermodynamics and heat transfer with emphasis on principles and phenomena related to fire. Fluid mechanics includes applications to sprinkler design, suppression systems, and smoke movement. Heat transfer introduces the student to principles of evaporation for liquid fuels. The subject of combustion is introduced involving premixed and diffusion flames, ignition and flame spread, and burning processes. Laboratory experience is gained by being exposed to standard fire tests and measurements. Design procedures are emphasized for systems involving suppression, detection, alarm, and building safety requirements. The background and application of codes and standards are studied to prepare the student for practice in the field. System concepts of fire safety and methods of analysis are presented. A senior design or research project is required which gives the student an opportunity to explore issues beyond the normal classroom environment.

In general, the curriculum is designed to give the student a grounding in the science and practice of fire safety. The field touches on many disciplines and its scientific basis is expanding. It is an engineering discipline that is still growing, and offers a variety of excellent career opportunities. These cover a wide spectrum involving safety assessment reviews, hazards analysis and research, loss prevention and regulatory issues.

## Requirements for Major

|  | Semeste |
| :---: | :---: |
| Freshman Year |  |
| CORE Program Requirements (incl. Engl 101) |  |
| CHEM 103 and 113 or 133-General Chemistry | 4........(4) |
| MATH 140, 141-Analysis I, II |  |
| ENES 100-Introduction to Engineering Design |  |
| ENES 102-Statics | 3 |
| PHYS 161-General Phys |  |
| Tota |  |
| Sophomore Year |  |
| CORE Program Requirements |  |
| MATH 240-Linear Algebra or |  |
| MATH 241-Analysis III |  |
| MATH 246-Differential Equations.................................................. 3 |  |
| PHYS 262, 263-General Physics |  |
| ENES 221,220-Dynamics/ Mechanics of Materials |  |
| ENFP 251-Introduction to Fire Protection Engineering.............. 3 |  |
| ENFP 255-Fire Alarm and Special Hazards Design |  |
| Total .......................................................................... $17 . . . . . . . .16$ |  |
| Junior Year |  |
| CORE Program Requirements |  |
| ENME 320-Thermodynamics |  |
| ENXX or CMSC-Approved Computational Analysis or |  |
| Computer Applications |  |
| ENFP 300-Fire Protection Fluid Mechanics ........................... 3 |  |
| ENFP 310-Water Based Fire Protection Systems Design ..................... 3 |  |
| ENFP 312-Heat and Mass Transfer................................................ 3 |  |
| ENFP 320-Fire Assessment Methods and Laboratory.............. 4 |  |
| Elective-Approved Elective (CHEM, ENFP, ENES, ENXX)* ......... 3 |  |
| Total | 6........ 15 |
| Senior Year |  |
| CORE Program Requirements ............................................. 3 |  |
| ENFP 405-Structural Fire Protection............................................... 3 |  |
| ENFP 411-Fire Risk Assessment .................................................... 3 |  |
| ENFP 415-Fire Dynamics ................................................ 3 |  |
| ENFP 416-Problem Synthesis and Design ........................................ 3 |  |
| ENFP 421-Life Safety and Risk Analysis.............................. 3 |  |
| Elective-Approved Electives (CHEM, ENFP, ENES, ENXX)* ....... 6......... 3 |  |
| ENFP 450-Professional Development Se | . 1 |
| Total |  |
| Total Credit Hours | 2...... 126 |

* At least 3 credits of Approved Electives must be in ENFP. One of the approved elective courses ( 3 credits) must also be either a statistics, mathematics, or applied mathematics course. A further chemistry course is recommended. A list of approved electives is available.


## Admission

Admission requirements are identical to those set by the A. James Clark School of Engineering. (See A. James Clark School of Engineering section in chapter 6.)

## Advising

Mandatory advising by department faculty is required of all students every semester. Students schedule their advising appointments in the department Office, 0151 Glenn L. Martin Hall, (301) 405-3992.

## Fieldwork and Internship Opportunities

Part-time and summer professional experience opportunities and paid internship information is available in the department Office, 0151 Glenn L. Martin Hall. See your advisor or the Coordinator: S. M. Spivak, (301) 405-3992.

## Financial Assistance

Numerous scholarships and grants are available to students in the department from organizational and corporate sponsors. Information is available on eligibility, financial terms and retention criteria in the department Office. The majority of the scholarships are for junior and senior students, but some scholarships are available for first- and secondyear students. Also refer to our web site at http:// www.enfp.umd.edu.

## Honors and Awards

Academic achievement awards are sponsored by the department and the student professional-honor societies. These awards are presented at the annual A. James Clark School of Engineering Honors Convocation. Eligibility criteria for these awards are available in the department Office. Qualified students in the department are eligible for participation in the A. James Clark School of Engineering honors program.

## Student Organizations

The departmental honor society, Salamander, is open to academically eligible junior and senior students. The University of Maryland student chapter of the Society of Fire Protection Engineers is the professional society for all interested students in the department. Student membership in the National Fire Protection Association is available too. Information on these organizations may be obtained from current members in the student lounge, 1123 Engineering Laboratory Building, (301) 405-3999.

Course code: ENFP

## FOOD SCIENCE PROGRAM

Please see entry for Nutrition and Food Science later in this chapter.

## FRENCH AND ITALIAN LANGUAGES <br> AND LITERATURES (FRIT)

## College of Arts and Humanities

3106C J imenez Hall, (301) 405-4024
Professor and Chair: Russell
Professors: Hage, Mossman, Verdaguer
Associate Professors: Black, Brami, Campangne, Falvo
Assistant Professors: Frindéthié, Letzter, Scullen
Lecturers: Amodeo, C. P. Russell, Thomas
Affiliate Lecturer: Jacoby
Emeriti: Fink, MacBain, Meijer, Tarica, Therrien

French and Italian are two of the world's great languages of culture, providing access to an outstanding body of literature and criticism, studies in the arts, the humanities, the social and natural sciences, and career opportunities in commerce, foreign affairs, and the academic world. The department seeks to provide an atmosphere conducive to cultural awareness and intellectual growth. It hosts active student clubs and a chapter of a national honor society. It supports two study abroad programs, Maryland-in-Nice and Maryland-in-Rome, and works actively with the French and Italian language clusters of the Language House.

## The French Major

Requirements for the French major include the College of Arts and Humanities requirements of 45 upper-level credits completed. The College foreign language requirement will be automatically fulfilled in the process of taking language major courses.

The undergraduate major in French consists of 36 hours of French courses above FREN 203. Two options, having the same core, lead to the Bachelor of Arts degree: (1) French language, culture, and literature, and (2) French/ International Business. No grade lower than C may be used toward the major. Students intending to apply for teacher certification should consult the Director of Undergraduate Advising as early as possible for proper planning.

Students must take language acquisition courses sequentially, i.e., 203, 204, 301, etc. Once credit has been received in a higher-level language acquisition or grammar course, a lower-level course may not be taken for credit.

## Advising

Departmental advising is mandatory for second-semester sophomores and seniors.

Core required of all majors ( 12 credits): FREN 204, 250, 301, 401.
Additional requirements outside French for both options: 12 credits in supporting courses as approved by department, or at least 12 credits (six credits at 200- level and six credits at 300-400 level) in one specific area, representing a coordinated plan of study.

## French Language, Culture and Literature Option (24 credits)

In addition to core: FREN 351, 352; 311 or 312,302 or 303 ; four additional 400-level courses.

## French and International Business Option (24 credits)

In addition to core: FREN 302, 303, 306, 311, 312 or $404 ; 406$; two of the following: $351,352,471,472,473,474$.

## Honors

A student may choose to do a departmental Honors version in the French Language Culture and Literature Option. The requirements are the same except that at least three of the upper-level courses, beginning with FREN 351, must be taken in the " H " version, and that, in addition to those courses regularly taken for the major, the Honors student will take FREN 495H (Honors Thesis), for a total of 39 hours in French. For further information, consult the coordinator of the French Honors Program.

## The Italian Major

The undergraduate major in Italian consists of 36 hours of Italian courses above ITAL 203. To satisfy the major requirements, students must take the following courses: the language sequence: ITAL 204, 211, 301, and either 302 or 311 ; the literature sequence: 251, 350; six courses at the 400level, of which only one may be in English. No grade lower than C may be used to satisfy the major requirements. Additional requirements outside Italian: 12 credits in supporting courses as approved by the department; or at least 12 credits (six credits at the 200 -level and six credits at the 300400 level) in one specific area, representing a coordinated plan of study.

Students must take language acquisition courses sequentially, i.e., 203, 204, 301, etc. Once credit has been received in a higher-level language acquisition or grammar course, a lower-level course may not be taken for credit.

## Romance Languages

Either French or Italian, or both, may serve as components of this major (see the entry on the Romance Language Program below).

Course Codes: FREN, ITAL

## Citations

Citation in French Language and Cultures
15 credit hours. Five courses in French from approved list of courses. Courses taken through Study Abroad programs may be applied. Contact the Director of Undergraduate Studies for more information.

Citation in Business Management for French M ajors (1102B)
15 credit hours. ECON 200 and four courses from approved list of BMGT courses. Contact Business, Culture and Languages Program at (301) 4052621 for more information.

Citation in Business French
15 credit hours. Five courses in French from approved list of courses. Contact Business, Culture and Languages Program at (301) 405-2621 for more information.

Citation in Italian Language and Culture
15 credit hours. ITAL 204, 211, 311 and two courses from approved list of courses. Contact the Director of Undergraduate Studies for more information.

Students who fulfill Citation requirements will receive a Citation on the official transcript.

## GEOGRAPHY (GEOG)

College of Behavioral and Social Sciences
2181 Lefrak Hall, (301) 405-4050
http:/ / www.inform.umd.edu/ GEOG
Associate Chair: Cirrincione
Chair: Goward
Professors: Goward, Prince, Townshend
Associate Professors: Brodsky, Christian, Cirrincione* (Curriculum and Instruction), Defries*, Dubayah, Geores, Kasischke, Kearney, Thompson
Assistant Professors: Liang
Lecturers: Eney, Kinerney, Ziatic
Professor Emeritus: Harper, Wiedel
Adjunct Faculty: Townsend, Tucker, Walthall, Williams
*Joint Appointment with unit indicated.

## The Major

The Department of Geography offers programs of study leading to the Bachelor of Science (B.S.) degree. Many students find that the multiple

## Senior Year

Geography Upper-Level Electives ........................................................ 12
Electives.12

Total. 120

## Introduction to Geography

The 100 -level geography courses are general education courses for persons who have had no previous contact with the discipline in high school or for persons planning to take only one course in geography. They provide general overviews of the field or in one of its major topics. Credit for these courses is not applied to the major.

## Related Programs

## Geographic Information Science/ Computer Cartography Program

The Geography Department offers an important area of specialization: GIS and Computer Cartography. The Bachelor of Science degree program in Geographic Information Science and Computer Cartography is designed to give students the technical skills needed to acquire, manage and analyze very large amounts of geographic data. Students will get extensive computer training in digital processing of remote sensing observations and cartographic vector data, spatial analysis, and the display of information products. Almost everything we do involves geographic information, from deciding where to live and travel, to environmental monitoring and urban planning. Influenced by computer technology, the academic disciplines of geographic information science such as remote sensing, geographic information systems (GIS), and computer cartography have evolved dramatically in the past few decades. Remote sensing is the science of obtaining geographic information from aircraft and satellites. GIS technology manages and analyzes different forms of digital geographic data, and this field has been growing at an extraordinary rate. Computer cartography has revolutionized traditional cartography to vastly improve map making and visualization of geographic information in a multimedia environment.

Students concentrating in GIS/Cartography must take the Geography Primary courses, totalling eight hours: one upper-level course in physical geography, and one in human geography plus six hours of systematic electives, totalling 12 hours; and Cartography/ Geographic technique courses, totalling 15 hours. Supporting area courses must be taken from a list provided by the department. All math programs should be approved by a departmental adviser.

## Geography Minor and Secondary Education Geography Specialization

Secondary Education majors with a concentration in geography are required to take 29 hours in geography. Eight hours of Primary Courses (GEOG 201/211, 202/212) are required, plus at least one upper-level gateway course in physical geography, human geography, and geographic techniques. The remaining 12 hours are to be selected from upper-level systematic geography electives. For majors in elementary education and others needing a geography course for teaching certification, GEOG 100 is the required course.

Geography minors should take at least GEOG 201/211, 202/12, and at least one upper-level gateway course in physical geography, human geography, and geographic techniques.

## Internship Opportunities

The department offers a one-semester internship program for undergraduates (GEOG 384 and 385). The goal of the program is to enhance undergraduates' intellectual growth and career opportunities. The internship provides an opportunity for the students to expand their understanding of the field by linking the theoretical aspects of geography acquired in the classroom to the applied aspects operating in a practice situation. The internship program is open only to geography juniors and seniors. All interns must have completed the following prerequisites: GEOG 201/211, 202/212, 305 or its equivalent, and the upper-level writing requirement. An application form from the undergraduate geography adviser must be submitted one semester before the internship is desired. See Professor Cirrincione, 1125 LeFrak Hall, (301) 405-4053.

## Honors

For information on the geography honors program, contact the undergraduate adviser.

## Student Organizations

Gamma Theta Upsilon, the geography undergraduate organization, operates a program of student-sponsored talks and field trips. Information may be obtained from Professor Dubayah, 1161 Lefrak Hall, (301) 405-4069.

Course Code: GEOG

## GEOLOGY (GEOL)

## College of Computer, Mathematical and Physical Sciences 1115 Geology Building, (301) 405-4365

http:/ / www.geol.umd.edu
Professor and Chair: Brown
Professors: Candela, Chang, Walker, Wylie $\dagger$
Associate Professors: McLellan, Prestegaard, Ridky, Stifel (emeritus)
Assistant Professors: Jiang, Kaufman
Adjunct Professor: Zen
Adjunct Associate Professor: Luhr, Shirey
Adjunct Assistant Professors: Böhkle, Hanchar
Senior Research Scientist: Morgan
Assistant Research Scientists: Becker, Holtz, Minarik, Piccoli
$\dagger$ Distinguished Scholar-Teacher

## The Major

Geology is the science of the Earth. In its broadest sense, geology concerns itself with planetary formation and subsequent modification, with emphasis on the study of planet Earth. Geologists study Earth's internal and surficial structure and materials, the chemical and physical processes acting within and on the Earth, and utilize the principles of mathematics, physics, chemistry, and biology to understand our planet and its environments.

Geological Studies encompass all the physical, chemical, and biological aspects of Earth. Increasingly, geologists are taking a holistic approach in the collection and interpretation of data about the Earth, which means that the wider context of the geological sciences is broad and diverse. In studying the Earth as a system, we are concerned with geology and geophysics, hydrology, oceanography and marine science, meteorology and atmospheric science, planetary science, and soil science. A major in any relevant discipline can lead to a satisfying career within the geological sciences. In general, graduate training is expected for advancement to the most rewarding positions and for academic employment.

Geologists are employed by governmental, industrial, and academic organizations. Geologists work in exploration for new mineral and hydrocarbon resources, as consultants on engineering and environmental projects, as teachers and researchers in universities, and in many other challenging positions. For many, the attraction of a career in geology is the ability to divide time between work in the field, the laboratory, and the office. Although the employment outlook within geology varies with the global economic climate, the long-range outlook is good. This is because our dwindling energy, mineral, and water resources, along with increasing concerns about natural hazards and environmental issues, present new challenges for geologists.

The Geology Program at Maryland includes a broad range of undergraduate courses to accommodate both Geology majors and students within the Environmental Science and Policy Program. Within the Geology major, a requirement exists for a senior undergraduate research project to be performed under the direction of a faculty adviser. This requirement provides invaluable experience in writing proposals and reports, gathering, analyzing and evaluating data, and delivering scientific talks. In addition, a Departmental Honors Program and a combined B.S./M.S. Program are available.

## Requirements for Major

The geology curriculum is designed to meet the requirements of industry, graduate school, and government. For the B.S. degree, the students are required to complete the departmental requirements ( 49 credits) and the supporting requirements (23/24 credits) in addition to the CORE (general education) Program requirements. The department also requires that to receive a degree in geology, students must have a grade of C or better in the required geology courses, and an average of $C$ or better in the supporting courses.

Courses required for the B.S. in Geology are listed below. Some courses require field trips for which students are expected to pay for room (if required), board, and part of the transportation costs. Field camp is taken during the summer at institutions other than the University of Maryland, College Park, that offer camps approved by the department.

Semester Credit Hours
CORE Program Requirements* 46
Geology Courses
One of the following: .....  .4
GEOL 100/ 110-Physical Geology and LaboratoryGEOL 120/110—Environmental Geology and Laboratory
GEOL 103-Water, Earth and Humans
GEOL 105-Geology of MarylandGEOL 107- Natural Hazards
GEOL 102-Historical Geology . .....  4
GEOL 322-Mineralogy. .....  .4
GEOL 340-Geomorphology .....  4
GEOL 341 - Structural Geology .....  .4
GEOL 342-Sedimentation and Stratigraphy.. .....  4
GEOL 393-Technical Writing .....  3
GEOL 394—Research Problems .....  3
GEOL 445-Geochemistry .....  3
GEOL 451-Groundwater .....  3
GEOL 423-Optical Mineralogy .....  3
GEOL 443-Petrology. .....  4
GEOL 490-Field Camp .....  649
Supporting Requirements
CHEM 103-General Chemistry I ..... 4
CHEM 113-General Chemistry II ..... 4
MATH 140-Calculus .....  4
MATH 141-Calculus II ..... 4
PHYS 141-General Physics .....  4
One of the following ..... 3-4
PHYS 142-General PhysicsBIOM 301-Introduction to BiometricsAny upper-level Geology course
Credit hours-supporting requirement23-24

* Of the normal CORE requirements (46 credit hours), at least 13-14 credits are met by the major requirements in Mathematics, Chemistry, Geology or Physics (Mathematics and the sciences area).


## Combined B.S./ M.S. Program in Geology

Normally, the minimum requirements for acceptance into this program are:

1. A GPA of at least 3.5
2. No more than 15 credits of required Geology courses and 4 credits of supporting requirements in mathematics, chemistry, and physics remaining for the B.S. Degree
3. No more than 6 credits of CORE requirements remaining for the B.S. degree
4. At least three letters of recommendation
5. An essay or statement of purpose
6. An interview with the Graduate Director

## Advising

The director of the Undergraduate Program serves as the adviser for the geology majors, 1119 Geology Building, (301) 405-4379.

## Honors

Admission to the honors program will be by invitation of the Honors Committee, normally at the end of the sophomore year and normally will be extended to students with an overall GPA of 3.0 or better and a GPA of 3.0 or better in all courses required for the major.

Graduation with Honors normally requires completion of the curriculum, a GPA of 3.5 or better in GEOL 393H and GEOL 394 H , and maintenance of a 3.0 overall GPA and a GPA of 3.0 or better in all courses required for the major. Maintenance of a GPA of 3.5 or above and a grade of A in both GEOL 393H and GEOL 394H will earn the distinction of Graduation with High Honor.

The curriculum for Honors in Geology follows the University Honors Program Track I: Thesis Option with a 15 -credit minimum.

1. The requirement for upper-division Honors courses will be met by a minimum of 9 hours as follows:
a. GEOL 489H-Recent Advances in Geology (3 credit hours), and
b. Six credit hours from the following:
1) a three-credit-hour graduate-level course approved by the departmental honors committee,
2) Honors Option project in a three- or four-credit-hour upper-level course from the offerings in the Geology Department. The Honors Option Proposal must be approved by the departmental honors committee, the professor teaching the course and the University Honors Program. A proposal must be approved by the department and submitted to the University Honors Program by the 10th day of class in the semester in which the course will be taken and the project completed.
2. The research and thesis requirement will be met by completion of GEOL 393 H and GEOL 394 H with a GPA of 3.5 or better (six credit hours).

## Honors and Awards

Bengt Svenonius Memorial Scholarship for graduating senior with the highest overall scholastic average; Fernow Memorial Faculty Field Camp Awards for geology majors to attend geology summer camp; Sigma Gamma Epsilon Award for a senior in geology for Outstanding Scholastic Achievement and service to the Society; and Best Senior Research Award.

## Student Organizations

Sigma Gamma Epsilon, National Honor Society for Earth Sciences, and the Geology Club.

Course Code: GEOL

## GERMANIC STUDIES (GERM)

## College of Arts and Humanities <br> 3215 Jimenez Hall, (301) 405-4091

Professor and Acting Chair: Oster
Professors: Beicken, Oster, Pfister, Frederiksen $\dagger$
Associate Professors: Fleck, Strauch
Assistant Professor: Alene Moyer
Emeriti: Best, Herin, Jones
$\dagger$ Distinguished Scholar-Teacher
Changes in major requirements are under review. For more information, please contact the department at (301) 405-4091 or Dr. Pfister at (301) 405-4106.

## The Major

The undergraduate major in Germanic Studies consists of 36 hours beyond the basic language acquisition sequence (GERM 101-201). No course completed with a grade lower than C may be used to satisfy the major requirements. Three program options lead to the Bachelor of Arts (B.A.) degree: 1) German language, 2) German literature, and 3) Germanic area studies. Secondary concentration and supportive electives are encouraged in the other foreign languages, comparative literature, English, history, and philosophy. Majors intending to go on to graduate study in the discipline are urged to develop a strong secondary concentration in a further area of Germanic studies; such "internal minors" are available in German
language, German literature, Scandinavian studies, and Indo-European and Germanic philology. All majors must meet with a departmental adviser at least once each semester to update their departmental files and obtain written approval of their program of study.

## Advising

Departmental advising is mandatory for second-semester sophomores, juniors, and seniors.

## Requirements for Major

Requirements for the Germanic Studies major include the College of Arts and Humanities requirement of 45 upper-level credits completed.

The College foreign-language requirement will be automatically fulfilled in the process of taking language major courses.

## German Language Option

CORE: 220, 301, 302, 321, and 322. Specialization: three of four German language courses (401, 403, 405, 419P); two 400 -level German literature courses; two upper-level courses in any of the three areas of specialization.

German Literature Option
CORE: 220, 301, 302, 321, and 322. Specialization: five 400-level German literature courses; two upper-level courses in any of the three areas of specialization.

Germanic Area Studies Option
CORE: 220, 301, 302, 321, and 322. Modern Scandinavian Specialization: 369, 461; five upper-level courses in the Germanic area studies group. Medieval Scandinavian Specialization: 383, 475; five upper-level courses in the Germanic area studies group.

Also available is a German Business Option, an International BusinessGerman Business Option, and an Engineering-German dual degree. Students should contact a departmental adviser for more information.

Students must take language-acquisition courses sequentially, i.e., 101, 102, 201, 202, etc. Once credit has been received in a higher-level language acquisition or grammar course, a lower-level course may not be taken for credit.

## Honors in German

The department offers an extensive Honors Program for majors. The Honors Program affords Honors students sustained individual contact with faculty members. Honors Students are called on to work independently, to pursue a project that carries them beyond the regular undergraduate curriculum. Interested students should ask for detailed information from the department Honors Studies Director.

## Citations

Citation in German Studies
15 credit hours. GERM 202 and 220 and/ or 301. Two or three additional courses from approved list of courses. Courses taken through Study Abroad programs may be applied. Contact the Director of Undergraduate Studies for more information.

Citation in Business M anagement for German M ajors (1103B)
15 credit hours. ECON 200 and four courses from approved list of BMGT courses. Contact Business, Culture and Language Program at (301) 4052621 for more information.

Citation in Business German
15 credit hours. Five courses in German from approved list of courses. Contact Business, Culture and Language programs at (301) 405-2621 for more information.

Students who fulfill Citation requirements will receive a Citation on the official transcript.

Course Code: GERM

## GOVERNM ENT AND POLITICS (GVPT)

College of Behavioral and Social Sciences<br>3140 Tydings Hall, (301) 405-4156<br>http:/ / www.bsos.umd.edu/ gvpt

Professor and Chair: Wilkenfeld
Professors: Alford ${ }^{\dagger}$, Alperovitz, Butterworth ${ }^{\dagger}$, Davidson, Dawisha, Elkin, Franda, Glass, Gurr, Harrison (Emeritus), Hathorn (Emeritus), Heisler, Herrnson, Marando, McNelly (Emeritus), Oppenheimer ${ }^{\dagger}$, Phillips, Piper, Pirages, Plischke (Emeritus), Quester, Stone, Terchek, Tismaneanu, Uslaner, Walters* (Afro-American Studies)
Associate Professors: Conca, Gimpel, Graber, Haufler, Kaminski, Lalman, McIntosh, Pearson, Soltan, Swistak, Telhami, Williams, Wilson* (AfroAmerican Studies)
Assistant Professors: Johnson* (Afro-American Studies), Matthes* (Women's Studies), Morris, Schreurs
Lecturer: Vietri
${ }^{\dagger}$ Distinguished Scholar-Teacher

* Joint Appointment with unit indicated

The Department of Government and Politics offers programs for the general student as well as for students who are interested in careers in government, the public sector, politics, foreign assignments, teaching, a variety of graduate programs, and law schools. Satisfactory completion of requirements leads to a Bachelor of Arts degree in government and politics.

The study of politics is both an ancient discipline and a modern social science. The origin of the discipline can be traced back to the earliest times when philosophers, statesmen, and citizens studied the nature of government, justice, responsibility, and the consequences of political action. More recently, the study of politics has also emphasized scientific analys is and methods of observations about politics. Today, the discipline reflects a broad effort to collect data about politics and governments utilizing relatively new techniques developed by all of the social sciences.

The Department of Government and Politics combines philosophical and scientific concerns in its overall program as well as in specific courses. It emphasizes such broad areas as political development, policy analysis, social justice, political economy, conflict, and human rights. These broad conceptual areas are integral components of study in the discipline. The areas are commonly referred to as American government and politics; comparative government; political theory; international relations; public administration; public law; public policy and political behavior.

## Majoring in Government and Politics and the Academic Review

All majors are subject to an academic performance review. To meet the provisions of the review, students must complete (1) GVPT 100, GVPT 170, and ECON 200 with a minimum of two B's and one C for the three courses and (2) a minimum cumulative GPA of 2.0.

Freshman Majors and the Academic Review
Entering freshmen can gain admission to the Department of Government and Politics upon admission to the University. Such students are to pass the academic performance review by the time they have attempted 45 credits at the University. Students who do not meet this standard will be required to select another major.

Transfer Students and Transfer Majors. New transfer students to the University as well as on-campus students changing majors to Government and Politics with fewer than 56 credits will be required to meet the academic performance review (as identified above) by the time they have attempted 30 hours after transferring to the department. Those with 56 credits or more will have to meet the performance review by the time they have attempted 15 hours after transferring to the department.

Appeals. Students who anticipate that they will be or who actually are unsuccessful in passing their performance review on time may appeal to the Director of Undergraduate Studies for a postponement of the review. Such appeals for postponement or second review will require documentation of unusual, extenuating, or special circumstances. The student will be notified in writing of the appeal decision.

## Requirements for Major

Government and Politics majors must complete 36 semester hours of GVPT courses with a minimum grade of $C$ in each course. At least 18 of the 36 credits must be in upper-level courses and all majors are required to complete GVPT 100, GVPT 170, and GVPT 241.

In addition, all majors must complete ECON 200, an approved skills option (a foreign language or three quantitative courses from a select list), and a secondary area of concentration in another department or approved interdisciplinary area. All courses used to satisfy these requirements must be completed with a minimum grade of $C$.

## Honors Program

All students majoring in government may apply for admission to the GVPT Honors Program. Additional information concerning the Honors Program may be obtained at the department offices.

## Internships

The department offers students a variety of internship experiences. Only nine hours of graded GVPT internship credit will apply to the 36 hours needed in the major. Internship credit graded on a pass/fail basis may not be used to satisfy the GVPT major requirements. In no case may more than 12 internship credits be counted towards the 120 credits needed to graduate. Internships are generally open only to GVPT majors with junior standing and a 3.0 GPA .

## Advising

Academic advising is available daily on a walk-in or appointment basis in the Undergraduate Advising Office, 3140K Tydings Hall.

## Course Code: GVPT

## HEALTH EDUCATION (HLTH)

## College of Health and Human Performance

2387 Health and Human Performances Building, (301) 405-2463

## Professor and Chair: Wilson

Assistant Chair: Hyde
Professors: Beck, Burt, Feldman, Gold, Greenberg, Leviton, Wilson
Associate Professors: Boekeloo, Desmond, Meiners, Sawyer
Assistant Professors: Crump, Howard, Spalding, Thompson
Instructors: Hyde, Schiraldi
Faculty Research Assistants: Deale, Gobrecht, Harvey, Lusby, Marowski,
Powell, Rotz, Shattuck, Stewart, Torchia, Wilson-John

## The M ajor

Students majoring in health education have two tracks to choose from at the undergraduate level. One option is Community Health Education, which prepares students for entry-level health education positions in community settings such as health associations, worksite health promotion programs, or other health agencies. The second option is School Health Education which prepares students for teaching health education in schools. Students are referred to the section on the College of Education in chapter 6 for information on teacher education application procedures.

## Requirements for Major

Students must earn a grade of C or better in courses applied toward the major.

## Health Education Major

The freshman and sophomore curricula for both the School Health Option and the Community Health Option are the same:

## Semester

Freshman Year Credit Hours
CORE Requirement .. 6
ENGL 101-Introduction to Writing ......................................................... 3
MATH 110 OR MATH 102 AND 103 AND 105 OR 115: Mathematics........ 3
HLTH 140-Personal and Community Health.

CHEM 121-Chemistry in Modern Life .................................................... 3
BSCI 105—Principles of Biology I ............................................................ 4
HLTH 371-Communicating Health and Safety ........................................ 3
PSYC 100-Introduction to Psychology........................................................... 3
SOCY 100— Introduction to Sociology ...................................................... 3
HLTH 150 - First Aid and Emergency Medical Services ............................. 2

## Sophomore Year

HLTH 230-Introduction to Health Behavior ............................................. 6
PHIL 140-Contemporary Moral Issues ..................................................... 3
BSCI 201, 202-Human Anatomy and Physiology I and II ......................4,4
Required Health Electives ........................................................................ 6
PSYC 221-Social Psychology................................................................... 3
HLTH 105-Science and Theory of Health ............................................... 2
CORE Requirement.................................................................................... 9

## School Health

Junior Year
ENGL 391 or 393-Advanced Composition or Technical Writing................ 3
HLTH 420-Methods and Materials in Health Education............................ 3
EDHD 413-Adolescent Development............................................................... 3
EDHD 420-Cognitive Development and Learning..................................... 3
EDCI 390-Principles and Methods of Secondary Education...................... 3
Required Health Elective ........................................................................... 3
EDHD 340-Human Development Aspects of the Helping Relationship..... 3
EDMS 410-Principles of Testing and Evaluation...................................... 3
EDCP 417-Group Dynamics and Leadership ........................................... 3
CORE Requirement................................................................................. 3
Senior Year
HLTH 340-Curriculum, Instruction and Observation................................ 3
Required Health Electives ........................................................................ 6
EDPA 301—Foundations of Education...................................................... 3
EDCI 491-Student Teaching in Secondary Schools Health .................... 12
CORE Requirement........................................................................................ 6

## Community Health

Junior Year
ENGL 391 or 393-Advanced Composition or Technical Writing................ 3
BSCI 122-Basic Microbiology ............................................................... 4
EDHD 340—Human Development Aspects of the Helping Relationship..... 3
EDMS 451-Introduction to Educational Statistics ................................... 3
HLTH 420-Methods and Materials in Health Education............................ 3
HLTH 391-Introduction to Community Health........................................... 3
HLTH 437-Consumer Behavior .............................................................. 3
HLTH 430-Health Education in the Workplace.......................................... 3
EDCP 417-Group Dynamics and Leadership ........................................... 3
CORE Requirement................................................................................. 3

## Senior Year

Required Health Electives ... 9
HLTH 490-Principles of Community Health .............................................. 3
FMCD 483 - Family and Community Service Systems ............................... 3
HLTH 491-Community Health Internship ................................................ 12

## Advising

Advising is mandatory. Undergraduate Health Education Adviser: David H. Hyde, 2387 HLHP Building, (301) 405-2523 or (301) 405-2463.

## Student Honors Organization

Eta Sigma Gamma. The Epsilon chapter was established at the University of Maryland in May 1969. This professional honorary organization for health educators was established to promote scholarship and community service for health majors at both the graduate and undergraduate levels. Students may apply after two consecutive semesters with a 2.75 cumulative grade point average.

Course Code: HLTH

## HEARING AND SPEECH SCIENCES (HESP)

College of Behavioral and Social Sciences

0100 Lefrak Hall, (301) 405-4214
E-mail: http:// www.bsos.umd.edu/ hesp/
Associate Professor and Chair: Ratner
Professors: Gordon-Salant, McCall, Yeni-Komshian
Associate Professors: Ratner, Roth, Zeng
Assistant Professor: Haarmann
Instructors: Banson, Battles, Dow, McCabe, Palmer, Perlroth, Sisskin, Willig, Worthington
Lecturer: Silverman

## The Major

Hearing and speech sciences is an inherently interdisciplinary field, integrating knowledge from the physical and biological sciences, medicine, psychology, linguistics, and education in order to understand human communication and its disorders. The department curriculum leads to the Bachelor of Arts degree. An undergraduate major in this field is an appropriate background for graduate training in Speech-Language Pathology or Audiology, as well as for graduate work in other disciplines requiring a knowledge of normal or disordered speech, language, or hearing. The student who wishes to work professionally as a speech-language pathologist or audiologist must obtain the M.A. degree in order to meet national certification requirements, and most state licensure laws.

The hearing and speech sciences curriculum is designed in part to provide supporting course work for majors in related fields, so most course offerings are available to both departmental majors and non-majors. Permission of instructor may be obtained for waiver of course prerequisites for non-majors wishing to take hearing and speech courses of interest.

## Requirements for M ajor

Changes in requirements are under review.
A student majoring in hearing and speech sciences must complete 30 semester hours of required courses (HESP 202, HESP 300, HESP 305, HESP 311, HESP 400, HESP 402, HESP 403, HESP 404, or HESP 406, HESP 407 and HESP 411) and six semester hours of electives in the department to satisfy major course requirements. No course with a grade less than C may count toward major course requirements. In addition to the 36 semester hours needed for a major, 12 semester hours of supporting courses in statistics and other related fields are required. For these 12 hours, a $C$ average is required.

A guide to the major is available through the department office in room 0100, Lefrak or on the departmental website at http:// www.bsos.umd.edu/ hesp/

Significant revisions to the undergraduate major in HESP were being reviewed by the campus at the time this catalog was published. Students are strongly advised to consult the department or the departmental website for the most current information regarding undergraduate major requirements and procedures.

Required courses for the HESP major:
HESP 202-Introduction to Hearing and Speech Sciences ....................... 3
HESP 300-Introduction to Psycholinguistics .................................................... 3
HESP 305-Anatomy and Physiology of the Speech Mechanism ............... 3
HESP 311-Anatomy, Physiology, and Pathology of the Auditory System .. 3
HESP 400-Speech and Language Development in Children..................... 3
HESP 402-Speech Pathology I: Language Disorders in Children ............. 3
HESP 403-Introduction to Phonetic Science............................................ 3
HESP 404—Speech Pathology II: Voice and Fluency Disorders .................. 3 OR
HESP 406 - Speech Pathology III: Aphasia and neuromotor disorders ...... 3
HESP 407-Bases of Hearing Science .................................................... 3
HESP 411-Introduction to Audiology ...................................................... 3
Electives-Students must take six credits from the following offerings:
HESP 109-Freshman seminar.
HESP 386-Experiential Learning ............................................................... 3
HESP 417-Principles and Methods in Speech Language Pathology and Audiology 3

HESP 418-Clinical Practice in Speech Language Pathology
and Audiology

HESP 422-Neurological bases of human communication ........................ 3
HESP 423-Phoenetics for teachers of English as a second language...... 3
HESP 469-Honors thesis research ........................................................ 6
HESP 498-Seminar in Hearing and Speech Sciences ................................ 3
HESP 499—Independent Study .............................................................. 3
Allied/ Related Fields (12 credits):
In addition to a required statistics course, the student will take nine credits from course offerings in Allied/ Related Fields. A full list of these offerings is available in the Hearing and Speech Sciences Department undergraduate guide.

## Departmental Honors

An Honors option in HESP is available to students. This option must be declared prior to the junior year, and requires a 3.5 or higher GPA overall and in HESP coursework. For specific information on procedures for completing the Honors option, consult the Undergraduate Director or the department guide.

## Advising

Information on advising for hearing and speech sciences may be obtained by calling the department office, (301) 405-4214. An undergraduate program guide is available through the department office at 0100 Lefrak, or on the web at http:// www.bsos.umd/ hesp/

## Special Opportunities

The Department operates a sizeable Hearing and Speech Clinic (301-4054218 ) and award-winning language enricnment preschool, the LEAP program. Both serve the campus and greater metropolitan area, and provide in-house opportunities for clinical observation and training. The department facilities also include a number of well-equipped speech, language and hearing research laboratories.

## Student Organizations

Hearing and speech majors are invited to join the departmental branch of the National Student Speech-Language and Hearing Association (NSSLHA).

Course Code: HESP

## HISTORY (HIST)

## College of Arts and Humanities

2115 Francis Scott Key Hall, (301) 405-4265
http:/ / www.inform.umd.edu/ ARHU/ Depts/ History/
Professor and Chair: Lampe
Professors: Bedos-Rezak, Belz, Berlin ${ }^{\dagger} \dagger$, Brush ${ }^{\dagger} \dagger$, Callcott ${ }^{\dagger}$ (Emeritus), Cockburn (Emeritus), Cole $\dagger$ (Emeritus), Eckstein, Evans (Emeritus), Foust (Emeritus), Friedel, Gilbert ${ }^{\dagger} \dagger$, Gordon (Emeritus), Gullickson, Harlan ${ }^{\dagger}, \dagger \dagger$ (Emeritus), Harris, Henretta ${ }^{\dagger}$, Holum, Jashemski ${ }^{\dagger}$ (Emerita), Kent (Emeritus), A. Olson ${ }^{\dagger}$, K. Olson, Price, Smith (Emeritus), Sutherland, Warren (Emeritus), Wright (Emeritus), Yaney (Emeritus), Zhang
Associate Professors: Barkley Brown, Cooperman, David-Fox, Flack, Gerstle, Grimsted, Landau, Lapin, Majeska, Mayo, Moss, Muncy, Ridgway, Rowland, Rozenblit, Sumida, Zilfi
Assistant Professors: Bradbury, Brooks, Gao, Lyons, Miller, Palmie, Sicilia, Wetzell, Williams
Adjunct: Carr, Papenfuse
Affiliate: Moses, Struna
$\dagger$ Distinguished Scholar-Teacher
$\dagger$ † Distinguished University Professor
The Department of History seeks to broaden the student's cultural background through the study of history and to provide preparation for those interested in law, publishing, teaching, journalism, civil service, military, museum work, archival and library work, diplomacy, business school, and graduate study.

An undergraduate adviser assists each major in planning a curriculum to meet his or her personal interests. We encourage students to meet with an adviser, both in the department and in the College of Arts and Humanities, once every semester.

The department sponsors a History Undergraduate Association which majors and other interested students are encouraged to join. It also sponsors Phi Alpha Theta, study-abroad programs, and experiential learning (internships).

## Requirements for Major

Requirements for the History major are 39 hours of history course work distributed as follows: 12 hours in 100-200 level introductory courses selected from at least two general geographical fields of history; 15 hours, including HIST 309, in one major area of concentration (see below); 12 hours of history in at least two major areas other than the area of concentration. All courses for the major must be completed with a minimum grade of $C$, and 21 hours of the 39 total hours must be at the junior-senior (300-400) level.

At least one course (three credits), must be taken from an approved list of courses on regions outside both Europe and the U.S. The list may be obtained from the History Undergraduate Adviser's Office.
I. Introductory Courses

1. The requirement is 12 hours at the 100-200 level taken in at least two geographical fields.
2. In considering courses that will fulfill this requirement, students are encouraged to:
a. select at least two courses in a sequence
b. select at least one course before 1500 and one course after 1500 .
c. sample both regional and topical course offerings. Students will normally take one or more introductory courses within their major area of concentration.
II. Major Area of Concentration
3. The requirement is 15 hours, including HIST 309, in a major area of concentration.
4. Students may choose an area of concentration that is either geographic, chronological, or thematic. Areas include:
a. Geographic regions: Latin America, Middle East, Britain and Western Europe, the United States, East Asia, Africa, Eastern Europe and Russia;
b. Chronological periods: ancient, medieval, early modern, and modern
c. Themes: science and technology, social and cultural, women and gender, African-American, Jewish, military, religious, business, and economic.
5. The proseminar, HIST 309, should normally be taken in the major area of concentration in the senior year after completing two or three upper-level courses in the area of concentration.
III. 12 Hours of History in at Least Two Areas Outside the Area of Concentration
6. Students are encouraged to select mainly upper-level courses.
7. Students are encouraged to consider regional diversity.
IV. Supporting Courses Outside History Nine credits at the 300-400 level in appropriate supporting courses; the courses do not all have to be in the same department. Supporting courses should study some aspect of culture and society as taught by other disciplines. A minimum grade of $C$ is required.
A.P. and I.B. credits are accepted.

## Honors

The purpose of the Honors Program in History is to allow promising undergraduates to develop historical and historiographical skills, in an atmosphere that guarantees personal attention and encourages hard work and excellence. The program is a four-semester, 12 -credit sequence that culminates in a senior thesis, a major research paper written under the close supervision of a faculty mentor. The program has two phases. In the junior year, students are introduced to the problems of history and writing at a sophisticated level via two seminars on problems in historiography. In the senior year, students take two supervised courses in the writing of the thesis. The minimum GPA for admission to the History Honors Program is 3.3 .

## Course Code: HIST

## HORTICULTURE

The Horticulture and Agronomy programs have been reorganized into a single major, Natural Resource Sciences (NRSC). See Natural Resource Sciences elsewhere in this chapter. (Note: Courses are offered under both HORT and NRSC codes.)

## HUM AN DEVELOPMENT (Institute for Child Study) (EDHD)

## College of Education

3304 Benjamin Building, (301) 405-2827
Professor and Chair: Porges
Professors: Alexander, Eliot, Fein, Fox, Guthrie, Hardy, Rubin, Seefeldt ${ }^{\dagger}$, Torney-Purta
Associate Professors: Bennett, Byrnes, Flatter, Gardner, Killen, Klein, Marcus, Nettles, Robertson-Tchabo, Wentzel, Wigfield
Assistant Professors: Green, Jones, Metsala, Smith
Emeriti: Bowie, Dittman ${ }^{\dagger}$, Goering, Hatfield, Huebner, Morgan ${ }^{\dagger}$, Tyler
${ }^{\dagger}$ Distinguished Scholar-Teacher
The Department of Human Development offers: (1) a major in Early Childhood Education; (2) undergraduate courses in human development at the 200-, 300-, and 400-levels; (3) graduate programs leading to the M.A., M.Ed., Ed.D., and Ph.D. degrees and the A.G.S. certificate; and (4) field experiences and internships to develop competence in applying theory to practice in schools and other settings. Concentrations in human development include infancy, early childhood, adolescence, adulthood, and aging. A specialization in educational psychology is available at the doctoral level. Research in educational psychology, social, physiological, personality and cognitive areas with emphasis on the social aspects of development enhance the instructional program.

Undergraduate courses and workshops are designed for pre-service and inservice teachers as well as for students preparing to enter human services vocations. Undergraduate students may elect human development courses in such areas as (1) infancy, (2) early childhood, (3) adolescence, (4) aging, and (5) educational psychology. Major purposes of undergraduate offerings in human development are (1) preparing people for vocations and programs which seek to improve the quality of human life, and (2) providing experiences which facilitate the personal growth of the individual.

Through the Institute for Child Study, the faculty provides consultant services and staff development programs for pre-school programs, parent groups, court systems, mental health agencies, and other organizations involved with helping relationships. Undergraduats may participate in these programs through course work and internships. If interested, contact the department/ Institute.

## Early Childhood Education

Graduates of the Early Childhood Education program receive a Bachelor of Science degree and meet the requirements for teaching preschool, kindergarten, and primary grades.

## Requirements for Major Including Program Options

All Teacher Education Programs have designated pre-professional courses and a specified sequence of professional courses. Before students may enroll in courses identified as part of the professional sequence, they must first gain admission to the College of Education's Teacher Education Program.

## Admission

Application for admission to the Teacher Education Professional Program must be made early in the semester prior to beginning professional courses. Admission procedures and criteria are explained in "Entrance Requirements" in the College of Education entry in chapter 6.

## Advising

Advising is mandatory for all students desiring acceptance into the Teacher Education Program. Students will receive advising through advising workshops which will be held during the pre-registration period. Information

## 122 Human Nutrition and Food Systems

regarding advising workshop schedules will be available each semester with pre-registration materials. Walk-in advising hours are also posted each semester. Check in the department office, Room 3304 Benjamin.

## Honors and Awards

Early Childhood Education majors are eligible for the Ordwein Scholarship. Information is available in the Dean's office, Room 3119 Benjamin.

## Required Courses

The following courses are required in the program of studies for Early Childhood and may also satisfy the University's general education requirements (CORE and USP). See departmental worksheets and advisers and the Schedule of Classes.

$$
\text { PSYC } 100
$$

* Social Science or History Courses: ANTH, GEOG, GVPT, ECON, SOCY ..... 6

HIST 156 .............................................................................................. 3
Biological Science with Lab: BIOL, BOTN, MICRO ..................................... 4
Physical Science/ Lab: ASTR, CHEM, GEOL, PHYS ..................................... 4
Other Pre-Professional Requirements
COMM (100, 125, or HESP 202 recommended) ...................................... 3
MATH 210, 211 .................................................................................... 4
MUSC 155........................................................................................... 3
Creative Arts: One of the following: KNES 181, 183, 421;
THET 120, 311, ARTT 100 .. 3
Education Electives: One of the following: FMST 332; SOCY 343;
NFSC 100, EDCI 416
.. 3
EDCI 280-School Service Semester...................................................... 3
EDCI 443A-Literature for Children and Youth .......................................... 3
Professional Courses
The Early Childhood Professional Block I starts only in the Fall Semester and is a prerequisite to Professional Block II. All pre-professional requirements must be completed with a minimum grade of $C$ before beginning the Early Childhood Professional Blocks. All pre-professional and professional courses must be completed with a minimum grade of C prior to student teaching. EDPA 301, Foundations of Education (3), is normally completed after Professional Block II. See adviser for program planning.

## Professional Block I:

EDHD 313-Creative Activities and Materials for the Young Child ............. 3
EDCI 314-Teaching Language, Reading, Drama and Literature................ 3
EDHD 312 - Professional Development Seminar...................................... 3
EDHD 416— Special Topics ............................................................................... 3
EDHD 419A—Human Development and Learning in School Settings ........ 3
Professional Block II:
EDCI 315-The Young Child in the Social Environment............................. 3
EDCI 316-The Teaching of Reading: Early Childhood ................................... 3
EDCI 374-The Teaching of Science: Early Childhood................................ 3
EDCI 351-The Teaching of Mathematics: Early Childhood ....................... 3
EDHD 419B—Human Development and Learning in School Settings ......... 3
Professional Block III:
EDHD 421-Student Teaching: Preschool ............................................... 4
EDHD 422-Student Teaching: Kindergarten ........................................... 4
EDHD 423-Student Teaching: Primary....................................................... 8
Course Code: EDHD

## HUM AN NUTRITION AND FOOD SYSTEMS

For information, consult the Nutrition and Food Science entry elsewhere in this chapter.

## HUM AN RESOURCE MANAGEM ENT

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## JEWISH STUDIES PROGRAM (JWST)

## College of Arts and Humanities <br> 0113 Woods Hall, (301) 405-4975

Director: Marsha Rozenblit
Professors: Beck, Berlin, Handelman
Associate Professors: Cooperman, Lapin, Manekin, Rozenblit
Assistant Professor: Fradkin
Instructors: Levy, Liberman

## The Major

The Jewish Studies major provides undergraduates with a framework for organized and interdisciplinary study of the history, philosophy, and literature of the Jews from antiquity to the present. Jewish Studies draws on a vast literature in a number of languages, especially Hebrew and Aramaic, and includes the Bible, the Talmud, and medieval and modern Hebrew literature. Yiddish language and literature comprise an important sub-field.

Departmental advising is mandatory for second-semester sophomores and seniors.

## Requirements for Major

Requirements for the Jewish Studies major include the College of Arts and Humanities requirement of 45 upper-level credits completed. The College foreign-language requirement will be automatically fulfilled in the process of taking Hebrew language courses. The undergraduate major requires 48 semester hours ( 27 hours minimum at 300-400 level) in Jewish Studies. These courses may include courses offered by Jewish Studies or crosslisted by Jewish Studies with the Departments of Asian and East European Languages and Literatures, History, Philosophy, English, Women's Studies, and Comparative Literature.

A minimum grade of $C$ is required in all courses offered toward major requirements. A major in Jewish Studies will normally conform to the following curriculum:

1. Prerequisite: HEBR 111, 112, 211, 212 (or placement exam)
2. Required courses: HEBR 313, 314; JWST 234, 235, and 309; one course in classical Jewish literature ( $200-$ level ); one upper-level course in Hebrew literature in which the text and/ or language of instruction are in Hebrew. ( 21 credit hours)
3. Electives: 15 credits in Jewish Studies courses. At least nine credits must be at the $300-400$ level.
4. Twelve credits of supporting courses in areas outside Jewish Studies such as history, sociology, philosophy, psychology, or literature, including at least six credits at the 300-400 level, to be selected with the approval of a faculty adviser.

## Citation in Jewish Studies

Requirements: 15 credits in Jewish Studies, at least 9 of which must be at the upper level. Students must take 1 course each in Jewish history, literature, and thought, and 2 other courses in Jewish Studies. No more than 3 credits of lower level language can count toward the Citation. No more than 6 credits may be taken at an institution other than UMCP. Students must earn at least a "C" in each course.

## Financial Assistance

The Meyerhoff Center for Jewish Studies, (301) 405-4975, offers scholarships for study in Israel. Applications for scholarships are accepted in early March.
See entries for Department of Asian and East European Languages and Cultures and East Asian Studies certificate elsewhere in this chapter. Students may also pursue a Jewish History concentration through the Department of History.

Course Code: JWST

## JOURNALISM (JOUR)

For information, consult the College of Journalism entry in chapter 6.

## KINESIOLOGY (KNES)

## College of Health and Human Performance <br> 2351 HLHP Building, (301)405-2450

Professor and Chair: Franks
Associate Chair: Phillips
Professors: Clark, Dotson, Ennis, Franks, Hagberg, Hurley, Iso-Ahola,
Associate Professors: Hatfield, Jeka, Phillips, Rogers, Wrenn
Assistant Professors: Brown, Chen, Contreras-Vidal, Mason, McDaniel, VanderVelden
Instructors: Brown, Lindle, Scott
Emeriti: Clarke, Eyler, Hult, Humphrey, Husman

## The Major

The Department of Kinesiology offers two undergraduate degree programs to satisfy different needs of students. Students may choose to major in Physical Education or in Kinesiological Sciences. Brief descriptions of each program follow. Students should obtain a current Student Handbook for the degree program of interest (available in HHP 2351 and 2301). The Student Handbook details important course sequences, suggested courses for each year, and applicable policies. Both programs require a grade of $C$ or better in all required coursework. Departmental contacts are Dr. Catherine Ennis for Physical Education (301-405-2478, ce22@umail.umd.edu) and Dr. Marvin Scott (301-405-2480, ms24@umail.umd.edu) or Mr. Wally Bixby at the Student Services Center (301-405-2472, HHP 2301) for Kinesiological Sciences.

In addition to University general education (CORE) classes, the following KNES CORE classes are required for all majors (both degree programs):
KNES 287 Sport and American Society
KNES 293 History of Sport in America
KNES 300 Biomechanics of Human Motion
KNES 350 Psychology of Sport
KNES 360 Exercise Physiology
KNES 370 Motor Development
KNES 385 Motor Control and Learning

## Physical Education Major

The Physical Education degree program is designed to lead to K-12 teacher certification in Maryland. Maryland teaching certificates are reciprocal with most other states. While this program is designed to provide preparation for individuals in public school settings, it also provides an excellent preparation for those wishing to pursue other professional opportunities in sport, exercise, or physical activity. Also, due to the strong scientific foundation of the degree program, an appropriate background is established for future graduate work for those who desire to continue their studies in any area involving human movement and sport. Many courses require proper sequencing and prerequisites. Not all courses are offered every semester. All interested students are urged to schedule an advising appointment with the program coordinator before declaring this major. Changes in requirements are under review. Students should consult the department for updated information.

## Physical Education Degree Requirements

Credits
Freshman Year:
BSCI 105 - Principles of Biology . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 4
KNES 180 - Foundations of Physical Education . . . . . . . . . . . . . . . . . . . 2
KNES 182 - Rhythmic Activities. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2
KNES 183 - Movement Content for ES Children . . . . . . . . . . . . . . . . . . 3
KNES 200-Gymnastics Skills Lab . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2
KNES 202/ 210 - Badminton/ Field games Skills Lab . . . . . . . . . . . . . . . 2
KNES 204 - Basketball/ T\&F Skills Lab . . . . . . . . . . . . . . . . . . . . . . . . . 2
KNES 217/ 221 - Volleyball/ Tennis Skills Lab . . . . . . . . . . . . . . . . . . . . 2
KNES 223 - Wt Train/ Aerobic Skills Lab . . . . . . . . . . . . . . . . . . . . . . . 2
Sophomore Year
BSCI 201, 202 Anatomy and Physiology I . . . . . . . . . . . . . . . . . . . . . . . 8
KNES 314 Methods in PE .............................................. 3
KNES 287, 293, 370 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9

Junior Year
KNES 371 ESPE: A Movement Approach . . . . . . . . . . . . . . . . . . . . . . . 3
KNES 333 Physical Activity for Handicapped . . . . . . . . . . . . . . . . . . . . . 3
KNES 282 Basic Care and Prevention of Athletic Injuries . . . . . . . . . . . . 3
EDHD 300S Human Dev \& Learning OR .......................... 6
EDHD 413 Adoles. Dev AND
EDHD 420 Cognitive Dev and Learning
KNES 300, 350, 360, 385. 13

## Senior Year

KNES 390 Practicum in Teaching PE . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
KNES 491 Curriculum in PE . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
KNES 480 Measurement in PE . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
EDCI 390 Prin \& Methods of Sec Ed . . . . . . . . . . . . . . . . . . . . . . . . . . 3
EDPA 301 Foundations of Education . . . . . . . . . . . . . . . . . . . . . . . . 3
EDCI 485 Student Teaching in Elem PE . . . . . . . . . . . . . . . . . . . . . . . . 6
EDCI 495 Student Teaching in Sec PE. . . . . . . . . . . . . . . . . . . . . . . . . . 6
Minimum total semester hours for program = 126 credits, including the CORE (general education) Program

Admission to Teaching: Admission to the College of Education is required upon completion of 45 applicable credits. Students must pass the Praxis I exam and have a 2.5 GPA after 45 credits to gain admission. Additional information is available from the College of Education.

## Kinesiological Sciences Major

This curriculum offers students the opportunity to study the body of knowledge of human movement and sport, and to develop specific programs of study which allow them to pursue a particular goal related to the discipline. There is no intent to orient all students toward a particular specialized interest or orientation. However, many currently enrolled students are pursuing careers in medically-related fields (i.e., physical therapy, physician, chiropractory) and in the fitness industry (i.e., corporate fitness, personal training, fitness club management) as well in the applied social sciences. The program provides a hierarchical approach to the study of human movement. First, a broad core of knowledge is recognized as being necessary for all students in the curriculum. These core courses are considered foundational to advanced and more specific courses. Secondly, at the "Options" level, students select from approved upper level KNES courses which they believe will provide the knowledge to pursue whatever goal they set for themselves in the future. To further strengthen specific areas of interest, students should carefully select electives.

## Kinesiological Sciences Degree Requirements

University Core ..... 40
(Includes BSCI 105, BSCl 201)
KNES Core $(287,293,300,350,360,370,385)$ ..... 22
Other required courses ..... 10
(BSCI 202, KNES 497, statistics)KNES Option classes12
(see Bulletin Board in Department or Handbook)
Physical Activity Courses (see Handbook) .....  8
Electives ..... 28

Minimum total semester hours for program $=120$ credits, including the CORE (general education) Program

## Advising

Advising is strongly recommended for all students majoring in Kinesiological Sciences, although it is not mandatory. Advisors are available in the College Student Services Center (HHP 2301) to assist with registration procedures, program updates, answer questions, provide career guidance and referrals. Students are advised to closely follow the program sheets which outline the order in which courses should be taken to allow proper and timely progression through the degree programs. Advising is required for all Physical Education majors. Advisors are assigned to each student, and the list is posted on the Bulletin Board across from HHP 2338.

## Honors

The Honors program provides junior and senior students with opportunities to engage in extended study, research and discussions with faculty. The program requires 18 credits of Honors courses and a thesis, which will be defended before a faculty committee. Applicants must have a 3.5 overall GPA on a minimum of 45 credits and a 3.5 GPA on at least nine credits
from the Kinesiology CORE. The faculty Honors Committee also will consider leadership, motivation and maturity for admission consideration. Qualified students typically apply in the Spring semester of the Sophomore year. To remain in the program after admitted, students must maintain a 3.5 GPA. Students may graduate with high honors by completing a thesis rated as outstanding and earning a cumulative GPA of 3.7

Course Code: KNES

## LANDSCAPE ARCHITECTURE (LARC)

## College of Agriculture and Natural Resources

2146 Plant Sciences Building 301-405-4350
mh160@umail.umd.edu, md35@umail.umd.edu
http:/ / www.larc.umd.edu/
Professor and Chair: R. Weismiller
Associate Professor and Coordinator: M. Hill
Associate Professor: J.B. Sullivan
Assistant Professors: D. Myers
Adjunct Assistant Professor: D. Locke, J. Myers
Instructor: D. Nola

## The Major

The Department of Natural Resource Sciences and Landscape Architecture offers three undergraduate majors. Two lead to the bachelor of science (B.S.) degree; one in Natural Resource Sciences and the other in General Agriculture Sciences. The third major leads to a bachelor of landscape architecture (B.L.A.) degree. For additional information on General Agriculture Sciences and Natural Resource Sciences, see the entry for those programs elsewhere in this chapter.

The landscape architecture curriculum is a four-year professional program. The program is primarily a site-based design discipline that also deals with regional and larger-scale environmental issues. The curriculum, a studiobased design program, integrates natural and social factor analysis into the design process. Digital design studios allow the integration of computeraided design with fundamental design and drawing skills.

## Admission

Landscape architecture is a limited-enrollment program (LEP). See Chapter 1 of this Catalog for general limited-enrollment program admission policies. For further information contact the College of Agriculture and Natural Resources at 301-314-8375.

Freshman admission - Most entering freshmen who have a GPA of 2.70 and a SAT score of 1100 will gain admission to the landscape architecture program directly from high school, as space permits. Early application is encouraged to ensure the best possible chance for admission.

Transfer admission - Admission of transfer students is limited by space considerations: Transfer students must meet the following minimum requirements: GPA $=2.70$ with grades of $C$ or better in LARC 160, MATH 115, and an acceptable 4 credit plant sciences course with a laboratory (HORT 100, NRSC 201, HORT 202, AGRO 101, BSCI 105, BSCI 106, BSCl 225). Students presenting an acceptable portfolio evaluated by the landscape architecture faculty may be exempted from one or both of the first year studios.

45 credit review - All students will be subjected to a performance review after they have completed 45 credits hours. To meet the provisions of the review, students must complete: (1) CORE Fundamental Studies; (2) 3 courses in CORE Distributive Studies; (3) LARC 160, 140, 141, 240, 220, MATH 115, HORT 253, and an acceptable 4 credit plant sciences course with a laboratory (HORT 100, NRSC 201, HORT 202, AGRO 101, BSCI 105, $\mathrm{BSCl} 106, \mathrm{BSCl} 225$ ) with minimum grades of C . Students who do not meet these requirements will not be allowed to continue in the landscape architecture LEP and will be required to accept another major.

Appeals - Students who are unsuccessful in gaining admission to the landscape architecture L5EP and believe they have extenuating or special circumstances which should be considered, may appeal inwriting to the Office of Undergraduate Admissions. The student will be notified in writing of the appeal decision. Students in the landscape architecture LEP who do not pass the 45 credit review but believe they have special circumstances which should be considered should appeal directly to the Coordinator of the Landscape Architecture program.

## Curriculum in Landscape Architecture

Landscape Architecture Degree (B.L.A.) Semester Credit Hours
GEOG 340 Geomorphology or
GEOG 372 Remote Sensing . .....  3
HORT 100 Introduction to Horticulture. .....  4
HORT 253 Woody Plant Materials I. ..... 3
HORT 254 Woody Plant Materials II .....  3
MATH 115 Precalculus. ..... 3
LARC 140 Graphic Fundamentals .....  3
LARC 141 Design Fundamentals. .....  3
LARC 160 Introduction to Landscape Architecture .....  .3
LARC 220 Land Surveying .....  2
LARC 240 Graphic Communications .....  3
LARC 241 Electronic Studio .....  3
LARC 263 History of Landscape Architecture. .....  3
LARC 265 Site Analysis and Design .....  3
LARC 320 Principles of Site Engineering .....  3
LARC 321 Landscape Structures \& Materials .....  3
LARC 340 Site Design Studio .....  4
LARC 341 Community Design Studio. ..... 4
LARC 420 Professional Practice .....  3
LARC 440 Urban Design Studio .....  4
LARC 450 Environmental Resources or
LARC 451 Sustainable Communities .....  .3
LARC 470 Landscape Architecture Seminar. .....  3
LARC 471 Capstone Studio .....  4
NRSC 200 Fundamentals of Soil Science .....  4
Total Major Requirements ..... 74
Additional CORE Program requirements ..... 27
Electives ..... 19
Total ..... 120

## Internship Opportunities

Internships are available at nearby federal, state and county agencies as well as in private landscape architecture practices.

## Student Organizations

The Landscape Architecture Student Association provides students with opportunities to get involved with on-campus activities. The club is chartered by the American Society of Landscape Architects.

## Scholarships

Several scholarships and awards are available to Landscape Architecture students. Contact the Associate Dean's office at (301) 405-2078 for additional information.

Course Code: LARC

## LINGUISTICS (LING)

## College of Arts and Humanities

1401 Marie Mount Hall, (301) 405-7002
Professor and Chair: Crain
Professors: Hornstein, Lightfoot
Associate Professors: Lombardi, Uriagereka, Weinberg
Assistant Professors: Benua, Poeppel, Resnik, Thornton
Affiliate: Berndt, Brent, Burzio, Gasarch, Smolensky, Zanuttini, Zsiga

## The Major

The Linguistics Department offers courses on many aspects of language study and an interdisciplinary major leading to a Bachelor of Arts. Language is basic to many human activities and linguistics relates to many other disciplines which include work on language.

Work on language has provided one of the main research probes in philosophy and psychology for most of the 20th century. It has taken on a new momentum in the last 30 years and language research has proven to
be a fruitful means to cast light on the nature of the human mind and on general cognitive capacity. Several courses focus on a research program which takes as a central question: How do children master their native language? Children hear many styles of speech, variable pronunciations, and incomplete expressions, but, despite this flux of experience, they come to speak and understand speech effortlessly, instantaneously, and subconsciously. Research aims to discover how this happens, how a person's linguistic capacity is represented in the mind, and what the genetic basis for it is. Students learn how various kinds of data can be brought to bear on their central question and how that question influences the shape of technical analyses.

The major in Linguistics is designed for students who are primarily interested in human language per se, or in describing particular languages in a systematic and psychologically plausible way, or in using language as a tool to reveal some aspect of human mental capacities. Such a major provides useful preparation for professional programs in foreign languages, language teaching, communication, psychology, speech pathology, and artificial intelligence (and thus in computer work).

Departmental advising in mandatory for second-semester sophomores and seniors.

## Requirements for M ajor

The major in Linguistics is 42 credits. The major consists of a "Core" of 18 credits plus 24 additional credits required for one of two tracks, "Linguistic Theory and a Language" or "Grammars and Cognition".

The double major is 27 credits - the core of 18 credits plus 3 upper level electives ( 9 credits). The double degree requires all 42 credits needed for the major.
(All linguistics courses are 3 credits each)
The Core (18 credits)
LING 200-Introductory Linguistics
LING 240-Language and Mind
LING 311-Syntax I (Fall only)
LING 312-Syntax II (Spring only)
LING 321—Phonology I (Fall only)
LING 322-Phonology II (Spring only)
Grammar and Cognition Tracks
PHIL 170 or 173 or 271
PHIL 360-Philosophy of Language
PSYC 100-Introduction to Psychology
PSYC 341-Introduction to Memory and Cognition
Two 300/ 400 level LING electives
Two electives from LING, PSYC, HESP, PHIL, or CMSC, chosen in consultation with the advisor.

Linguistic Theory and a Language Track
Six courses of study (or 18 credits total) in one language; one of these courses should be in the history or structure of the language, if offered. Two 300/ 400 level LING electives.

When possible, the language of specialization should be the same as the one used to satisfy the College of Arts and Humanities' foreign language requirement. The specialization normally includes those courses that make up the designated requirement for a major in the chosen language. Special provision may be made for students who are native speakers of a language other than English and wish to conduct analytical work on the grammar of that language. A student may also study grammatical theory and English; the 18 -hour concentration in English consists of courses in the history and structure of English to be selected in consultation with the student's Linguistics adviser.

For a double major, students need 27 credits in Linguistics, which normally include the LING courses for one of the two specializations.

## Citation in Linguistics

15 credit hours. LING 200, 240, 321, 311 and one course from approved list of courses. Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

## MANAGEMENT AND ORGANIZATION

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## MANAGEMENT SCIENCE AND STATISTICS

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## MARKETING

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## MATERIALS AND NUCLEAR ENGINEERING (ENM A, ENNU)

## A. James Clark School of Engineering

 Materials Science and Engineering (ENMA)2135 Chemical and Nuclear Engineering Building, (301) 405-5208
http:/ / www.mne.umd.edu
Chair: Christou
Professors: Armstrong* (Emeritus), Arsenault, Christou, Dieter* (emeritus), Orhlein, Roytburd, Rubloff, Smith (emeritus), Wuttig, Yeh
Associate Professors: Ankem, Briber (associate chair), Lloyd, MartinezMiranda, Ramesh, Salamanca-Riba
Assistant Professors: Kidder, Kofinas, Takeuchi, Wilson
Adjunct: Lawn

* Member of Mechanical Engineering Department


## The Major

The development, production and use of novel materials has become a major issue in all fields of engineering. Materials which are strong and light at the same time are needed for space structures; faster electro-optical switching materials will result in improved mass communications; and stronger high temperature plastics would improve the efficiency of transportation systems. The mission of the materials science and engineering program is to provide the student with an interdisciplinary science-based education to understand the structure and resulting properties of metallic, ceramic, polymeric, and electronic materials. Students will gain the ability to solve problems in the design, processing and use of advanced materials. Students will have the opportunity to work with faculty and industry on complex problems through projects, internships, and research and co-op experiences. A wide variety of careers are open to graduates of this program ranging from production and quality control in the traditional materials industries to the molecular construction of electronic materials in ultra-clean environments, and to the applications of materials in electronic packages. The application of materials to solve environmental, energy, and reliability problems are also career options.

Students may major in the Bachelor of Science in Materials Science and Engineering Program or may use Materials Engineering as a field of concentration in the Bachelor of Science Engineering Program.

## Requirements for Major

Requirements for the Materials Science and Engineering major include thorough preparation in mathematics, chemistry, physics, and engineering science as well as the required University general education (CORE) requirements. All students will be required to select an area of specialization, an upper-class science elective, and two technical electives. A minimum of 123 credits is required for a bachelor's degree. A sample program follows:


Minimum Degree Credits: 120 credits and the fulfillment of all department, school, and university requirements.
Four suggested specialization areas follow. Students are expected to take four specialization electives in one particular area during their junior and senior years after consulting with their adviser.

Materials Science: ENMA 464-Environmental Effects; ENMA 420Intermediate Ceramics; ENMA 489C-Electronic Packing Materials; ENMA 495-Polymeric Materials; ENMA 481—Electronic Materials; ENMA 499— Laboratory Projects

Applications of Materials and Manufacturing: ENMA 472-Technology and design of Engineering Materials: ENMA 489A-Design of Composites; ENMA 489L-Manufacturing Ceramics; ENMA 489R-Manufacturing Polymers; ENME 400-Machine Design; ENME 412-Mechanical Design for Manufacturing; ENME 465-Fracture Mechanics; ENAE 424Design and Manufacturing of Composites and Prototypes; ENMA 499— Laboratory Projects

Organic Materials: ENMA 495-Polymeric Materials; ENMA 496Processing of Polymers; ENCH 490-Introduction to Polymer Chemistry; ENMA 489R-Manufacturing Polymers; ENCH 494-Polymer Technology Laboratory; ENMA 499-Laboratory Projects

Electrical and Electronic Materials: ENMA 481-Introduction to Electronic and Magnetic Materials; ENMA 489C-Electronic Packing Materials; ENEE 302-Digital Circuits; ENEE 460-Control Systems: ENEE 480Fundamentals of Solid State Electronics.

## Admission

All Materials Science and Engineering students must meet admission, progress, and retention standards of the A. James Clark School of Engineering.

## Advising

Students choosing materials science and engineering as their major or materials engineering as their primary or secondary field of concentration should contact Ms. Parvathi Narayan, the Undergraduate Secretary, Room 2309, Chemical and Nuclear Engineering Building, at (301) 405-5209. Ms. Narayan can set up appointments with Professors Lloyd, Kofinas and Wilson, the Undergraduate Advisors.

## Co-op Program

The Materials Science and Engineering program works within the A. James Clark School of Engineering Cooperative Engineering education Program. For details, see the A. James Clark School of Engineering entry in chapter 6.

## Financial Assistance

Financial Aid based upon need is available through the Office of student Financial Aid. Faculty Merit Scholarships are offerred to outstanding students by the department. Other scholarships are available through the A. James Clark School of Engineering.

## Honors and Awards

Each of the large number of professional-materials-oriented societies such as the metallurgical and ceramic societies sponsor awards to recognize outstanding scholarship and undergraduate research. All students enrolled in the materials engineering program are encouraged to select a faculty adviser who in their junior and senior years will guide them towards nomination for these awards.

Student organization: There is an active student chapter of The Minerals, Metals \& Materials Society (TMS).

Course Code: ENMA
Nuclear Engineering Program (ENNU)
2309 Chemical and Nuclear Engineering Building, (301) 405-5209
http:/ / www.mne.umd.edu
Professor and Chair: Christou
Professors: Christou, Modarrest, Mosleh, Roush, Wolf
Associate Professor: Al-Sheikhly, Pertmer
Assistant Professors: Gavrilas
Emeriti: Duffy, Hsu, Munno, Silverman, Almenas
$\dagger$ Distinguished Scholar-Teacher

## The Major

Nuclear and radiation engineering combines applied and fundamental science with the most advanced technologies available today. The discipline contributes to our lives through medical procedures, diagnoses of the structural integrity of airplanes and bridges, advanced materials manufacturing, non-polluting electricity generation, space exploration, environmental restoration, and of course, smoke detectors. All of these, and many other applications, utilize nuclear technology. The mission of the nuclear engineering program is to provide the student with an interdisciplinary education which allows the graduate to attain the skills necessary to meet the challenges of future technologies. Students gain the ability to apply knowledge of radiation engineering, reactor neutronics, radiation interactions with matter, and nuclear system safety to solve current and future problems in a wide variety of areas. Students have the opportunity to work with faculty and industry on 'real world' problems through research projects, internships, and co-op experiences. Because of the wide range of uses of nuclear and radiation technologies, the nuclear engineer finds interesting and challenging opportunities in industry, government, and research laboratories, with careers ranging from electricity generation to materials development, to applications of ionizing radiation in manufacturing processes and health industries.

## Requirements for Major

The curriculum is composed of: (1) the required University general education (CORE) requirements; (2) a core of mathematics, physics, chemistry, and engineering sciences required of all engineering students; (3) 15 credits of courses selected within a secondary field; (4) 27 credits of nuclear engineering courses including ENNU 215, 441, 442, 443, 450, $455,465,480,485,490$, and 495 ; (5) the course on environmental effects on materials, ENMA 464. A maximum degree of flexibility has been retained so that the student and adviser can select a number of elective courses. A sample program follows.


Minimum Degree Credits: 120 credits and fulfillment of all department, school, and University requirements. Students must consult with an adviser on selection of appropriate courses for their particular course of study.

## Admission

All Nuclear Engineering students must meet admission, progress and retention standards of the A. James Clark School of Engineering.

## Co-op Program

The nuclear engineering program works within the A. James Clark School of Engineering Cooperative Engineering Education Program. For information on this program, see the A. James Clark School of Engineering entry in chapter 6 of this catalog, or call the department office at 405-3863.

## Advising

Students choosing nuclear engineering as their primary field should follow the listed curriculum for nuclear engineers. They should submit a complete program of courses for approval during their junior year. Students electing nuclear engineering as their secondary field should seek advice from a member of the nuclear engineering faculty prior to their sophomore year. Contact Ms. Parvathi Narayan, the Undergraduate Secretary, Room 2309, Chemical and Nuclear Engineering Building, at (301) 405-5209 or call Professor Gavrilas, the Undergraduate Advisor, at (301) 405-5832 to schedule an appointment.

## Financial Assistance

Financial aid based upon need is available through the Office of Student Financial Aid. A number of scholarships are available through the A. James Clark School of Engineering. Part-time employment is available in the department. Of particular interest are scholarships available to qualified students at all undergraduate levels from the Institute for Nuclear Power Operations, the US Department of Energy and the American Nuclear Society. Faculty merit scholarships are offered to outstanding students by the department.

## Honors and Awards

Annual awards are given to recognize scholarship and outstanding service to the department, school and university. These awards include the American Nuclear Society Award for Leadership and Service and the Award for Outstanding Contribution to the ANS Student Chapter.

## Student Organization

Students operate a campus student chapter of the professional organization, the American Nuclear Society.

Course Code: ENNU

## MATHEM ATICS (MATH)

College of Computer, Mathematical and Physical Sciences 1117 Mathematics Building, Undergraduate Office, (301) 405-5053

Professor and Chair: Fitzpatrick
Professors: J. Adams, W. Adams, Antman, Auslander, Benedetto, Berenstein, Boyle, Brin, Chu, Cohen, J. Cooper, Ellis, Fey**, Freidlin, Glaz, Goldman, Grebogi*, Green, Greenberg, Grillakis, Grove, Gulick, Halperin ***** (Dean, CMPS), Hamilton, Healy, Herb, Jacobson, Johnson, Kagan, Kedem, King, Kleppner, Kudla, Kueker, Laskowski, Layt, Levermore, J. Li, Lipsman****, Lopez-Escobar, Machedon, Millson, Nochetto, Novikovt†, Osborn, Pego, Rosenberg, Rudolpht, Schafer, Slud, Sweet, Washington, Wolfe, Wolpert $\dagger$, Yang, Yorke $\dagger$ +***
Associate Professors: Berg, Coombes, Dancis, Helzer, Lee, Liu, Schwartz, Smith, Stuck, von Petersdorff, Warner, WinkeInkemper, Wu
Assistant Professors: D. Cooper**, Hunt***, Iozzi, B. Li, Qin, Ramachandran
Professors Emeriti: Babuskat $\dagger$, Brace, Correl, Edmundson, Ehrlich, Goldberg, Goldhaber, Good, Heins, Horvath, Hubbard, Hummel, Kellogg, Kirwan, Lehner, Markley, Neri, Olver, Owings, Stellmacher, Syski, Zedek
Associate Professors Emeriti: Sather, Schneider
Affiliate Professors: O'Leary, Stewart, Young
Adjunct Professor: Rinzel
$\dagger$ Distinguished Scholar-Teacher
$\dagger \dagger$ Distinguished University Professor

* Joint Appointment: IPST and Institute for Plasma Research
** J oint Appointment: Department of Curriculum and Instruction
*** Joint Appointment: IPST
****Associate Dean, CMPS
***** Dean, CMPS
The program in mathematics leads to a degree of Bachelor of Science in mathematics and offers students training in preparation for graduate work, teaching, and positions in government or industry. Mathematical training is integrated with computer use in several courses. Because a strong mathematical background is important in several fields, over a third of UMCP mathematics majors are double majors. Additional information on these topics and mathematics is available from the department website.


## Requirements for Major

There are two tracks for the major, the traditional track and the secondary education track. The latter is for students seeking to become certified to teach mathematics at the secondary level. Each mathematics major must complete each required course with a grade of C or better.

## TRADITIONAL TRACK

## Major Requirements:

1. The introductory sequence MATH 140, 141, 240, 241 or the corresponding honors sequence MATH 350-351 (previously MATH 250-251).
2. Eight MATH/ MAPL/ STAT courses at the 400 -level or higher, at least four of which are taken at College Park. The eight courses must include:
(a) At least one course from MATH 401, 403, 405.
(b) At least one course from MATH 246, 414, 415, 436, 462. If MATH 246 is chosen, it will not count as one of the eight upperlevel courses.
(c) One course from MAPL 460,466.
(d) MATH 410 (completion of MATH 350-351 [previously MATH 250-251] exempts the student from this requirement and (e) below; students receive credit for two 400 -level courses.)
Students are strongly encouraged to complete MATH 310 prior to attempting MATH 410.
(e) A one-year sequence which develops a particular area of mathematics in depth, chosen from the following list:
(i) MATH 410-411
(ii) MATH 410-412
(iii) MATH 403-404
(iv) MATH 403-405
(v) MATH 446-447
(vi) STAT 410-420
(f) The remaining 400 -level MATH/ MAPL/STAT courses are electives, but cannot include any of: MATH 400, 461, 478, or STAT 464. Also, students with a strong interest in applied mathematics may, with the approval of the Undergraduate Office, substitute two courses (with strong mathematics content) from outside the Mathematics Department for one upper-level elective course.
3. One course from CMSC 105, 106, 114 or ENEE 114. Student may be exempt from this requirement if he or she can demonstrate adequate programming knowledge from prior course or work experience.
4. One of the following supporting three-course sequences. These are intended to broaden the student's mathematical experience. Other sequences might be approved by the Undergraduate Office but they would have to make use of mathematical ideas, comparable to the sequences on this list.
(a) (i) PHYS 161-262-263
(ii) PHYS 171-272-273
(iii) PHYS 141-142, and an upper-level physics course approved by the Mathematics Department
(b) ENES 102, PHYS 161, ENES 220
(c) (i) CMSC 114-214 and one of CMSC 311, 330 (ii) CMSC 114-150-251
(d) CHEM 103-113, and one of CHEM 227, 233
(e) ECON 200-201 (previously ECON 201-203), and one of ECON 305 or 306
(f) BMGT 220-221-340.

## SECONDARY EDUCATION TRACK

## Major Requirements:

1. The introductory sequence MATH 140, 141, 240, 241 or the corresponding honors sequence MATH 350-351 (previously MATH 250-251).
2. Seven MATH/ MAPL/ STAT courses at the 400 -level or higher, at least four of which are taken at College Park. The seven courses must include:
(a) MATH 410
(b) MATH 402 or MATH 403
(c) MATH 430
(d) STAT 400 or STAT 410
(e) At least one course from MATH 406, 445, 446, 447, 450, 456 or 475.
(f) At least one course from Math 246, 401, 420, 452, 462, or 472 or MAPL 460 or 466 . If MATH 246 is chosen, it will not count as one of the seven upper-level courses.
(g) The remaining 400 -level MATH/ MAPL/ STAT courses are electives, but cannot include any of: MATH 400, 461, 478, or STAT 464.
3. At least one of the courses CMSC $105,106,114$, or 214 or any CMSC course requiring one of these as a prerequisite.
4. EDCI 450 and 451.
5. One of the following supporting two course sequences. These are intended to broaden the student's mathematical experience.
(a) CHEM 103 and 104
(b) CHEM 103 and 113
(c) PHYS 221 and 222
(d) PHYS 161 and 262
(e) PHYS 141 and 142
(f) BIOL 105 and 106
(g) ASTR 200 and a second 3-credit ASTR course, excluding ASTR $100,101,110$, and 111.
(h) METO 200 and 201, and any 400 level METO course.
(i) GEOL 100 and 110, and one of GEOL 322 or GEOL 341.

The student-teaching pair EDCI 450-451 is 15 credits and has further prerequisites in the College of Education. In order to take these courses the student must be admitted into the College of Education. A student in the secondary education track of the mathematics major would normally be expected to receive a double major in Mathematics and Mathematics Education.

## AREAS OF STUDY

Within the Department of Mathematics there are a number of identifiable areas which students can pursue to suit their own goals and interests. They are briefly described below. Note that they do overlap and that students need not confine themselves to one of them.

1. Pure mathematics: the courses which clearly belong in this area are: MATH 402, 403, 404, 405, 406, 410, 411, 414, 415, 417, 430, 432, 436, 437, 445, 446, 447, 452, STAT 410, 411, 420 . Students preparing for graduate school in mathematics should include MATH 403, 405, 410 and 411 in their programs. MATH 463 (or 660) and MATH 432 (or 730) are also desirable. Other courses from the above list and graduate courses are also appropriate.
2. Secondary teaching: When selecting the seven courses for the Secondary Education Track, students are encouraged to chose the following as they are required for certification to teach mathematics at the secondary level: MATH 402 or 403 , MATH 430, and STAT 400. The following additional courses are particularly suited for students preparing to teach: MATH 401, MATH 406, MATH 445, and MATH 475.
EDHD 413, EDHD 420, EDPA 301, EDCI 350, EDCI 355, EDCI 390, EDCI 457, EDCI 450 and EDCI 451 are required for certification. Before registering for any of these courses, the student must apply for and be admitted to the College of Education's Secondary Education Program. Note that the Maryland State Department of Education (MSDE) is phasing in additional requirements for teaching of reading courses for all areas of secondary education. These changes are almost certain to result in additional classes for those seeking certification in secondary mathematics.
3. Statistics: For a student with a Bachelors degree seeking work requiring some statistical background, the minimal program is STAT 400-401. To work primarily as a statistician, one should combine STAT 400-401 with STAT 430 and at least one more statistics course, most suitably, STAT 440 or STAT 450. A stronger sequence is STAT 410, 420, 430. This offers a better understanding and wider knowledge of statistics and is a general purpose program (i.e., does not specify one area of application). For economics applications STAT 400, 401, 430, 440, 450, and MAPL 477 should be considered. For operations research MAPL 477 and/ or STAT 411 should be added or perhaps substituted for STAT 450. To prepare for graduate work, STAT 410 and 420 give the best background, with STAT $405,411,430,440,450$ added at some later stage.
4. Computational mathematics: there are a number of math courses which emphasize the computational aspects of mathematics including the use of the computer. They are MAPL 460, 466, 467, MATH 431, 450, 456, 475 and STAT 430. Students interested in this area should take CMSC 114, 214 as early as possible, and CMSC 420, 211 are also suggested.
5. Applied mathematics: the courses which lead most rapidly to applications are the courses listed above in 3 and 4 and MATH 401, $412,414,415,420,431,436,462,463,464$, and MATH/ MAPL 420 and 472. A student interested in applied mathematics should obtain, in addition to a solid training in mathematics, a good
knowledge of at least one area in which mathematics is currently being applied. Concentration in this area is good preparation for employment in government and industry or for graduate study in applied mathematics.

## Advising

Advising for math majors is mandatory. Students are required to sign up for an advising appointment at the math undergraduate office window (1117 Mathematics Building), beginning the week before preregistration.

## Honors

The Mathematics Honors Program is designed for students showing exceptional ability and interest in mathematics. Its aim is to give a student the best possible mathematics education. Participants are selected by the Departmental Honors Committee during the first semester of their junior year. A precise statement of the requirements may be found in the Math Undergraduate Office.

The department also offers a special mathematics department honors analysis sequence (MATH 350-351, previously MATH 250-251) for promising freshmen with a strong mathematical background (including calculus). Enrollment in the sequence is normally by invitation but any interested student may apply to the Mathematics Departmental Honors Committee for admission. Participants in the University Honors Program may also enroll in special honors sections of the lower-level mathematics courses (MATH 140H, 141H, 240H, 241H, 246H).

The mathematics departmental honors calculus sequence and the University Honors Program are distinct, and enrollment in one does not imply acceptance in the other. Neither honors calculus sequence is a prerequisite for participating in the Mathematics Honors Program, and students in these sequences need not be mathematics majors.

## Awards

Aaron Strauss Scholarships. Up to two are awarded each year to outstanding junior math majors. The recipient receives full remission of (in-state) tuition and fees. Applications may be obtained early in the spring semester from the Mathematics Undergraduate Office, 1117 Mathematics Building.

Higginbotham Prize: A monetary award is made to an outstanding junior math major in the spring.

Carol Karp Award: A monetary award is made to a senior math major for an outstanding achievement in logic.

Milton Abromowitz Award: A monetary award is made to an outstanding senior math major in the spring.

## Placement in Mathematics Courses

The Department of Mathematics has a large offering to accommodate a great variety of backgrounds, interests, and abilities. The department permits students to take any course for which they have the appropriate background, regardless of formal course work. For example, students with a high school calculus course may be permitted to begin in the middle of the calculus sequence even if they do not have advanced standing. Students may obtain undergraduate credit for mathematics courses in any of the following ways: passing the appropriate CEEB Advanced Placement Examination, passing standardized CLEP examinations, and through the department's Credit-by-Examination. Students are urged to consult with advisers from the Department of Mathematics to assist with proper placements.

## Statistics and Probability and <br> Applied M athematics

Courses in statistics and probability and applied mathematics are offered by the Department of Mathematics. These courses are open to non-majors as well as majors, and carry credit in mathematics. Students wishing to concentrate in the above may do so by choosing an appropriate program under the Department of Mathematics.

# M ATHEM ATICAL STATISTICS PROGRAM 

College of Computer, Mathematical and Physical Sciences 1105 Mathematics, (301) 405-5061
http:// www.math.umd.edu/ stat
Director: Smith
Professors: Freidlin, Kagan, Kedem, Slud, Yang
Associate Professors: Quin
Professor Emeritus: Syski
The Mathematical Statistics Program is a graduate program for students concentrating in the study of Statistics, Probability and their application in real world problems. An undergraduate program emphasizing Statistics is available to majors in Mathematics, and undergraduate citations in Statistics and in Actuarial Mathematics are also available. All STAT courses carry credit in Mathematics.

Course code: STAT

## MEASUREM ENT, STATISTICS, AND EVALUATION (EDMS)

## College of Education

1230 Benjamin Building, (301) 405-3624
http:/ / www.inform.umd.EDU/ EDM S
Professor and Chair: Lissitz
Professors: Dayton, Macready, Stunkand (Emeritus)
Associate Professors: Hancock, Johnson, Schafer
Assistant II: Roberts
Adjunct Professor: Perg
Affiliated Professor: Rudner
Adjunct Associate Professor: Van Secker

## For Advanced Undergraduates and Graduates

The Department of Measurement, Statistics, and Evaluation offers courses in classroom assessment, applied statistics, and computer-based simulation (Monte Carlo method) for undergraduates. These courses provide a foundation in methods that are very useful for most career choices. The department is primarily graduate-oriented and offers programs at the master's and doctoral levels for persons with quantitative interests from a variety of social science and professional backgrounds. In addition, a doctoral minor is offered for students majoring in other areas. The doctoral major is intended primarily to produce individuals qualified to teach courses at the college level in measurement, applied statistics and evaluation, generate original research and serve as specialists in measurement, applied statistics or evaluation in school systems, industry or government. The master's program is designed to provide individuals with a broad range of data management, analysis and computer skills necessary to serve as research associates in academia, government, and business. At the doctoral level, a student may choose a specialty within one of three areas: theoretical measurement, applied statistics, and program evaluation. Undergraduates may begin course work for the M.A. while still pursuing the B.A. or B.S., subject to department approval.

Course Code: EDMS

## MECHANICAL ENGINEERING (ENME)

## A. James Clark School of Engineering

2181 Engineering Class room Building, (301) 405-2410
http:/ / www.enme.umd.edu/
Professor and Chair: Anand
Associate Chair: diMarzo
Director, Undergraduate Studies: Ainane
Professors: Anand, Barker, Baz, Bernard, Dasgupta, diMarzo, Duncan, Fourney, Gupta, A., Holloway, Joshi, Magrab, Ohadi, Pecht, Radermacher, Tsai, Wallace
Associate Professors: Azarm, Balachandran, Bigio, Han, Herold, Piomelli, Sandborn, Shih, Wang, Zhang
Assistant Professors: Bruck, Buckley, Chen, DeVoe, Gupta, S., Herrmann, Jackson, Kiger, Kim, McCluskey, Mead, Schmidt, Walsh

Lecturers: Ainane, Coder, Etheridge, Graham, Haslach, Last, Pavlin
Emeriti: Allen, Armstrong, Berger, Buckley, Cunniff, Dieter, Jackson, Kirk,
Marks, Sanford, Sayre, Shreeve, Talaat, Walston, Yang

## The Major

The mechanical engineering major prepares the student for the challenges of today and the future. The curriculum is one of the most up-to-date and forward-looking programs in the country. Students become involved with real-world engineering projects early on in the program through extensive interaction with engineers from industry and this interaction is continued throughout hte curriculum. The coursework is now fully intregated in order to provide a seamless experience in their undergraduate education. The student graduates with the skills and the knowledge base which are necessary for success in today's marketplace and with the education necessary to adapt and succeed in the future as technology continues to change.

The mechanical engineer of today faces a more extensive range of critical problems than ever before. It is essential that the graduate be skilled not only in the traditional fundamentals of mechanical engineering such as solid mechanics, fluid mechanics, thermodynamics, heat transfer, materials engineering, electronic instrumentation and measurements, controls and design, but also in new and emerging areas such as mechatronics, smart structures, electronic packaging, communication, information systems, total quality management, reliability and electromechanical systems. Most of these topics require extensive use of modern computing hardware and software. New classrooms which are equipped with state-of-the art computers and software have been added and these facilities are used as an on-going part of many courses. The student is taught to make use of this capability and to make sound engineering judgments while analyzing the seemingly unmanageable amounts of data and information which are obtained. Attributes such as teamwork, ethics, social awareness, and leadership are emphasized in many courses.

Electives taken during the senior year prepare the graduate to choose any of a number of career paths or to select a broad-based group of electives. All students work on projects throughout their program,, many of which teach the advantages of teamwork and the skills required for a team to succeed. Individual projects provide the opportunity for sometimes far-out creative thinking. In all cases, the students work closely with individual faculty members who serve as teachers, advisors, and mentors. Many undergraduate students have the opportunity to serve as Research Fellows and/ or Teaching Fellows in the department.

Requirements for M ajor

|  | Semeste Credit Hour <br> \| <br> II |
| :---: | :---: |
| Freshman Year |  |
| MATH 140-Calculus I....................................................... 4 | 4 |
| MATH 141-Calculus II | 4 |
| CHEM 133-General Chemistry for Engineers........ ................. 4 |  |
| PHYS 161-General Physics. | 3 |
| ENGL101-Introduction to Writing ....................................... 3 | 3 |
| ENES 100-Introduction to Engineering Design........................ 3 | 3 |
| ENES 102-Statics | 3 |
| CORE Requirements | 6 |
| Total Credits ............................................................... 14 | 1416 |
| Sophomore Year |  |
| MATH 241-Calculus III..................................................... 4 | 4 |
| MATH 246-Differential Equations | 3 |
| PHYS 262, 263-General Physics....................................... 4 | 4 |
| ENES 220-Mechanics of Materials .................................... 3 | 3 |
| ENES 221-Dynamics ..................................................... 3 | 3 |
| ENME 232-Thermodynamics | 3 |
| ENME 252-Electronics and Instrumentation I | 3 |
| ENME 271-Computational Methods in Mechanical Engineering |  |
| CORE Requirements ......................................................... 3 | .. 3 3 |
| Total Credits ............................................................... 17 | . 1716 |
| Junior Year |  |
| ENME 331-Fluid Mechanics ............................................. 3 | 3 |
| ENME 332-Transfer Processes | 3 |
| ENME 351-Electronics and Instrumentation II........................ 3 | . 3 |
| ENME 361-Vibration, Controls, and Optimization I | 3 |
| ENME 362-Vibration, Controls, and Optimization II | 3 |
| ENME 371-Product Engineering and Manufacturing................. 3 | ... 3 |


| ENME 382-Engineering Materials and |  |
| :---: | :---: |
| Manufacturing Processes. <br> ENME 392-Statistical Methods for |  |
|  |  |
| Product and Process Development. | 3 |
| ENGL 393 - Technical Writing............................................. 3 |  |
| CORE Requirements | 3 |
| Total Credits ............................................................... 15 | 15 |
| Senior Year |  |
| ENME 472-Integrated Product and Process Development II........ | 3 |
| Technical Electives* ......................................................... 9 | 9 |
| CORE Requirements ........................................................ 3 | 3 |
| Total Credits ............................................................... 12 | 15 |
| *At least three of the four technical electives must be design. |  |

Sample Elective Topics
Computer-Aided Design and Manufacturing
Packaging of Electronic Systems
Energy Conversion
Engineering Management
Engineering Software Development
Environmental Engineering
Fracture Mechanics
Automative Design
Robotics
Manufacturing
Mechatronics
Fluid Machinery

## Admission

Admission requirements are identical to those set by the Clark School of Engineering. Please consult chapter 1.

## Advising

All mechanical engineering students are required to meet with an adviser during registration. Contact the Undergraduate Advising Office, 2188 Engineering Classroom Building.

## Cooperative Education Program

Participation in the Cooperative Education Program is encouraged. See chapter 1 for details.

## Financial Assistance

A very limited amount of financial aid is available. Information may be obtained in the Undergraduate Advising Office.

## Honors and Awards

The Honors Program is administered through the Clark School of Engineering. Individual honors and awards are presented based on academic excellence and extracurricular activities.

## Student Organizations

Student chapters of professional societies include the American Society of Mechanical Engineers, the Society of Automotive Engineers, the Society of Manufacturing Engineers, and the American Society of Heating, Refrigeration and Air Conditioning Engineers. The mechanical engineering honor society is Pi Tau Sigma. Information regarding these societies may be obtained at 2188 Engineering Classroom Building.

Course Code: ENME

## METEOROLOGY (METO)

College of Computer, Mathematical, and Physical Sciences 3433 Computer and Space Sciences Building, New Wing, (301) -405-5391 http:// www.meto.umd.edu

## Professor and Chair: Kalnay

Professors: Baer, Carton, Dickerson, Ellingson, Hudson, Pinker, Thompson, Vernekar, Zhang.

## Adjunct Professor: Sellers

The Department of Meteorology offers a limited number of courses of interest to undergraduate students. Undergraduates interested in pursuing a bachelor's degree program preparatory to further study or work in meteorology are urged to consider either a citation (minor) in Meteorology or the Physical Sciences program. It is important that students who anticipate careers in meteorology consult the Physical Sciences program adviser representing the Department of Meteorology as early as possible in their studies.

Because of its interdisciplinary nature, the study of the atmosphere requires a firm background in the basic sciences and mathematics. To be suitably prepared for 400-level courses in meteorology, the student should have the following background: either the physics-major series PHYS 171-272-273 or the series PHYS 161-262-263; the mathematics series MATH 140-141-240-241-246 and either the series CHEM 103-113. Consult the list of approved courses (chapter 8) for electives in meteorology.

Students who may be preparing for graduate education in meteorology are strongly advised to pursue further course work from among the areas of physics, applied mathematics, chemistry, computer science, and statistics to supplement course work in meteorology. With proper counseling from the Department of Meteorology adviser, the student wishing to graduate with an M.S. degree in meteorology may achieve that goal in five-and one-half years from the inception of university studies.

Course Code: METO

## MICROBIOLOGY

Departments in the College of Life Sciences have been reorganized. Courses in microbiology are now offered by the Department of Cell Biology and Molecular Genetics.

## SCHOOL OF MUSIC (MUSC)

College of Arts and Humanities
Tawes Fine Arts Building, (301) 405-5549

## Director: Kendall

Associate Directors: Fry, Miller
Professors: Cohen, Cossa, DeLio, Elsing, Fischbach, Folstrom, Guarneri String Quartet (Dalley, Soyer, Steinhardt, Tree), Heavem3ectong, (ec lelln Tc0.1
and literature of music; (3) to prepare the student for graduate work in the field; and (4) to prepare the student to teach music in the public schools. To these ends, three degrees are offered: the Bachelor of Music, with majors in theory, composition, and music performance; the Bachelor of Arts, with a major in music; the Bachelor of Science, with a major in music education, offered in conjunction with the College of Education.

Music courses and private lessons are open to all majors who have completed the specified prerequisites, or their equivalents. Lessons are also available for qualified non-majors, if teacher time and facilities permit. The University Bands, University Orchestra, University Chorale, University Chorus, Jazz Ensemble, and other ensembles are likewise open to qualified students by audition.

## The Bachelor of Music Degree

Designed for qualified students with extensive pre-college training and potential for successful careers in professional music. A grade of $C$ or above is required in all major courses.
College of Arts and Humanities requirements are waived for students majoring in B.M. Degree programs.

Sample Program—Bachelor of Music (Perf. Piano)
Freshman Yor Credits
MUSP 119/ 120—Applied Music......................................................................... 8
MUSC 128-Sight Reading for Pianists ................................................... 4
MUSC 150/ 151—Theory of Music I/II ..................................................... 6
CORE Program..................................................................................... 12
Total ................................................................................................. 30
Sophomore Year
MUSP 217/ 218-Applied Music............................................................. 8
MUSC 228-Accompanying for Pianists .................................................. 4
MUSC 230-History of Music I................................................................ 3
MUSC 250/251—Advanced Theory of Music I/II ...................................... 8
CORE Program..................................................................................................... 9
Total ................................................................................................. 32

## Junior Year

MUSP 315/ 316-Applied Music............................................................. 8
MUSC 330/ 331-History of Music II/ III ................................................... 6
MUSC 328-Chamber Music Performance for Pianists ............................. 4
MUSC 450-Musical Form..................................................................... 3
CORE Program...................................................................................................... 10
Total ................................................................................................... 31

## Senior Year

MUSP 419/420-Applied Music............................................................ 8
MUSC 492-Keyboard Music I ............................................................... 3
Musc 467-Piano Pedagogy I................................................................... 3
Elective................................................................................................ 4
CORE Program........................................................................................ 9
Total ................................................................................................... 27

Designed for qualified students whose interests include a broader liberal arts experience. A grade of C or above is required in all major courses. Requirements for the Music-Bachelor of Arts Degree major include a minimum of 45 upper-level credits completed and the foreign language requirement of the College of Arts and Humanities.

## Sample Program—Bachelor of Arts (Music)

Credit Hours

## Freshman Year

MUSP 109/ 110-Applied Music ......................................................... . 4
MUSC 150/ 151— Theory of Music I/ II ................................................... . 6
MUSC 129-Ensemble ......................................................................... . 2
Electives, College and CORE Requirements .......................................... 18
Total ......................................................................................................... 30

## Sophomore Year

MUSP 207/ 208-Applied Music ........................................................... . . 4
MUSC 250/251—Advanced Theory of Music I/ II ..................................... . 8
MUSC 229—Ensemble ........................................................................ . 2

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

## 132 Natural Resource Sciences and Landscape Architecture

Junior Year
新 .....  2
MUSC 330/331-History of Music II/ III ..... 6
MUSC 450-Musical Form ..... 3
MUSC 329-Ensemble ..... 1
Electives, College and CORE Requirements ..... 18
Total ..... 30
Senior Year
Music Electives ..... 10
Electives, College and CORE Requirements ..... 20
Total ..... 30

## Citations

Citations in Music Performance
16 credit hours. MUSC 129, 229, 329, 130, and 140; MUSP 302 (prer MUSP 203), and MUSP 303 (prer MUSP 302); and one elective from approved list of courses.

Citation in Music Studies
15 credit hours. MUSC 130, 140; MUET 210 or 200; and two electives from approved list of courses.

Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

## The Bachelor of Science Degree (Music Education)

The School of Music in conjunction with the College of Education offers the Bachelor of Science degree with concentrations available in Instrumental Music Education and Choral-General Music Education for qualified students preparing for careers in K-12 teaching. For sample program requirements, see Deptartment of Curriculum and Instruction, Music Education.

## Special Programs

The School of Music cooperates with other departments in double majors, double degrees, and Individual Studies programs. Details are available on request.

Course Codes: MUSC, MUED, MUSP

## NATURAL RESOURCE SCIENCES AND LANDSCAPE ARCHITECTURE (NRSL)

For Information, consult listings elsewhere in this chapter under Agronomy and Horticulture and Landscape Architecture.

## NATURAL RESOURCES MANAGEMENT PROGRAM (NRMT)

College of Agriculture and Natural Resources<br>1457 Animal Sciences/ Biological Resource Eng. Bldg., (301) 405-1198<br>http:/ / www.agnr.umd.edu/ users/ Bioreng/ ugnrmt.htm<br>E-mail: bg4@umail.umd.edu

Associate Professor and Coordinator: Kangas
Assistant Professor: Baldwin
Instructor: Adams

## The Major

The goal of the Natural Resources Management Program is to teach students concepts dealing with the sound use and management of natural resources. In the program, the role of natural resources in economic development is balanced with concern for society and the environment. Employment opportunities for students graduating from the program exist in the fields of forestry and urban forestry, wetland science, environmental consulting, wildlife management, park management, and environmental enforcement, regulation, and policy development.

Students will pursue a broad academic program and elect subjects concentrated in one of three areas of interest: Plant and Wildlife Resources Management, Land and Water Resources Management, of Environmental Education and Park Management.
(Students interested in landscape management, turf and golf course management, plant science, horticulture and crop production, or conservation of soil, water, and environment should consider the Natural Resource Sciences major listed immediately before the Natural Resources Management Program)

## Requirement for the Major

## Semester

 Credit HoursCORE Program Requirements* .40
BSCl 105-Principles of Biology 1 . .4
BSCI 106-Principles of Biology II ..... 4
CHEM 103, 113-General Chemistry I, General Chemistry II* .....  8
One of the following:
GEOL 100, 110? Physical Geology and Physical
Geography Laboratory* OR 4
GEOG 201, 211? Geography of Environmental Systems
and Geography of Environmental Systems Laboratory* .....  4
NRSC 200-Fundamentals of Soil Science* .....  4
AREC 240-Introduction to Economics and the Environment* .....  3
AREC 332-Introduction to Natural Resource Policy. .....  3
CMSC 103-Introduction to Computing .....  3
One of the following:
MATH 140-Calculus I* OR .....  4
MATH 220-Elementary Calculus I* .....  3
BIOM 301-Introduction to Biometrics .....  3
BSCl 460, 461 - Plant Ecology and Plant Ecology Laboratory .....  5
One of the following:
GEOG 340-Geomorphology OR .....  3
GEOL 340-Geomorphology .....  4
BSCI 223-General Microbiology* .....  4
One of the following:
PHYS 117-Introduction to Physics* OR ..... 4
PHYS 121-Fundamentals of Physics I* .....  4
One of the following:
GVPT 273-Introduction to Environmental Politics OR .....  3
GVPT 306-Global Ecopolitics .....  3
NRMT 470 - Principles of Natural Resources Management .....  .4
*May satisfy college requirements and/ or a CORE requirement.
Option Areas (23 hours)
Plant and Wildlife Resource Management
Science Area ..... 10
Management Area ..... 10
Related Course Work or Internship .....  3
Land and Water Resource Management
Science Area ..... 10
Management Area ..... 10
Related Course Work or Internship .....  3
Environmental Education and Park ManagementScience Area10
Management and Education Area ..... 10
Related Course Work or Internship ..... 3

## Advising

Advising is mandatory. See the Coordinator, 1457 Animal Sciences/ Biological Resources Engineering Building, (301) 405-1198.

## Student Organization

Students may join the campus branch of the Natural Resources Management Society. Further information is available from the Natural Resources Management Society in 1457 Animal Sciences/ Biological Resources Engineering Building.

Course Code: NRMT

## NATURAL RESOURCE SCIENCES (NRSC)

## College of Agriculture and Natural Resources

2102 Plant Sciences Building
301-405-4351, 301-405-4355
cw5@umail.umd.edu, kh26@umail.umd.edu
http:/ / www.agnr.umd.edu/ users/ nrsl/
Professor and Chair: Weismiller
Professors: Angle, Dernoeden, James, Kenworthy, McIntosh*, Miller, Mulchi, Ng, Quebedeaux, Rabenhorst, Solomos, Steiner, Walsh, Weil
Associate Professors: Beste, Bouwkamp, Carroll, Coale, Deitzer, Glenn, Grybauskas, M. Hill, R. Hill, McClurg, Ritter, Slaughter, J.B. Sullivan, Swartz, Turner, Vough
Assistant Professors: Coleman, Costa, Dzantor, Everts, Kratochvil, Lea-Cox, Myers, J.H. Sullivan
Affiliate Professors: Balge, Kearney, Terlizzi
Adjunct Professors: Chappelle, Lee, Tamboli, Thomas
Adjunct Associate Professors: Daughtry, Meisinger, Montroll, Saunders, Van Berkum
Adjunct Assistant Professor: Pooler
Instructors: Buriel, Mityga, Nola, Steinhilber
Professors Emeriti: Aycock, Axley, Bandel, Clark, Decker, Fanning, Gouin, Hoyert, Kuhn, Link, Miller, Oliver, Shanks, Stark, Thompson, Wiley

* Distinguished Scholar-Teacher


## The M ajor

The Department of Natural Resource Sciences and Landscape Architecture offers three undergraduate majors. Two lead to the bachelor of science (B.S.) degree; one in Natural Resource Sciences and the other in General Agriculture Sciences. The third major leads to a bachelor of landscape architecture (B.L.A.) degree. For additional information on General Agriculture Sciences and Landscape Architecture, see the entry for those programs earlier in this chapter.

Undergraduate students enrolled in the Natural Resource Sciences major must select one of the following five areas of concentration:

```
Conservation of Soil, Water and Environment (Area A)
Horticulture and Crop Production (Area B)
Landscape Management (Area C)
Plant Science (Area D)
Turf and Golf Course Management (Area E)
```

The Natural Resource Science major combines the principles of basic science with a thorough understanding of plant, soil and environmental sciences. This amalgamation of basic and applied sciences provides graduates with the opportunity for careers in conserving soil and water resources, improving environmental quality, increasing crop production to meet the global need for food, and in the 'Green Industry' which involves beautifying and maintaining the urban landscape.

These NRSC curricula are flexible enough to allow the student to concentrate on basic science courses that are needed for graduate work or to select courses that prepare for employment after completing a bachelor's degree. NRSC areas of concentration such as 'Plant Science' or 'Conservation of Soil, Water and the Environment' are meant to specifically prepare students for graduate studies. Students completing graduate programs in NRSC are prepared for research, teaching, and management positions with industry, international agencies, or federal and state government.

Graduates with a bachelor's degree are employed by private corporations as environmental soil scientists, golf course managers, agribusiness company representatives, or by county, state, or federal government as agronomists or extension agents. Horticulture is a diverse profession that also has numerous employment opportunities for NRSC graduates. These range from fruit, vegetable, floral and nursery crop production to urban forestry and landscape management. NRSC graduates are also in high demand world-wide in traditional horticultural production, international trade and in the growing fields of biotechnology and bioremediation.

## Curriculum in Natural Resource Sciences

NRSC Major
Semester
Requirements for all Areas of Concentration ..... Credit Hours
AGRO 101 Introductory Crop Science, or
HORT 100Introduction to Horticulture .....  4
CHEM 103 General Chemistry I .....  4
ENGL 101 Introduction to Writing. .....
ENGL 393Technical Writing$\ldots 3$
MATH 113 College Algebra with Applications, or MATH 115Precalculus .....  3
NRSC 200Fundamentals of Soil Science .....  4
NRSC 398 Seminar .....  1
With the exception of ENGL 101 and ENGL 393, a grade of $C$ or better inthe above courses is required.
Area A: Conservation of Soil, Water and Environment Requirements CHEM 113General Chemistry II .....  4
CHEM 104 Fundamentals of Organic and Biochemistry, or CHEM 2330rganic Chemistry I. .....  .4
COMM 100Foundations of Oral Communication, or
COMM 1070ral Communication: Principles and Practices .....  3
GEOL 100/ 110Physical Geology. .....  .4
MATH 140Calculus 1, or
MATH 220Elementary Calculus I .....  4
PHYS 117 Introduction to Physics .....  .4
*Students intending to take additional chemistry or attend graduate school
should substitute CHEM 113, followed by CHEM 233 and CHEM 243.
Applications \& Breadth (Select three of the following) .....  9
NRSC 413Soil and Water Conservation .....  3
NRSC 415 Soil Survey and Land Use .....  3
NRSC 423Soil-Water Pollution .....  3
NRSC 444Remote Sensing .....  3
NRSC 461Hydric and Hydromorphic Soils .....  3
Advanced Soil Science (Select three of the following) ..... 11-14
NRSC 411Soil Fertility Principles .....  3
NRSC 414Soil Morphology, Genesis and Classification .....  4
NRSC 417 Soil Hydrology and Physics .....  3
NRSC 421Soil Chemistry .....  4
NRSC 422Soil Microbiology .....  3
Practical Experience (Select at least 2 credits) .....  2
AGRO 308Field Soil Morphology ..... 1-3
NRSC 389Internship .....  3
Supporting Courses (Select two of the following) .....  6
AGRO 406 Forage Production .....  3
AGRO 407Cereal and Oil Crops .....  3
AREC 432 Introduction to Natural Resources Policy .....  3
BIOM 301Introduction to Biometrics .....  3
ENBE 234Principles of Erosion and Water Control (1) and
ENBE 236Design of Drainage Systems (1) andENBE 237Design of Irrigation Systems (1). 3
GEOL 451Groundwater Geology .....  3
GEOL 452Watershed and Wetland Hydrology .....  3GEOL 340 Geomorphology (4), orGEOG 340$\begin{array}{r}3 \\ \hline\end{array}$
NRMT 451Water Quality: Field and Lab Analys is Methods .....  3
NRSC 440Crops, Soils and Civilization .....  3
NRSC 441 Sustainable Agriculture ..... 3
NRSC 454Environmental Issues in Plant and Soil Sciences .....  3
Total CORE, NRSC and Conservation of Soil, Water and Environment Area ..... 95
University Electives ..... 25
Area B: Horticulture and Crop Production Requirements AGRO 453 Weed Science .....  3
AREC 250 Elements of Agricultural and Resource Economics .....  3
AREC 306 Farm Management .....  3
BSCl 226Plant Taxonomy, or
BSCI 490Plant Structure .....  .4
BSCI 227 Principles of Entomology. .....  4
HORT 202Management of Horticultural Crops, orNRSC 203Plants, Genes and Biodiversity 3
NRSC 201Plant Structure and Function .....  4
NRSC 389Internship .....  3
NRSC 401Environmental Plant Physiology .....  3
NRSC 410 Principles of Plant Pathology
.3
NRSC 411 Principles of Soil Fertility.
Advanced Production Electives (Select four of the following) AGRO 305 Introduction to Turf Management .....  3
AGRO 4 xxCrops Courses (Minimum of two) ..... 6-8
BSCl 497 Insect Pests of Ornamentals and Turf .....  3
HORT 432 Greenhouse Crop Production .....  3
HORT 433Technology of Fruit and Vegetable Crop Production .....  .4
HORT 452 Principles of Landscape Establishment and Maintenance .....  3
HORT 456 Nursery Crop Production .....  3
HORT 472 Advanced Plant Production .....  2
HORT 474 Physiology of Maturation and Storage of Horticultural Crops6-8
Total CORE, NRSC and Horticulture and Crop Production Area ......104-108
University Electives ..... 12-16
Area C: Landscape M anagement Requirements
AGRO 305 Introduction to Turf Management, or
NRSC 411 Principles of Soil Fertility. .....  3
AREC 250 Elements of Agricultural \& Resource Economics, or
ECON 200 Principles of Economics II .....  3
BMGT 220 Principles of Accounting. .....  3
BMGT 350 Marketing Principles and Organization .....  3
BSCI 227 Principles of Entomology. .....  4
CHEM 104 Fundamentals of Organic and Biochemistry .....  4
HORT 161Graphic Applications for Landscape Management .....  3
HORT 200 Land Surveying .....  2
HORT 202Management of Horticultural Crop .....  4
HORT 253 Woody Plant Material I ..... 3
HORT 254 Woody Plant Material II ..... 3
HORT 255 Landscape Design and Implementation. .....  4
HORT 261Computer Applications in Landscape Management .....  3
HORT 271 Plant Propagation ..... 3
HORT 320 Principles of Site Engineering. .....  4
HORT 321 Landscape Structures and Materials .....  3
HORT 452 Principles of Landscape Establishment and Maintenance .....  3
LARC 160 Introduction to Landscape Architecture .....  3
NRSC 201Plant Structure and Function .....  4
NRSC 389 Internship .....  3
NRSC 410Principles of Plant Pathology . .....  4
Total CORE, NRSC and Landscape Management Area ..... 105
University Electives ..... 15
Area D: Plant Science Requirements
BSCl 227 Principles of Entomology .....  4
BSCI 442Plant Physiology, or
NRSC 401Environmental Plant Physiology .....  3
CHEM 113 General Chemistry II .....  4
CHEM 233 Organic Chemistry I. .....  .4
HORT 202 Management of Horticultural Crop Production. .....  4
HORT 271 Plant Propagation .....  3
HORT 399 Special Problems .....  2
HORT 472 Advanced Plant Propagation .....  2
MATH 140Calculus I, or
MATH 220 Elementary Calculus I. .....  3
NRSC 201Plant Structure and Function .....  .4
NRSC 203 Plants, Genes and Biodiversity. .....  3
NRSC 410Principles of Plant Pathology .....  4
PHYS 121 Fundamentals of Physics I.. .....  4
Advanced Departmental Electives (Select one of the following) AGRO 403 Crop Breeding. .....  3
HORT 400 Nurs \& Greenhouse Nutrient Mangmnt Planning .....  3
HORT 432 Greenhouse Crop Production. ..... $\ldots 3$
HORT 433 Technology of Fruit and Vegetable Crop Production .....  4
HORT 452 Principles of Landscape Establishment and Maintenance .....  3
HORT 456 Nursery Crop Production .....  3
HORT 474 Physiology of Maturation and Storage of Horticultural Crops. .....  3
Advanced Science Electives (Select one of the following)BCHM 261 Elements of Biochemistry, or .3
BSCI 435 Plant Biochemistry. .....  4
NRSC 411 Principles of Soil Fertility. ..... 3
NRSC 417 Soil Hydrology and Physics .....  3
NRSC 421 Soil Chemistry .....  4
Total CORE, NRSC and Plant Science Area ..... 101-104
University Electives ..... 16-19
Area E: Turf and Golf Course Management Requirements AGRO 305 Introduction to Turf Management ..... 3
urfgrass .....  3
AGRO 402 Sports Turf Management .....  3
AGRO 410 Commercial Turf Maintenance and Production .....  3
BSCI 105Principles of Biology I. .....
BSCI 106 Principles of Biology II. .....  4
BSCI 227 Principles of Entomology ..... 4
Organic and Biochemistry
3
COMM 107Oral Communication: Principles and Practices .....  3
ENBE 237 Design of Irrigation Systems .....  1
NRSC 389 Internship3
NRSC 410 Principles of Plant Pathology. .....  4
NRSC 411Principles of Soil Fertility. ..... 3
PHYS 121Fundamentals of Physics .....  4
Total CORE, NRSC and Turf and Golf Course Management Area ..... 99
University Electives ..... 21

Course Codes: NRSC, AGRO, HORT

## Fieldwork and Internship Opportunities

Internships with scientists are available at nearby federal and state agencies. Numerous internships also exist and can be readily arranged for students interested in private sector employment.

## Student Organizations

Student chapters of the Agronomy Club and Soil Conservation Service provide students with opportunities for professional activities. The department's soil judging team participates in regional and national competitions.

The Horticulture Club provides students with opportunities to get involved with on-campus activities. The main goals of the club are traveling and seeing a broad perspective of horticulture, as well as being active in the community in environmental and social programs.

## Scholarships

Numerous scholarships and awards are available to NRSC students. Contact the Associate Dean's office at (301) 405-2078 for additional information.

## NUTRITION AND FOOD SCIENCE (NFSC)

College of Agriculture and Natural Resources<br>3304 Marie Mount Hall, (301) 405-4521

http:/ / www.agnr.umd.edu/ users/ nfsc
Professors: Bean, Castonguay, Lei, Moser-Veillont, Sims
Associate Professors: Jackson, Kantor
Assistant Professors: Blake, Boyle-Roden, Meng, Tuttle
Lecturer: Curtis, Klein
Adjunct Professor: DeLuca, Hansen
Adjunct Associate Professor: McKenna
Research Professor: Lineback
Emeriti: Ahrens, Prather, Schlimme, Wiley
†Distinguished Scholar-Teacher
The department offers three areas of emphasis: dietetics, food science, and nutritional science. Each program provides for competencies in several areas of work; however, each option is designed specifically for certain professional careers.

## Requirements for Major

The Dietetics major develops an understanding and competency in food, nutrition, dietetics management, clinical nutritional care, nutrition education, and community nutrition. The dietetics program is approved by the American Dietetic Association, and qualifies students, after completion of a post-baccalaureate internship, to sit for the national exam to become a Registered Dietitian.

The Food Science major is concerned with the application of the fundamental principles of the physical, biological, and behavioral sciences and engineering to understand the complex and heterogeneous materials recognized as food. The food science program is accredited by the Institute of Food Technologists and prepares students for careers in food industry and food safety.

The Nutritional Science major emphasizes the physical and biological sciences in relation to nutrition and the development of laboratory skills in these areas. Students in this major frequently elect to go on to graduate or medical school.

Grades. All students are required to earn a grade of $C$ or better in courses applied toward satisfaction of the major. This includes all required courses with a prefix of NFSC, as well as certain required courses in supporting fields. A list of these courses for each program may be obtained from the department office.

## Program Requirements

## I. Dietetics

## a. Major Subject Courses

NFSC 100-Elements of Nutrition ......................................................... 3
NFSC 112-Food Science and Technology (Spring only)........................... 3
NFSC 250-Science of Food ................................................................... 4
NFSC 315-Nutrition During the Life Cycle (Spring only) ......................... 3
NFSC 350—Food Service Operations. ..................................................... 5
NFSC 380-Nutritional Assessment (Fall only) ........................................ 3
NFSC 440-Advanced Human Nutrition ................................................... 4
NFSC 460-Medical Nutrition Therapy ....................................................................... 4
NFSC 470-Community Nutrition (Spring only) ....................................... 3
NFSC 491-Issues and Problems in Dietetics (Spring only) OR
CORE Advanced Studies.
... 3
Subtotal. ..... 35
b. Supporting Courses
MATH 113-Elementary Algebra ORMATH 115-Precalculus3
CHEM 103-General Chemistry I. ..... 4
CHEM 113-General Chemistry II .....  4
CHEM 233-Organic Chemistry I. ..... 4
CHEM 243-Organic Chemistry II. .....
BSCI 105-Principles of Biology I. .....  .4
BSCI 230-Cell Biology and Physiology .....  .4
BSCI 440-Mammalian Physiology .....  4
BSCI 223-General Microbiology .....  .4
SOCY 100-Introduction to Sociology. ..... 3
PSYC 100-Introduction to Psychology .....  3
EDMS 451-Introduction to Educational Statistics OR
BIOM 301-Introduction to Biometrics ..... 3
BCHM 461-Biochemistry I. .....  3
BCHM 462- Biochemistry II. .....  3
ENGL 101-Introduction to Writing. .....  3
ENGL 393-Technical Writing. .....  3
BMGT 360-Human Resource Management. .....  3
BMGT 364 Management and Organization Theory .....  3
Additional CORE program courses ..... 18
Restricted Electives. .....  2
Electives .....  .3
Subtotal.120
II. Food Science
a. Major Subject Courses
NFSC 100-Elements of Nutrition. ..... 3
NFSC 112-Food Science and Technology (Spring only) ..... 3
NFSC 250-Science of Food ..... 4
NFSC 398-Seminar .....  1
NFSC 412-Principles of Food Processing ..... 4
NFSC 421-Food Chemistry ..... 3
(CORE capstone) ..... 3
NFSC 423-Food Chemistry Laboratory ..... 2
NFSC 430—Food Microbiology. .....  2
NFSC 431-Food Quality Control
4
4
NFSC 434—Food Microbiology Laboratory .....
NFSC 450-Food and Nutrient Analysis ..... 34
b. Supporting Courses
CMSC 102-Introduction to Information Technology OR
CMSC 103-Introduction to Computing .....  3
MATH 113-Elementary Algebra ORMATH 115-Precalculus. 3
MATH 220-Elementary Calculus I. .....  3
MATH 221-Elementary Calculus II .....  3
CHEM 103-General Chemistry .....
CHEM 113-General Chemistry II .....  .4
CHEM 233-Organic Chemistry I. .....  .4
CHEM 243-Organic Chemistry II .....  4 .....  3
BCHM 461-Biochemistry I
BCHM 461-Biochemistry I
BSCI 105-Principles of Biology 1 . .....
ENBE 414-Mechanics of Food Processing .....  4
MICB 200-General Microbiology. ..... 4
PHYS 121-Fundamentals of Physics I .....
ENGL 101-Introduction to Writing. .....  3
ENGL 393-Technical Writing. .....  3
BSCI 223-Introduction to Biometrics .....  3
Additional CORE program requirements ..... 24
Restricted electives. .....  3
Electives .....  3
Subtotal120
III. Nutritional Science
a. Major Subject Courses
NFSC 100-Elements of Nutrition .....  3
NFSC 112 - Food Science and Technology (Spring only) .....  3
NFSC 315-Nutrition during the Life Cycle (Spring only) .....  3
NFSC 421-Food Chemistry. .....  3
NFSC 440-Advanced Human Nutrition .....  4
NFSC 450-Food and Nutrient Analys is ..... 3
NFSC 495-Nutrition Research or CORE Advanced Studies ..... 2
Subtotal ..... 22
b. Supporting Courses
MATH 113-Elementary Algebra OR
MATH 115-Precalculus .....  3
MATH 220-Elementary Calculus I .....  3
CHEM 103-General Chemistry I .....  4
CHEM 113-General Chemistry II .....  4
CHEM 233-Organic Chemistry I .....  4
CHEM 243-Organic Chemistry II .....  .4
BSCI 230-Cell Biology and Physiology .....  4
BSCl 440 -Mammalian Physiology .....  4
PHYS 121-Fundamentals of Physics I .....  4
BCHM 461-Biochemistry I .....  3
BCHM 462-Biochemistry II .....  3
BCHM 464-Biochemistry Laboratory I .....  2
BCHM 465-Biochemistry III ..... 3
BSCI 223-General Microbiology .....  4
BIOM 301-Introduction to Biometrics .....  3
ENGL 101-Introduction to Writing .....  3
ENGL 393-Technical Writing .....  3
BSCl 105-Principles of Biology I .....  .4
BSCl 222-Genetics .....  4
Additional CORE program requirements ..... 24
Restricted electives .....  3
Electives .....  5
Subtotal ..... 98
TOTAL CREDITS ..... 120

## Advising

Department advising is mandatory. When planning a course of study, students must consult the Undergraduate Catalog for the year they entered the program and also see an appropriate departmental adviser. Information on advising may be obtained by calling the department office, (301) 405-4521.

## Student Organizations

The NFSC Department has an active undergraduate Food and Nutrition (FAN) club which sponsors outreach activities and speakers on career-related topics, and participates in a variety of social activities. Call (301) 405-4521 for more information.

## Course Codes: NFSC

## PHILOSOPHY (PHIL)

## College of Arts and Humanities

1124 Skinner Building, (301) 405-5689/90
Professor and Chair: Slote
Professors: Bub, Cherniak, Darden, Devitt, Greenspan, Lesher, Levinson, Martin, Pasch (emeritus), Perkins (emeritis), Rey, Suppe, Svenonius, Wallace (part-time)
Associate Professors: Brown, Celarier (emeritus), Horty, Lichtenberg, Manekin, Odell, Pietroski, Stairs
Assistant Professors: Kerstein, Morreau, Washington
Affiliate Professors: Brush, Hornstein
Adjunct Professors: Crocker, Fullinwider, Galston, Luban, Sagoff
Adjunct Associate Professor: Wachbroit
Adjunct Assistant Professors: Levine, Li, Wasserman

## The Major

The study of philosophy develops students' logical and expository skills and increases their understanding of the foundations of human knowledge and value. The department views philosophy as an activity rather than a body of doctrine and students can expect to receive intensive training in clear thinking, inventive synthesis, and precise expression. For some, this will serve as preparation for graduate studies in philosophy. However, philosophical skills are useful in professions such as law, medicine, government, business management, and in any field that demands intellectual rigor. The department offers a wide range of courses, including several that deal with the philosophy of various disciplines outside philosophy itself.

## Requirements for M ajor

For students matriculating after June 1, 1991:
(1) a total of at least 36 hours in philosophy; not including PHIL 386
(2) PHIL 310, 320, 326, either 271 or 273, either 250 or 360 or 380 or 462 or 464 , either 341 or 346, and at least two courses numbered 400 or above;
(3) a grade of C or higher in each course counted toward the fulfillment of the major requirement.

Fifteen hours of supporting courses are required to be selected in accordance with guidelines available in the Philosophy Department Lounge, Skinner Building, room 1119.

Requirements for the Philosophy major include a minimum of 45 upper-level credits completed and the foreign-language requirement of the College of Arts and Humanities.

Departmental advising is mandatory for second-semester sophomores and seniors.

Course Code: PHIL

## Citations

Citation in Cognitive Science
15 credit hours. PHIL 280 and 170 or 271 or 273 and three courses from approved list of courses.

Citation in Philosophy
15 credit hours. PHIL 170, 173, 273 and two courses from approved list of courses.

Citation in Philosophy of Science
15 credit hours. PHIL 250 or 256 ; 170 or 271 or 273 ; and three courses from approved list of courses.

Citation in Value Theory
15 credit hours. PHIL 341 or 346 or 440 or 441 or 442 and four courses from approved list of courses.

Students who fulfill Citation requirements will receive a Citation on the official transcript. Please contact the Director of Undergraduate Studies for more information.

## PHYSICAL EDUCATION

See Kinesiology elsewhere in this chapter.

## PHYSICAL SCIENCES PROGRAM

College of Computer, $M$ athematical, and Physical Sciences
1120 Physics Building, (301) 405-5949
http:/ / www.inform.umd.edu/ EdRes/ Colleges/ CM PS/ Depts/ Physics/
Physical_Science/
Chair: Einstein
Astronomy: Deming
Chemistry: Berkowitz
Computer Science: Kaye
Geology: Minarik
Engineering: Salamanca-Riba
Mathematics: Wolfe
Meteorology: Hudson
Physics: Einstein
Adviser: Gleason

## Purpose

This program is designed to meet the needs of a broad and diverse group; students whose interests cover a wide range of the physical sciences; students whose interests have not yet centered on any one science; students interested in a career in an interdisciplinary area within the physical sciences; students who seek a broader undergraduate program than is possible in one of the traditional physical sciences; students interested in meteorology; pre-professional students (pre-law [especially patent law], pre-medical); or students whose interest in business, technical writing, advertising, or sales require a broad technical background. This program can also be useful for those planning science-oriented or technical work in the urban field; some of the Urban Studies courses should be taken as electives. Students contemplating this program as a basis for preparation for secondary-school science teaching should consult the Science Teaching Center staff of the College of Education for additional requirements for teacher certification.

The Physical Sciences Program consists of a basic set of courses in physics, chemistry, and mathematics, followed by a variety of courses chosen from these and related disciplines: astronomy, geology, meteorology, computer science, and the engineering disciplines. Emphasis is placed on a broad program as contrasted with a specialized one.

Students are advised by members of the Physical Sciences Committee. This committee is composed of faculty members from each of the represented disciplines. The selection of a primary adviser depends upon the interest of the student. Usually the student will choose to work with one of the committee members representing the discipline the student has selected as the primary area of concentration to satisfy the distributive requirements of the program. Two secondary-area advisers are also required.

## Curriculum

The basic courses include MATH 140, 141 and one other math course for which MATH 141 is a prerequisite ( 11 or 12 credits); CHEM 103 and 113 ( 8 credits); PHYS 161, 262 and 263 (11 credits) or PHYS 171, 174, 272, 273, 275, 276 ( 14 credits); CMSC 104 ( 4 credits) or CMSC 105 ( 3 credits) or CMSC 106 (4 credits) or ENES 240 ( 3 credits) or CMSC 114 and CMSC 214 (8 credits).
Students desiring a strong background in physics should take the 171-276 sequence, which is required of physics majors, leads directly into advanced physics courses, and offers much smaller classes than the 161-263 sequence. Students who select Computer Science as an area of concentration should consider taking the CMSC 114 and 214 sequence.
(CMSC 150 is a prerequisite for CMSC 214. CMSC 104 and CMSC 105 are no longer offered at UM; students may substitute equivalent courses from other institutions if educationally justifiable.)

Beyond the basic courses, students complete 24 upper-level (300-400) distributive credits. The distributive credits must be divided among three areas of concentration with at least six credits in each area. The areas of concentration include the disciplines of chemistry, physics, mathematics (including statistics), astronomy, geology, meteorology, computer science or one of the engineering disciplines. Students who wish to select electrical engineering need the permission of the Associate Dean in the School of Engineering. A grade of "C" or better must be earned in all program courses (basic prerequisite and distributive requirement courses).

All Physical Sciences students must have a planned program of study, including specific core and distributive courses, approved by the Physical Sciences Committee. These plans should be submitted as early as possible, generally in the sophomore year and normally no later than the beginning of the junior year. At the time the program is submitted, it must have at least 18 credits in the three distributive areas of the Physical Sciences program to be completed. Any changes to the plan must be approved in writing by the student's adviser and the chairperson. Engineering courses used for one of the options must all be from the same department, e.g., all must be ENGR courses or a student may use a combination of courses in ENNU, ENCH and ENMA, which are all offered by Department of Chemical and Nuclear Engineering; courses offered as engineering sciences, ENES, will be considered as a department for these purposes. Selection of ENEE courses is by permission only. An Environmental Science option is also available; it is described on the Web site.

Certain courses offered in the fields included in the program are not suitable for Physical Sciences majors and cannot count as part of the requirements of the program. These include any courses corresponding to a lower level than the basic courses specified above (e.g. MATH 115), some of the special topics courses designed for non-science students, as well as other courses. Students should consult a Physical Sciences adviser for a current listing of "excluded" courses. Students must obtain written approval to use any of the special topics courses as part of their Physical Sciences requirement.

## Honors

The Physical Sciences Honors Program offers students the opportunity for research and independent study, and will lead to a B.S. degree with Honors or High Honors. The requirements are: a) overall grade point average of 3.0 or better; b) grade point average of 3.2 or better in Physical Sciences courses; c) at least three credits (which may be distributed over two semesters) of independent study courses in the Physical Sciences Program; d) an honors thesis summarizing independent research; e) an oral examination concerning thesis and related subjects. The thesis adviser and two other faculty members (at least one a member of the Physical Sciences Committee) will comprise the examining committee.

## Selection of College

Students may elect to receive their degrees from either the College of Computer, Mathematical, and Physical Sciences or the Colleges of Agriculture and Natural Resources and of Life Sciences. CMPS students have no further requirements to fulfill beyond those stated here plus the general education requirements. Agricultural and Life Sciences students must also satisfy the College requirements of their respective Colleges: these entail one additional course selected from one of the biological sciences, e.g., a four-credit course offered by the Departments of Botany (not BOTN 100), Entomology, Microbiology (not MICB 100) or ZOOL 101, but not BIOL.

## PHYSICS (PHYS)

College of Computer, $M$ athematical, and Physical Sciences 1120 Physics Building, (301) 405-5979
http:/ / www.physics.umd.edu

## Professor and Chair: Goodman

Professors and Associate Chairs: Baden, Chant, Wellstood
Professors Emeriti: C. Y. Chang, Currie, DeSilva, Falk, Ferrell, Glick, Glover, Gluckstern, Griem, Holmgren, Kacser (Associate Professor Emeritus), Layman, MacDonald, Richard, Snowt, Suchert, Weber, Woo, Zorn

Chancellor Emeritus: Toll
President Emeritus: Gluckstern
Distinguished University Professors: DasSarma, Fisher, Gloeckler, Ott, Sagdeev, Webb
University System of Maryland Regents Professor: Fisher
Professors: Alley, Anderson, Antonsen, Banerjee, Bhagat, Boyd, Brill, C. C. Chang, Chant, Chen, Cohen, Dorfmant, Dragt $\dagger$, Drake, Drew, Einstein, Fivel, Gates, Goldenbaum, Goodman, Greenberg, Greene, Griffin, Hadley, Hamilton, Hassam, Hu, Jacobson, Jawahery, Kelly, Kim, Kirkpatrick, Korenman, Langenberg, Liu, Lobb, Mason, Misner, Mohapatra, Paik,
Papadopoulos, Park, Pati†, Prange, Ramesh, Redish, Roos, Roy, Skuja, Venkatesan, Wallace, Williams ${ }^{\dagger \dagger}$
Professor (part-time): Z. Slawsky
Adjunct Professors: Boldt, Lynn, Mather, Phillips, Ramaty
Associate Professors: Anlage, Baden, Beise, Ellis, Eno, Ji, Hammer, Wellstood, Yakovenko
Assistant Professors: Becker, Lathrop, Luty, Roberts, Sullivan
Lecturers: Nossal, Rapport, Restorff, M. Slawsky, Solow, Stern
Distinguished Scholar-Teacher
$\dagger \dagger$ Distinguished Faculty Research Fellow
The Physics Program includes a broad range of undergraduate courses designed to satisfy the needs of almost every student, from the advanced physics major to the person taking a single introductory physics course. In addition, there are various opportunities for personally-directed studies between student and professor, and for undergraduate research. For further information consult "Undergraduate Study in Physics" available from the department.

## The Major

Courses required for Physics Major:
Note: Changes in major requirements are under review. Students should check with a department advisor for updated information.
Lower-level CoursesPHYS 171—Introductory Physics: Mechanics and Relativity...................... 3
PHYS 272-Introductory Physics: Fields 3
PHYS 273-Introductory Physics: Waves .....  3
PHYS 174—Physics Laboratory Introduction .1
PHYS 275—Experimental Physics I: Mechanics, Heat, and Fields .....  2
PHYS 276-Experimental Physics II: Electricity and Magnetism. .....  2
MATH 140-Calculus I. .....  4
MATH 141-Calculus II. .....  .4
MATH 241-Calculus III .....  .4
MATH 246—Differential Equations. .....  3
MATH 240-Introduction to Linear Algebra .....  4
Upper-level Courses PHYS 374-Intermediate Theoretical Methods .....  4
PHYS 401—Quantum Physics I .....  4
PHYS 402-Quantum Physics II .....  4
PHYS 404-Introduction to Statistical Mechanics ..... 3
PHYS 410-Classical Mechanics .....  .4
PHYS 411-Intermediate Electricity and Magnetism. .....  4PHYS 375-Experimental Physics III: Electromagnetic Waves,Optics, and Modern Physics$\ldots 3$
PHYS 405-Advanced Experiments .....  3

A grade of $C$ or better is required in all Mathematics and Physics courses required for the major.

## Honors

The Physics Honors Program offers to students of good ability and strong interest in physics a greater flexibility in their academic programs. To receive a citation of "with honors in physics" the student must pass a comprehensive examination in his or her senior year. To receive a citation of "with high honors in physics" he or she must also complete a senior thesis.

Course Code: PHYS

## PLANT BIOLOGY

Departments in the College of Life Sciences have been reorganized. Courses in plant biology are now offered by the Department of Cell Biology and Molecular Genetics.

## PRODUCTION MANAGEMENT

For information, consult the Robert H. Smith School of Business entry in chapter 6 .

## PSYCHOLOGY (PSYC)

College of Behavioral and Social Sciences
1107 Zoology-Psychology Building, (301) 405-5866
Professor and Chair: Hall
Associate Professor and Associate Chair: Plude
Professors: Anderson (emerita), Beidel, Brauth, Carter-Porges*, Cassidy,
Collewijn**, Cooling, Fein*, Fox*, Gelso, Goldstein, Gollub (emeritus), Hill,

## ROM ANCE LANGUAGES PROGRAM

College of Arts and Humanities
3106 Jimenez Hall, (301) 405-4024
Advisory Committee: Falvo (Italian), Little (Spanish), Campangne (French)
The Romance Languages Program is intended for students who wish to major in more than one Romance language.

## The Major

Students selecting this major must take a total of 45 credits selected from courses in two of the three components listed below: French, Italian and Spanish. The first four courses listed under each group are required for that particular language component; exceptions or substitutions may be made only with the approval of the student's adviser in consultation with the Romance Languages Advisory Committee. To achieve the total of 45 credits, 21 credits are taken in each of the two languages, as specified, and three additional credits are taken at the 400 -level in either of the languages chosen. Literature or civilization courses may not be taken in translation.

There are no requirements for support courses for the Romance Languages major.

## The Major

Sociology is the scientific study of society and its institutions, organizations, and groups. By observing the broad range of activities in society, and exploring topics such as social class, race, gender, deviance, family, religion, the work place, and demographic trends, sociologists provide important information and perspectives on our social order and the causes and impacts of social change. Sociology provides important information useful both to personal life and public policy decisions. Sociology is among the broadest of the social sciences and is characterized by considerable pluralism in theoretical and methodological approaches, substantive specializations, and in units of analysis.

Students major in Sociology for a variety of reasons. Some emphasize sociology's relevance to understanding a broad range of social issues that interest them for intellectual curiosity, personal life relevance, or usefulness for ameliorative social change efforts. Other majors emphasize acquisition of sociological knowledge and skills useful in a variety of career paths where understanding societal problems and trends, group dynamics, and personnel issues are critical. For a small core of majors, the purpose of the undergraduate program is preparation and training for admissions to graduate programs and eventual careers as sociologists in teaching, research and/ or policy development. Other majors use sociology as a basis for graduate study in related fields, including law, social work, public policy, and human resource management.

## Goals and Objectives of the Undergraduate Sociology Program

The overall goals of the program are:

- To provide meaningful and challenging courses within the University CORE program
- To provide meaningful and challenging courses as electives for non-majors
- To provide a coherent program of courses for Sociology majors which enables majors to attain:
a) general sociological knowledge and understanding of our society;
b) sociological knowledge and skills relevant to a variety of career paths,
c) sociological knowledge and skills relevant to application to and success within competitive sociology graduate programs and careers; and
- To provide a Sociology Honors component for selected students who have the capability and motivation to work at the most challenging level.

The program attempts to provide students the opportunity and ability to meet the following objectives:

- To read and think critically and to assess information about our society in terms of sociological concepts and a social science model of argument
- To understand the key questions addressed by the discipline, and to be able to identify both similarities and contrasts with other disciplines
- To be familiar with basic sociological information about our society and its place in the international order
- To be acquainted with the role of theory in the construction of sociological inquiry; for majors this entails knowing the central ideas of major classical and contemporary theorists
- To understand the social science model of evidence and argument: for majors this entails familiarity with basic social statistics techniques, basic methods of data collection, basic techniques of organizing and presenting information, and the ability to carry out a small research project.


## Requirements for Major

As part of the 120 credits and other requirements for a Bachelor of Arts degree, sociology majors must complete a minimum of 38 credits in Sociology and 12 credits in supporting courses outside of Sociology. All these credits must be completed with a minimum grade of C or better in each course. The 38 credits in Sociology must include the following:

1) four basic courses required of all majors: SOCY100 (3 ); SOCY201 (4); SOCY202 (4); and SOCY203 (3)
2) a breadth requirement consisting of one course from three of the following concentration areas:
a) Family and Demography: SOCY410; SOCY443
b) Organizations and Institutions: SOCY431; SOCY443; SOCY460; SOCY464; SOCY466
c) Social Psychology: SOCY230; SOCY430
d) Stratification and Inequality: SOCY441
3) a depth requirement consisting of at least three courses (including one required) in any one of the following concentration areas:
a) Family and Demography: SOCY410 (required); SOCY411; 412; 418*; 442; 443; 444; 461
b) Organizations and Institutions: SOCY431 (required); SOCY425; 426; 438*; 443; 456; 457; 460; 462; 463; 464; 465; 466; 467
c) Social Psychology: SOCY230 (required); SOCY402 or 404; 430; 440; 447; 448*; 450; 463
d) Stratification and Inequality: SOCY441 (required); SOCY325; 421; 422; 424; 425; 428*; 442; 462; 467
4) an intermediate methods course or research course requirement, consisting of one course to be selected from a list maintained by the Sociology Undergraduate Advising Office.
5) elective courses in sociology, sufficient to fill out the required minimum of 38 credits in sociology; these may be selected from any of the sociology courses.

The four supporting courses outside of sociology (12 credits) must be linked to the area of concentration selected to meet the depth requirement and must be selected from a list of recommended supporting courses maintained by the Sociology Undergraduate Advising Office.

Students should note the following in reference to Sociology requirements:
a) SOCY201 has a pre-requisite of Math 111 or higher;
b) some of the courses necessary to fulfill depth requirements and/ or the methods/research course requirement may have prerequisites such as SOCY201, 202, and 203;
c) it is permissible to count one course as fulfilling more than one type of requirement, e.g. a course can be counted towards meeting a breadth requirement and a depth requirement, or a courses might be counted towards a depth requirement while simultaneously fulfilling the methods/research course requirement;
d) special topics courses (indicated with an * in the above lists) may be repeatable for credit if its content differs from when previously taken;
e) SOCY498 courses may be used to fulfill depth requirements for particular concentration areas when so designated by the Undergraduate Sociology Office; the Sociology Undergradute Office maintains current lists of special topics courses (SOCY498) that fulfill depth requirements; and
f) each course counted as meeting sociology or supporting course requirements must be passed with a grade of $C$ or better.

## Honors Program in Sociology

The Sociology Honors Program seeks to encourage and recognize superior scholarship by providing an opportunity for interested, capable, and energetic undergraduate students to engage in study in an area of the student's interest under the close supervision of a faculty mentor. The honors program is based upon tutorial study and independent research.

Students who have an overall cumulative grade point average of at least 3.3, a cumulative average of 3.5 in Sociology courses, and who have taken at least nine credits in Sociology may apply. Transfer students with equivalent academic records at other accredited institutions are also eligible. Admission to the program will be based upon academic performance and the judgment of the Undergraduate Committee whether the applicant has sufficient maturity and interest to complete successfully the requirements for graduation with Honors. Further information on the honors program is available from the Sociology Undergraduate Office.

## Advising

Regular advising is strongly recommended for all majors. Advising is particularly important for those majors who are considering going on to graduate school. Majors are reminded of the importance of taking the four basic required courses (SOCY 100, 201, 202, 203) as soon as possible because these are prerequisites for some upper level work. Further information on course work, internships, the department honors program, careers, and other topics may be obtained from the Sociology Undergraduate Advisor, 2108 Art/ Sociology Building, 405-6389.

## Internship Opportunities

Although internships are not a requirement for a major, students may wish to consider the internship program offered by the department or through the Experiential Learning Office located in Hornbake Library. Majors may receive up to six credits in SOCY386 when an internship / volunteer position is
combined with an academic project. A prerequisite of 12 credit hours in Sociology course work is required.

## Student Organizations

The Sociology Collective, open to all Sociology majors, is organized by a group of interested undergraduates to fill student needs within the Sociology community. The Collective provides information about topics of interest, including department activities, career planning, and relevant changes within the university, and strives to enhance the sense of community within the department. Representatives of the Collective participate in many faculty committees within the department and thereby provide the undergraduate perspective on policy issues.

Alpha Kappa Delta is the National Honor Society for Sociology majors. Membership is based on Sociology GPA ( 3.0 minimum) and overall GPA ( 3.0 minimum). Students may apply after they have completed 18 hours of Sociology course work. This organization's activities focus on providing tutoring services for undergraduates in core courses.

Survey Research Center
1103 Art-Sociology Building, 314-7831
Director: Stanley Presser
The Survey Research Center specializes in the design and conduct of both mail and telephone surveys. It supports undergraduate and graduate education by providing both technical training and practical experience to students.

Course Code: SOCY

## Areas of Specialization

Undergraduate specializations are available in research methods, social psychology, social demography, social institutions, and inequality. These specializations can often be integrated with a second major. Versatility and the rich experiential learning possibilities of the Washington metropolitan area combine to make the sociology curriculum valuable preparation for a career choice.

## Requirements for Major

Note: Changes in major requirements are under review. Students should consult the department for updated information.

Students in sociology must complete 50 hours of departmental requirements, none of which may be taken pass/ fail. Thirty-eight of these hours are in sociology course work, which must be completed with a minimum grade of C in each course; SOCY 100 should be taken in the freshman or sophomore year followed by SOCY 203. Three hours of mathematics (MATH 111 or its equivalent or higher) are required of majors as a prerequisite of SOCY 201. SOCY 202 follows SOCY 201. SOCY 441 (stratification) and one additional upper-level methods course should be taken by the second semester of the junior year.

The supporting course requirement for majors is 12 hours of a coherent series of courses from outside of the department that relate to the student's major substantive*** or research interests. These courses need not come from the same department, but at least six hours must be taken at the 400 -level. It is strongly recommended that the student work out an appropriate supporting sequence for the particular specialization with the department adviser.

## Department of Sociology Requirements

Semester Credit Hours
CORE/ USP Program Requirements .................................................. $40 / 43$
SOCY 100- Introduction to Sociology 3

SOCY 201* - Introductory Statistics for Sociology.................................... 4
SOCY 202-Introduction to Research Methods in Sociology ..................... 4
SOCY 203-Sociological Theory ................................................................ 3
SOCY 441-Stratification and Inequality ................................................. 3
1 additional methodology course** ......................................................... 3
2 Sociology courses at any level............................................................. 6
4 Sociology courses at 400 level.......................................................... 12
4 supporting courses*** .................................................................... 12
Internship (recommended, not required)**** ........................................... 6
USP/ CORE Electives**** .....................................................24-30/21-27
Total ................................................................................................ 120
*Three hours of mathematics (MATH 111 or its equivalent, or higher) are required as prerequisite.
**The second required methods course and all supporting courses must be selected from approved lists
*** Courses complementing Sociology specialization must be selected from an approved list and must include at least two courses at the 400level.
$* * * *$ Students choosing to take internships will reduce their elective credit total by six credits.

## Advising

Regular advising is strongly recomended for all majors. Further information on course work, internships, the departmental honors program, careers, and other topics may be obtained from the Sociology undergraduate adviser, 2108 Art/ Sociology Building, (301) 405-6389.

## Fieldwork and Internship Opportunities

Although internships are not a requirement for a major, students may wish to consider the internship program offered by the department or through the Experiential Learning Office located in Hornbake Library. Majors may receive up to six credits in SOCY 386 when an internship/ volunteer position is combined with an academic project. A prerequisite of 12 credits in Sociology course work is required.

## Honors

The Sociology Honors Program seeks to encourage and recognize superior scholarship by providing an opportunity for interested, capable, and energetic undergraduate students to engage in study in an area of the student's interest under the close supervision of a faculty mentor. The honors program is based upon tutorial study and independent research.

Students who have an overall cumulative grade point average of at least 3.3, a cumulative average of 3.5 in Sociology courses, and who have taken at least nine credits in Sociology may apply. Transfer students with equivalent academic records at other accredited institutions are also eligible. Admission to the program will be based upon academic performance, and the judgment of the Undergraduate Committee whether the applicant has sufficient maturity and interest to successfully complete the requirements for graduation with Honors. Further information on the honors program is available from the Sociology Undergraduate Office.

## Student Organizations

The Sociology Collective, open to all Sociology majors, is organized by a group of interested undergraduates to fill student needs within the Sociology community. The Collective provides information about topics of interest, including department activities, career planning, and relevant changes with the university, and strives to enhance the sense of community within the department. Representatives of the Collective participate on faculty committees within the department and thereby provide the undergraduate perspective on policy issues.

Alpha Kappa Delta is the National Honor Society for Sociology majors. Membership is based on Sociology G.P.A. (3.0) and overall G.P.A. (3.0). Students may apply after they have completed 18 credits of Sociology course work. This organization's activities focus on providing tutoring services for undergraduates in the core courses.

## Survey Research Center

1103 Art-Sociology Building, (301) 314-7831
Director: Stanley Presser
The Survey Research Center was created in 1980 as a special purpose research facility within the behavioral and social sciences. The center specializes in the design of questionnaires and survey data collection for policy purposes, and has the capacity to conduct mini-surveys, survey experiments, and in-depth clinical interviews. The center supports undergraduate and graduate education by providing both technical training and practical experience to students. The center also has a strong community service mission through the provision of technical assistance on survey methods and survey design to units of state and local governments, and by conducting surveys on a contract or grant basis for these governmental units.

Course Code: SOCY

## SPANISH AND PORTUGUESE LANGUAGES AND LITERATURE (SPAN, PORT)

College of Arts and Humanities<br>2215 Jimenez Hall, (301) 405-6441

Professor and Chair: Sosnowski
Associate Chair: Lavine
Professor emerita: Nemes
Professors: Aguilar-Mora, Cypess, Harrison, Pacheco ${ }^{\dagger} \dagger$
Associate Professors: Benito-Vessels, Igel, Lavine, Naharro-Calderón, Peres
Assistant Professors: Bouvier, Cabal-Krastel, Lacorte, Rodriguez, Sánchez Instructors: Canabal, Little, Roman
${ }^{\dagger} \dagger$ Distinguished University Professor

## The Majors

Requirements for the Spanish and Portugese majors include the College of Arts and Humanities requirement of 45 upper-level credits completed. The College foreign-language requirement will be automatically fulfilled in the process of taking language major courses.

Undergraduate majors can benefit from a wide range of courses in Spanish and Latin American literature and civilization; technical courses in translation, linguistics, and commercial uses of Spanish. Area studies programs are also available in conjunction with other disciplines to provide the student with a solid knowledge of the Spanish and Latin American worlds

A grade of at least C is required in all major and supporting area courses.
Departmental advising is mandatory for second-semester sophomores and seniors.

## Language and Literature Major

Courses: SPAN 207, 221, 301-302, 311 or 312, 321-322 or 323-324, $325-326$ or 346-347; plus four courses in literature at the 400 -level; one course may be taken in Luzo-Brazilian literature, for a total of 39 credits. Nine credits of supporting courses, six of which must be at the 300- or 400 -level in a single area other than Spanish, for a combined total of 48 credits. Suggested areas: art, comparative literature, government and politics, history, philosophy, and Portuguese.

## Foreign Area Major

Courses: SPAN 207; 301-302; 311 or 312; 315 and 415 or 316 and 317 321-322 or 323-324; 325-326 or 346-347, plus three courses in literature at the 400 -level; one course may be taken in Luzo-Brazilian literature, for a total of 39 credits. Nine credits of supporting courses, six of which must be at the 300 - or 400 -level in a single area other than Spanish, for a combined total of 48 credits. Suggested areas: anthropology, economics, geography, government and politics, history, Portuguese, and sociology

## Translation Option

Courses: SPAN 207; 301-302, 311 or 312; 316 and 317; two courses from 318, $356,357,416,417 ; 321-322$ or $323-324$; one course from $325,326,346,347$; plus two courses in literature at the 400 -level; one course may be taken in Luzo-Brazilian literature, for a total of 39 credits Nine credits of supporting courses, six of which must be at the $300-$ or 400 -level in a single area other than Spanish, for a combined total of 48 credits. Suggested areas: art, comparative literature, government and politics, history, philosophy, and Portuguese.

## Business Option*

Courses: SPAN 207; 211; 301-302; 311 or $312 ; 315$ and $415 ; 316$ and 317 ; 325-326 or 346-347; 422, for a total of 36 credits. Twelve credits of supporting courses, six of which must be at the 300 - or 400 -level in a single area other than Spanish. Suggested areas: business and management, economics, government and politics, history and geography.

Students interested in majoring in a combination of two Romance languages should see the description of the Romance Languages Program, above.
*A double major program, Business, Language, and Cultures, combines International Business and Spanish.

## Citations

Citations in Spanish Language and Cultures
15 credit hours. Five courses in Spanish from an approved list of courses. Courses taken through Study Abroad programs may be applied. Contact the Director of Undergraduate Studies for more information.

Citation in Portuguese Languages and Cultures
15 credit hours. PORT 205, 231 and three courses from approved list of courses. Contact the Director of Undergraduate Studies for more information.

Citation in Business Management for Spanish Majors (1105B)
15 credit hours. ECON 200 and four courses from approved list of BMGT courses. Contact Business, Culture and Language Program at (301) 4052621 for more information.

Citation in Business Spanish
15 credit hours. Five courses in Spanish from approved list of courses. Contact Business, Culture and Language Program at (301) 405-2621 for more information.

Students who fulfill Citation requirements will receive a Citation on the official transcript.

## Honors

The department Honors Program offers qualified students the possibility of working in close contact with a mentor on an original thesis. Honors seminars are primarily for students who have been accepted to the Program, but are open to others with the approval of the Honors Director. Honors students must take six credits of Honor Thesis. Interested students should see the Director of the Spanish Honors Program.

## Lower-Division Courses

The elementary and intermediate courses in Spanish and Portuguese consist of three semesters of four credits each (101, 102, 201). The language requirement for the B.A. degree in the College of Arts and Humanities is satisfied by passing 201 or equivalent. Students who wish to enroll in Spanish 101, 102, and 201 must present their high school transcript for proper placement. See the Schedule of Classes for further information. Students may not receive credits for both Spanish 102 and Spanish 103

Transfer students with college credit have the option of continuing at the next level of study.

Students must take language acquisition courses sequentially, i.e., 101, 102, 201, 202, etc. Once credit has been received in a higher-level language acquisition or grammar course, a lower-level course may not be taken for credit.

Course Codes: SPAN, PORT

## SPECIAL EDUCATION (EDSP)

## College of Education

1308 Benjamin Building, (301) 405-6515/4
http:/ / www.inform.umd.edu/ educ
Professor and Chair: Burke
Professors: Beckman, Egel, Graham, Harris, Hebeler (emeritus), Leone, Moon, Speece
Associate Professors: Cooper, Kohl, Lieber, Neubert
Assistant Professors: Maccini, Malmgren
Associate Director: McLaughlin
Research Associates: Florian, Greig, Gruber, Kelly, Li, Meisel, PageVoth, Warren
Coordinator of Undergraduate Advising: Molloy
Lecturers: Aiello, Buchanan, Danehy, Fink, Henderson, Hudak, Long, Lyles, Simon, Thanhouser, Waranch
Faculty Research Assistants: Barnwell, Bertsch, Frank, Lane, Newcomb, Samels, Stepanek, Walker

The Special Education Department offers an innovative and rigorous undergraduate program which prepares teachers of infants, children, or young adults with disabilities. This program has been nationally recognized for many of its exemplary features. It is a five-year ( 10 -semester, 150 -credit hour) professional certification program which graduates students with a Bachelor of Science degree in special education with full special education teacher certification in the State of Maryland and certification reciprocity in 31 other states. Students considering a special education major enroll in courses which meet university and college requirements while they take supporting course work designed to provide an understanding of typical human development and basic psychological and sociological principles of human behavior. Special Education students receive specialized training in the following areas: language development; motor development; socialemotional development; typical human behavior; social and educational needs of individuals with disabilities; diagnostic and educational assessment procedures; instructional procedures and materials; curriculum development; classroom and behavior management; effective communication with the parents and families of children with disabilities; community resource planning; and local, state, and federal laws concerning children and youth with disabilities. Graduates of the program are expected to master specific skills in each of these areas.

## Requirements for Major

Students interested in majoring in Special Education must consult a departmental adviser as early as possible after matriculation at the university since the curriculum requires an extensive and sequenced program of studies. Students accepted as Special Education majors take a two-semester sequence of generic special education courses and practicum experiences during the third year (Semesters V and VI ). These courses provide the student with a solid foundation in theory and practice related to the education of all children with disabilities across a wide range of ages.

Changes in requirements are under review. Students should consult the department for updated information.

Students work directly with children or youth with disabilities during each semester, leading up to student teaching during the last semester.

## Combined Bachelor's/ Master's Program

Selected undergraduate students majoring in special education will be eligible for dual application of credit to both the bachelor's and master's degrees. A student desiring graduate credit should apply for admission to the Graduate School during the last semester of the fourth year. If admitted to the Graduate School, the student may select up to 12 credits (four courses) of specified course work from the fifth year of the undergraduate program to be applied simultaneously toward the credits required for the master's degree in special education at the University of Maryland. The selected courses may not include field practica or student teaching experiences. Students will be expected to fulfill supplemental requirements in the selected courses. To complete the master's degree, students must fulfill all Graduate School requirements for the degree, with the exception of

Nonhandicapped and Handicapped Infants and Young Children OR
EDSP 460—Introduction to Secondary/ Transitional Special Education (3)
EDSP 411-Field Placement: Severe Disabilities III (4)
EDSP 412-Vocational and Transitional Instruction for Students with Severe Disabilities (3)
EDSP 417-Student Teaching: Severe Disabilities (11)
EDSP 418-Seminar: Issues and Research Related to the Instruction of Students with Severe Disabilities (3)

The Educationally Handicapped Option
EDSP 440-Assessment and Instructional Design for the Educationally Handicapped: Cognitive and Psychosocial Development (3)
EDSP 441-Assessment and Instructional Design for the Educationally Handicapped: Oral Language and Communication Disorders (3)
EDSP 442-Field Placement: Educationally Handicapped I (4)
EDSP 330-Families and the Education of Handicapped Children (3)
EDSP 445-Field Placement: Educationally Handicapped II (4)
EDHD 413-Adolescent Development (3)
EDCI 456-Diagnosis and Treatment of Learning Disabilities in Mathematics (3)
EDSP 480-Microcomputers in Special Education (3)
EDSP 446-Instructional Design for the Educationally Handicapped: Functional Living Skills (3)
EDSP 447-Field Placement: Educationally Handicapped III (4)
EDSP 450-Inclusive Practices in the Schools (3)
EDSP 457-Student Teaching: Educationally Handicapped (11)
EDSP 458-Seminar: Special Issues and Research Related to the Educationally Handicapped (3)
EDSP 460-Introduction to Secondary/ Transitional Special Education (3)
The Secondary and Transition Special Education Option
EDSP 330-Families and the Education of Handicapped Children (3)
EDSP 460-Introduction to Secondary/ Transitional Special Education (3)
EDSP 461-Field Placement: Secondary/ Transition I (4)
EDSP 462-Vocational Assessment and Instruction in Special Education (3)

EDSP 463-Field Placement: Secondary/ Transition II (3)
EDCI 456-Diagnosis and Treatment of Learning Disabilities in Mathematics (3)
EDSP 450-Inclusive Practices in the Schools (3)
EDSP 465 - Field Placement: Secondary/ Transition III (3)
EDSP 467- Student Teaching: Secondary/ Transition (11)
EDSP 468-Special Topics Seminar in Secondary/ Transition Special Education (3)
EDSP 464-Secondary and Transition Methods in Special Education (3)
EDSP 446-Instructional Design for the Educationally Handicapped: Functional Living Skills (3)
EDSP 480-Microcomputers in Special Education (3)
The Early Childhood Special Education Option
EDSP 480-Microcomputers in Special Education (3)
EDSP 420-Developmental and Behavioral Characteristics of NonHandicapped and Handicapped Infants and Young Children (3)
EDSP 421-Field Placement: Early Childhood Special Education I (4)
EDSP 422-Curriculum and Instruction in Early Childhood Special Education (Moderate to Mild: 3-8 yrs) (3)
EDSP 424—Field Placement: Early Childhood Special Education II (4)
EDCI 410-The Child and the Curriculum: Early Childhood (3)
EDSP 330-Families and the Education of Handicapped Children (3)
EDSP 423-Assessment of Preschool Handicapped Children and Infants (3)
EDSP 430-Intervention Techniques and Strategies for Preschool Handicapped Children and Infants (3)
EDSP 431-Field Placement: Early Childhood Special Education III (Severe to Moderate) (4)
EDSP 437-Student Teaching: Early Childhood Special Education (11)
EDSP 438-Seminar: Special Issues in Early Childhood Special Education (3)

EDSP 400-Assessment, Curriculum and Instructional Methods for Students with Severe Handicaps (3)
EDSP 441-Assessment and Instructional Design for the Handicapped: Oral Language and Communication Disorders (3) or
EDSP 404-Education of Students with Autism (3)
For SD endorsement: EDSP 403—Physical and Communication Adaptation for Students with Disabilities (3)

Course Code: EDSP

## SPEECH COM MUNICATION

The Department of Speech Communication is now the Department of Communication. See entry on page 96.

## STATISTICS

For information consult the entry under Mathematical Statistics Program, page 129.

## THEATRE (THET)

## College of Arts and Humanities

2809 Clarice Smith Performing Arts Center, (301) 405-6676
E-mail: thetdept@umdacc.umd.edu
http:/ / www.inform.umd.edu/ THET

## Chair: Hildy

Professors: Hildy, Meersman
Associate Professors: Conway, Coustaut, Hébert, Huang, Patterson, Reese, Schuler, Wagner
Assistant Professors: Burbank, Cabot
Instructors: Alford, Kriebs
Emeritus: Gillespie, Pugliese

## The Major

Small classes, student-faculty town meetings, and a close knit departmental environment promote a strong sense of community within the Department of Theatre. It is a lively, multi-cultural community where the contributions of all are valued. An extensive schedule of departmental and student productions offer students myriad opportunities to practice their craft. The department is a supportive and stimulating environment that fosters students' creative development and spurs their achievements. A well-rounded and comprehensive curriculum prepares for careers in acting, directing, design, technical theatre, theatre management, and teaching. Since the skills cultivated by a liberal arts approach to theatre study-selfdiscipline, creativity, self-confidence, and critical thinking-are valuable in all career fields, theatre training is an excellent preparation for any profession. Our performance, design, and technical theatre faculty are active in professional as well as academic theatre-members of Actors Equity and United Scenic Artists-providing students a vital link to the world of professional theatre. Our history, criticism, and theory faculty regularly publish and participate at national and international conferences. Situated in close proximity to the vibrant and stimulating professional theatre world of Washington, D.C. and Baltimore, students have ready access to the best of both contemporary and classical productions. They enjoy a unique opportunity to participate in this busy theatrical region through internships and other projects. The Department of Theatre is home to The National Players, which offers audition opportunities to our graduates. Now in its 50th season, National Players is America's longestrunning classical touring company, performing and conducting workshops across the country. The Clarice Smith Performing Arts Center is the largest facility of its kind on any university campus in the nation. The Center features six state-of-the-art performing venues including a 650 seat proscenium theatre and 100 and 200 seat experimental theatres. In addition, the center houses the Department of Dance, School of Music, and a Performing Arts Library.

The department offers two tracks leading to the B.A. in Theatre. Both share a common core of classwork, which provides a solid liberal arts grounding. The Performance Track is an intensive training in acting, vocal production, movement, and directing. The Design/Technical Track encompasses a comprehensive study in scene design, costume design, lighting design, sound design, stage management, and technical direction. In cooperation with the Department of Curriculum and Instruction, a selective admission program for teacher certification in Theatre/ English Education is available. For more information, see an advisor in EDU 2311.

## Requirements for M ajor

Requirements for the College of Arts and Humanities include a minimum of 45 upper-level credits and a foreign language requirement.

Major requirements are 43 credits of course work in theatre, exclusive of those courses taken to satisfy the college and university requirements, plus 10-12 credits of supporting area courses. Of the 43 credits, at least 21 must be upper-level ( $300-400$ series). No course with a grade less than C may be used to satisfy major or supporting area requirements.

Required core courses for all majors (31 credits): THET 110, 111, 120, 170, 171, 279, 330, 475, 479, 490, 491.

Design Emphasis (12 credits): THET 273, 373 required. Choose two of the following: 371, 377, 383.

Performance Emphasis (12 credits): THET 221*, 320*, 387. Choose one of the following: 420*, 430, 474.

* An audition is required for these courses.

Supporting courses (10-12 credits): Two from each of the following: ENGL $304,403,404,434,450,451,454 ; 4-6$ credits from any DANC, MUSC, ARTH, or ARTT course approved by the departmental advisor.

## Advising

Advising is mandatory for undergraduate theatre majors. Students should report to the Theatre Department office for registration materials before making an appointment with their adviser.

## Financial Aid

Scholarships and financial assistance may be awarded to prospective and enrolled students through a number of Creative and Performing Arts Scholarships and Theatre Patrons Scholarships. Other scholarships and workships are awarded yearly to continuing students. For further information, contact the Coordinator of the Scholarship Program or visit our web site at http:/ / www.inform.umd.edu/ THET.

Course Code: THET

## TRANSPORTATION, BUSINESS, AND PUBLIC POLICY

For information, consult the Robert H. Smith School of Business entry in chapter 6.

## WOMEN'S STUDIES (WMST)

## College of Arts and Humanities

2101 Woods Hall, 405-6877
Professor and Chair: Moses
Professors: Beck, Bolles,Dill, Rosenfelt, Zambrana
Associate Professors: Barkely Brown, Kim, King
Assistant Professors: Matthes
Visiting Assistant Professor: Allahyari
Affiliate Professors: Harley, Williams, Wilson (Afro-Amercian Studies); Paoletti, Parks, Sies, Struna (American Studies); Friedenberg (Anthropology); Gips (Art); Withers (Art History); Kerkham, Liu (Asian and East European Language and Culture); Palmer (Biology); Greer (Chemical Engineering); Doherty, Hallet, Stehle (Classics); Grunig, Parry-Giles (Communication); Collins, Fuegi, Lanser, Peterson (Comparative Literature); Fassinger (Counseling and Personnel Services); Heidelbach (Curriculum and Instruction); Coletti, Donawerth, Kauffman, King, Kornblatt, Leonardi, Lindemann, Logan, McDowell, Ray, Smith, Washington (English); Leslie (Family Studies); Hage, Mossman (French and Italian Languages and Literature); Frederickson, Oster, Strauch (Germanic Studies); Bedos-Rezak, Brush, Gullickson, Lyons, Muncy, Zilfi (History); Beasley (Journalism); Day, Luckert, Masnick (Library Services); Robertson (Music); Fullinwider, Li (Philosophy and Public Policy); Alexander, Helms, O'Brien, Scholnick (Psychology); Bianchi, Desai, Hunt, Kahn, Moghadam, Presser, Segal (Sociology); Bouvier, Cypess, Peres (Spanish and Portuguese Languages and Literature); Coustaut, Gillespie, Schuler (Theatre); Weil (Center for Women in International Security); Ryan (Writing Center)
The Women's Studies Program is an interdisciplinary academic program designed to examine the historical contributions made by women, reexamine and reinterpret existing data about women, and introduce students to the methodology of feminist scholarship. The program offers interdisciplinary courses on women, encourages the offering of courses on women in other disciplines, and promotes the discovery of new knowledge about women. Women's Studies courses challenge students to question traditional knowledge about women and men and to examine differences among women. Students gain an understanding of and respect for differences in human lives as they encounter issues of diversity in the classroom: age, ability, class, ethnicity, race, religion, and sexual preference.

## Requirements for the Major

The Women's Studies major offers students a coherent but flexible program of study examining scholarship and theory on the history, status, contributions, and experiences of women in diverse cultural communities, and on the significance of gender as a social construct and as an analytical category. Drawing from approximately fifty course, many of which are crosslisted with other academic units, students will have the opportunity to design an emphasis within the major relevant to their special interests. Students will earn a total of 39-42 credit hours, distributed as indicated below. A number of courses may count in more than one category. At least 30 credit must be at or above the 300 level. No course with a grade less than C may be used to satisfy the major. Students will design their programs in consultation with a Women's studies advisor. Advising is mandatory.

## 1. Foundation Courses (18 credit hours)

WMST 200: Introduction to Women's Studies: Women and Society...(3) OR
WMST 250: Introduction to Women's Studies: Women, Art \& Culture (3)
WMST 300: Feminist Reconceptualizations .
WMST 350 Feminist Education Practicum and Analysis . .(6)

> OR

WMST 380: Women's Studies Field Work and Analysis ....................(6)
WMST 400: Theories of Feminism ....................................................(3)
WMST 488: Senior Seminar.

## 2. Distributive Courses (9 credit hours)

Area 1: Arts and Literature
WMST 241: Women Writers of French Expression in Translation (X-listed as FREN 241).
WMST 250: Introduction to Women's Studies:
Women, Art, and Culture
WMST 255 Introduction to Literature by Women
(X-listed as ENGL 255).
WMST 275: World Literature by Women (X-listed as CMLT 275).................................................................
WMST 281: Women in German Literature and Society
(X-listed as GERM 281)
WMST 348: Literary Works by Women................................................(3)
WMST 408: Special Topics in Literature by Women
before 1800 (X-listed as ENGL 408).
WMST 444: Feminist Critical Theory (X-listed as ENGL 444) ................(3)
WMST 448: Special Topics in Literature by Women of Color*
(X-listed as ENGL 448).
WMST 458: Special Topics in Literature by Women after 1800
(X-listed as ENGL 458).
WMST 466: Feminist Perspective on Women in Art
(X-listed as ARTH 466).
WMST 468: Feminist Cultural Studies ............................................................(3)
WMST 481: Femmes Fatales and the Representation
of Violence in Literature (X-listed as FREN)
WMST 496: African -American Women Filmmakers*
(X-listed as THET 496)
FREN 482: Gender and Ethnicity in Modern French Literature
Area II: Historical Perspectives
WMST 210: Women in America to 1880 (X-listed as HIST 210) ........(3)
WMST 211: Women in America Since 1880 (X-listed as HIST 211) ...(3)
WMST 212: Women in Western Europe, 1750-present
(X-listed as HIST 212).
WMST 320: Women in Classical Antiquity (X-listed as CLAS 320)
WMST 453: Victorian Women in England, France, and the
United States (X-listed as HIST 493)
WMST 454: Women in Africa * (X-listed as HIST 494)........................(3)
WMST 455: Women in Medieval Culture and Society
(X-listed as HIST 495).
WMST 457: Changing Perceptions of Gender in the US:
1880-1935 (X-listed as HIST 433)
WMST 492: History of the American Sportswoman:
Institutions and Issues (X-listed as KNES 492)..
AASP 498W: Black Women in United States History*...........................(3)
AMST 418J: Women and Family in American Life ..................................(3)
HIST 309: Proseminar in Historical Writing: Women's History ............(3)
HIST 319Z: Special topics in History: Women in the Middle East* ....(3)
Area III: Social and Natural Sciences
WMST 200: Introduction to Women's Studies: Women and Society
WMST 313: Women and Science (X-listed as ZOOL 313)..
WMST 325: Sociology of Gender (X-listed as SOCY 325)..
WMST 336: Psychology of Women (X-listed as ZOOL 326) ..... (3)
WMST 360: Caribbean Women* ..... (3)
WMST 410: Women in the African Diaspora* ..... (3)
WMST 420: Asian-American Women* ..... (3)
WMST 425: Gender Roles and Social Institutions ..... (3)
WMST 430: Gender Issues in Families (X-listed as FMST 430 ) ..... (3)
WMST 436: Legal Status of Women (X-listed as GVPT 436) ..... (3)
WMST 452: Women and the Media (X-listed as JOUR 452). ..... (3)
WMST 471: Women's Health (X-listed as HLTH 471) ..... (3)
WMST 493: J ewish Women in International Pers pective* ..... (3)
WMST 494: Lesbian Communities and Difference* ..... (3)
AASP 498F: Special Topics in Black Culture: Women and Work* ..... (3)
CCIS 498: Special Topics in Criminology and Criminal Justice: Women and Crime ..... (3)
COMM 324: Communication and Gender ..... (3)
SOCY 498W: Special Topics in Sociology: Women in the Military ..... (3)* Fulfills Women's Studies Multi-Cultural Requirement

## 3. Courses in Cultural Diversity

Students will select two courses for a minimum of 6 semester credit hours. Approved courses are noted with an asterisk in section 2, above. Courses in this category may overlap with other requirements

## 4. Student-Developed Emphasis

Each student, with the help of a Women's Studies advisor, will design an emphasis consisting of at least three courses or nine semester credit hours Courses in this category may overlap with other requirement. Courses will ordinarily be drawn from those approved for the major. In some instances, students may secure permission from the Women's Studies advisor to include other courses.

## 5. Electives

Students should select their elective from the full list of courses for the major. The number of credit hours will vary depending on the individual student's program, but should bring the total number of semester credit hours to at least 39.

## Honors

The Honors Program is designed to give students the opportunity to pursue rigorous interdisciplinary research and writing. Interested students who have a GPA of at least 3.0 should apply to the program in their junior year. Students are required to take six credits of upper-level honors or honorsoptions courses and honors seminars (WMST 488H), as well as write and defend a thesis. Contact the Academic Advisor for further information.

## Advising

Undergraduates in good academic standing may enroll in the Women's Studies Program or obtain more information about available options and services by contacting Undergraduate Academic Advisor, Women's Studies Program, 2101 Woods Hall, University or Maryland, College Park, Maryland 20742, (301) 405-6877.

Course Code: WMST

## ZOOLOGY

Departments in the College of Life Sciences have been reorganized. Courses in zoology are now offered by the Department of Biology.

## CAMPUS-WIDE PROGRAMS

Air Force Aerospace Studies Program (ROTC)
2126 Cole Student Activities Bldg., (301) 314-3242
Director: Moses
Assistant Professors: Christ, Klose, Shick
Staff: Condon, Graves

The Air Force Reserve Officers Training Corps (ROTC) provides two programs for college men and women to earn a commission as a Second Lieutenant in the United States Air Force while completing their University degree requirements. To enter the AFROTC program, students should inform their adviser, and register for classes in the same manner as for other courses.

## Four-Year Program

This program is composed of a General Military Course (GMC) and a Professional Officer Course (POC). The first two years (GMC), normally for freshmen and sophomores, give a general introduction to the Air Force and the various career fields. Students enrolled in the GMC program incur no obligation and may elect to discontinue the program at any time. The final two years (POC) concentrate on the development of leadership skills and the study of United States defense policy. Students must compete for acceptance into the POC. Students enrolled in the last two years of the program are eligible for an AFROTC scholarship.

Students in the four-year program who successfully complete the first two years of the program and are accepted into the POC program must attend four weeks of field training at a designated Air Force base during the summer after completing their sophomore year of college.

## Two-Year Program

This program is normally offered to prospective juniors but may be taken by seniors and graduate students. The academic requirements for this program are identical to the final two years of the four-year program and students are eligible to receive the same benefits. During the summer preceding entry into the program, all candidates must attend six weeks of field training at a designated Air Force base. Students should start the application process as soon as possible-not later than the January prior to joining the cadet corps.

## THE CURRICULUM

## General Military Course (GMC)

Freshman year-ARSC 100 (Fall) and ARSC 101 (Spring). These courses introduce the student to the roles of the Department of Defense and the U.S. Air Force in the contemporary world. Each one-credit course consists of one hour of academic class and two hours of Leadership Laboratory each week.

Sophomore year-ARSC 200 (Fall) and ARSC 201 (Spring). ARSC 200 provides an historical review of air power employment in military and nonmilitary operations in support of national objectives and a look at the evolution of air power concepts and doctrine. ARSC 201 examines concepts of leadership, ethics, and quality. Each one-credit course consists of one hour of academic class and two hours of Leadership Laboratory each week.

## Professional Officers Course (POC)

Junior year-ARSC 310 (Fall) and ARSC 311 (Spring). 3 credits per semester. Course introduces students to management and leadership theory and application. Leadership laboratory participation is required for AFROTC cadets.

Senior year-ARSC 320 (Fall) and ARSC 321 (Spring). 3 credits per semester. Course reviews history of American defense/ foreign policy. Second semester concentrates on ethics, military justice, officership and related issues. Leadership laboratory participation is required for AFROTC cadets.

All Aerospace courses are open to any university student for credit whether or not he or she is in the AFROTC Program. Students who are not in the AFROTC Program do not attend the Leadership Laboratory.

## General Requirements for Acceptance into the POC

The student must complete the General Military Course and the field training session, pass the Air Force Officer Qualifying Test, be physically qualified, be in good academic standing, meet age requirements and be a U.S. citizen. Successful completion of the Professional Officer Course and a bachelor's degree or higher are prerequisites for a commission as a Second Lieutenant in the United States Air Force. Additional information may be obtained by telephoning the Office of Aerospace Studies, (301) 314-3242.

## Scholarships

AFROTC scholarship programs provide four-, three-, and two-semester scholarships to students on a competitive basis. Scholarships are available in many fields and are based on merit. Those selected receive tuition, lab expenses, incidental fees, and book allowance plus a non-taxable monthly allowance of $\$ 200$.

Any student accepted by the University of Maryland may apply for these scholarships. AFROTC membership is required to receive an AFROTC scholarship.

## AFROTC Awards

AFROTC cadets are eligible for numerous local, regional, and national awards. Many of these awards include monetary assistance for school.

Course Code: ARSC

## STUDY ABROAD PROGRAMS

3125 Mitchell Bldg., (301) 314-7746
E-mail: studyabr@deans.umd.edu
http:/ / www.inform.umd.edu/ INTL/ studyabroad
Coordinator: Rick Weaver
The goal of the Study Abroad Office is to enable students to incorporate a summer, winter, semester, or year abroad into their degree program at Maryland. Study abroad increases awareness of other cultures and languages while providing a comparative international perspective. Many students find study abroad essential for their major or career plans. Others view it as part of their liberal arts education.

## Advising and Information

The Study Abroad Office provides handouts and advising on the wide variety of programs available. A small library provides information on programs offered by other universities. The office assists students in obtaining credit for their experience abroad. All students can use study abroad to enrich their programs and to fulfill CORE requirements and electives.

## Maryland Study Abroad Semester/ Year Programs

Study in London: The curriculum consists of courses in the humanities, business, social sciences, and sciences. Students live in dorms, in flats with other program participants, or with a British family to increase their immersion in British life. Fall and spring semesters.

Study in Nice, France: Offers French language courses for foreigners and regular courses at the University of Nice for students with sufficient French language background. Year and spring semester.
Study in Mexico City: Offers Spanish language and Latin American studies courses. Fall and spring semesters.
Study in Alcalá, Spain: Offers Spanish language and culture studies at the University of Alcalá de Henares. Students may enroll in an internship or in a course in Spanish literature, business, or civilization. Spring semester.

Study in Tel Aviv, Israel: Offers a semester of study in Israel. Students attend Tel Aviv University where they take courses taught in English that focus on Israeli and Middle East studies. Fall and spring semesters.

Study in Rome, Italy: Students take courses in English at the American University of Rome. AUR offers instruction in the liberal arts, business, Italian language and culture, and international studies. Fall and spring semesters.

Study in Brazil: Offers a summer and fall semester at the Catholic University of Rio de Janeiro to take regular university courses offered in Portuguese.

Denmark's International Study Program: Maryland acts as a coordinator for DiS in Copenhagen, which offers courses in English focusing on humanities and social sciences, engineering, international business, marine biology, and environmental studies. Students are housed with famailies or in dorms. Fall and spring semesters.
German and Engineering: As part of the dual degree program, students spend six months in Germany studying the language and completing an
internship with an engineering company. A two-month intensive technical German language study is followed by four months' paid internship in Germany. Spring semester.

## Winterterm

New and exciting programs are offered every year. At the time of printing, Winterterm 2001 programs were being developed. In 2000, the following programs were offered:

Study in Belize: Mayan Culture, Tropical Rainforests, and Coral Reefs: Part one of this course explores present day archeological sites related to Mayan culture. In the second part, students study the tropical environment of Belize.

Study in Costa Rica: Sustainable Tropical Agro-Ecosystems: Students explore the ecosystems and economic and environmental resource interrelationships in the context of a global economy.

Cuba: The Cuban Revolution - Politics and Society: This course examines the origins and implications of the Cuban Revolution. One week of study on campus is followed by two weeks in Havana where participants have the opportunity to interact with scholars, government officials, and students.

Study in Germany: Business, Politics and the European Union: The course focuses on the European Union and the central roles that European and German history, politics, culture and business have played in its emergence and evolution.

Grenada: Caribbean Literature: Students explore the social and political context of two Caribbean texts while exploring the history and culture of Grenada.

Honduras: Hands-on Projects in Sustainable Development Students gain knowledge about development problems in a tropical environment. Most program activities take place on the Zamorano campus or in the surrounding Yeguare watershed.

Japan: A View from the Performing Arts: Performing arts groups serve as examples of individual, group and social interaction in Japan. The class visits performances, historical sites, and meets with Japanese people related to the performing arts.

Study in Mexico: Social Change and Mobilization: In Mexico City, students are introduced to changing patterns of social inequality, the process of adopting democratic institutions and processes, and emerging social movements.

Study in Vietnam: The Five Faces of Vietnam: Participants explore the political, cultural, and economic life of contemporary Vietnam as well as the legacies of the American war in Vietnam.

## Summer Programs

Architecture Abroad: The School of Architecture sponsors various summer study programs which allow students at an advanced undergraduate and graduate level to deal creatively with architectural issues in a foreign environment. Program locations vary, but include Tunisia, Turkey, and Western Europe.

Costa Rica: This 10-week course offers students the opportunity to live and work in a developing region of Costa Rica while studying a multi-disciplinary program of architecture, planning, resource management, international development, and women's issues.
Summer in Germany: The Department of Germanic Studies sponsors a fiveweek intensive language and culture program in Germany.
Israel: Students work with the Combined Caesarea Expeditions to excavate the terrestrial and harbor remains of ancient Caesarea. Training is provided in all aspects of archeological fieldwork.

Summer in Taxco, Mexico: The Department of Spanish and Portuguese sponsors a six-week intensive Spanish language program for students at the elementary and intermediate levels.
South Africa: This course focuses on three phases of the South African postindependence period and includes discussion and field trips to meet with current political leaders and non-governmental agencies.

Summer in Spain: The Department of Spanish and Portuguese sponsors a five-week intensive language and culture program in Spain.

Honors in Kiplin Hall, England: Offers a survey of British history, culture, and literature in London and Kiplin Hall for Honors students.

## Exchanges

The Study Abroad Office administers reciprocal exchanges with specific universities overseas. These exchanges are often related to academic departments and require extensive language or academic background. All the exchanges require at least a 3.0 grade point average. Exchanges are available with the following British Universities: King's College for Engineering and Physics majors; University of Kent for government and politics majors; Kingston University for chemistry majors; University of Sheffield for English majors and American studies majors; University of Lancaster for math majors; University of Bristol for philosophy majors; University of Surrey for sociology majors; and University of Liverpool for history majors. In Japan, Keio University for intensive Japanese language, and Hiroshima and Chiba universities for the humanities, social sciences, and sciences and engineering. In Korea, Yonsei University. In Germany, the University of Tübingen and the Gesamthochschule Kassel. In Austria, the University of Vienna. In Spain, University of Alcalá for students in Business. In Sweden, Uppsala University.

## UNDERGRADUATE STUDIES

## University Honors Program

Anne Arundel Hall, (301) 405-6771/ 3
http:/ / www.inform.umd.edu/ EdRes/ Colleges/ HONR

## Director: Mack

The University Honors Programs offers the most talented students on campus special educational opportunities and resources. Honors students combine Honors course work with regular electives and studies in their major to deepen their total educational experience. First- and second-year undergraduates broaden their intellectual horizons by selecting Honors seminars and Honors versions of regular courses in the arts and sciences, most of which fulfill CORE (general education) requirements. They may earn the Honors Citation by fulfilling all requirements in five semesters. Juniors and seniors may continue taking Honors seminars, teach in two one-credit colloquia for first-year students, and apply to more than 30 departmental or college Honors programs that provide opportunities to work closely with faculty mentors on independent research projects.

Honors seminars offer small (12-20 students) academic experiences characterized by active participation, intensive writing, and faculty who encourage critical thinking and reflective learning. A course entitled Knowledge and Its Human Implications provides second-semester Honors students with the option of a challenging, interdisciplinary common intellectual experience.

Anne Arundel Hall, the Honors Living/ Learning Center, houses 100 of the Honors students, program staff, scholar-in-residence, computer lab, Portz Library, seminar rooms, and lounges. Other Honors students live and study together in Queen Anne's Hall, Denton Hall and on designated Honors floors in various other residence halls.

Qualified first-year entering students are invited into Honors; transfer students with between 12 and 30 credits (excluding AP credits) will be considered for admission. Transfer students with more than 30 credits transferring from an Honors program in their previous school should contact the University Honors Program for information about campus Honors opportunities. Most departmental and college Honors programs begin in the junior year. Please contact departments or colleges directly for admission requirements.

For more information, write Director, University Honors Program, Anne Arundel Hall, University of Maryland, College Park, Md., 20742, or call 301-405-6771.

## Gemstone

2157 A.V. Williams Building, (301) 405-8047
http:/ / www.isr.umd.edu/ gemstone/
Faculty Director: Dr. Christopher Davis
The Gemstone program brings together the top undergraduate honors students from many disciplines, including business; engineering; journalism; the social sciences; agriculture and natural resources; the arts and sciences; computer, mathematical, and physical sciences; and the life
sciences. As first-year students, Gemstone participants form interdisciplinary teams that work with a faculty mentor for three years analyzing and investigating important societal problems. Gemstone students enjoy a stimulating living/ learning environment on special Gemstone floors in the residence halls. The culmination of the project is a book-length team thesis completed in the senior year. The senior year also includes a research conference. Prior to graduation, a final presentation will be made to an evaluation panel of faculty advisers and experts in area of study.

Gemstone projects vary from year to year. Recent teams have worked on issues including next generation mass transportation, reclamation of the Chesapeake Bay, and information technology and medicine. Gemstone students enroll in a series of three three-credit, specially-designed courses that examine the relationship between technological innovation and society from historical, sociological, and economic perspectives. Under the guidance of a faculty mentor, each Gemstone team focuses its research on challenges associated with technological change and its role in driving societal change. The interdisciplinary nature of the teams will enable examination of these issues from different perspectives. Additionally, students enroll in two-credit seminars where each team meets regularly with the faculty mentor.

For additional information, please contact Dr. Vickie Claflin, Assistant Director, Gemstone Program, at the address and phone number above or by E-mail at vclaflin@isr.umd.edu.

## Honors Humanities

For information, please see College of Arts and Humanities entry in chapter 6.

## College Park Scholars Program

1125 Cumberland Hall, (301) 314-CPSP (2777)
http:/ / www.inform.umd.edu/ SCHOLAR
Executive Director: Katherine C. McAdams
College Park Scholars is an innovative two-year living/learning program for academically talented students. Admission is by invitation. Upon admission to the program, College Park Scholars choose one of the multidisciplinary academic programs as a focus, and have an opportunity to live together with other students in that program in specially designated Scholars' residence halls. For Fall 2000, 12 programs are available:

## Advocates for Children

American Cultures
Arts
Business, Society, and the Economy
Earth, Life and Time
Environmental Studies
International Studies
Life Sciences
Media, Self and Society
Public Leadership
Science, Discovery, and the Universe
Science, Technology and Society
Students in each program attend weekly, faculty-led colloquia focused on thematic topics related to their Scholars' program. The colloquia are interactive, engaging students in discussion and debate with prominent experts in various fields. Students also have an opportunity to enroll in specially designed sections of the first-year writing courses. The various College Park Scholars curricula allow students to fulfill their general education (CORE) requirements by choosing clusters of courses with their theme in mind. Every program has an experiential learning component; Scholars choose from independent research projects with their faculty mentors, service learning projects, and a variety of internships both on and off campus.

The College Park Scholars' residence halls form a collaborative living/ learning community where students meet faculty in their offices, organize study groups on their floors, and join guest speakers for dinner in the dining hall. A diverse student population enriches all the Scholars' experiences, and directors encourage students with different experiences and backgrounds to take leadership roles in both the curricular and extracurricular programs. In addition, students in all the programs are offered opportunities to participate in faculty-led study abroad experiences between semesters or during the summer.

College Park Scholars are encouraged to take advantage of global access to information through the Internet and World Wide Web connections available in the residence halls. Students use internet resources to communicate with their faculty directors, other students, and experts and data from across the country and around the world.

At the successful completion of the Scholars curriculum, students receive a College Park Scholars citation on their transcript. Then, in their junior year, College Park Scholars have an opportunity to apply to their departmental or college honors programs.

For more information on any of the programs identified above, please write to Executive Director, College Park Scholars, 1125 Cumberland Hall, University of Maryland, College Park, MD 20742-9331, or call (301) 314-2777.

Individual Studies Program (IVSP)
Division of Letters and Sciences
1117 Hornbake Library, (301) 314-9403

## IVSP Coordinator: Lisa Tenley

The Individual Studies Program provides an opportunity for students to create and complete individualized majors. To be accepted into the program, a student must:

1) have a clearly-defined academic goal which cannot reasonably be satisfied in an existing curriculum at College Park;
2) be able to design, with faculty assistance, a sequence of courses and other learning experiences which is judged to have adequate substance for the awarding of a degree in the special field of study; and
3) have at least a 2.0 GPA and earn a minimum grade of $C$ in designated major courses.

Most IVSP majors are either a form of "area study" utilizing offerings from many departments, or a clear combination of two or more disciplines. Many include internships or independent study projects in the program. All work is done under the supervision of a faculty adviser.
Applicants are required to write a detailed prospectus outlining their proposed program of study. They must meet the general education requirements according to year of entry. The process of applying often involves considerable consultation and several drafts of a prospectus, so it should be begun as early as possible. Students may be admitted to the Individual Studies Program after completion of 30 college credits ( 15 of which must be at the University of Maryland) at the University of Maryland, College Park, and must be officially approved by the Individual Studies Faculty Review Committee prior to the final 30 credits. Individual Studies programs must be approved before students can declare Individual Studies as a major.

Individual Studies provides three courses specifically for its majors: IVSP 317, a one-credit progress report graded Satisfactory/ Fail; IVSP 318, an independent study course which students can use for a variety of out-of-class internship and research opportunities (a variable-credit course, it may be taken for a total of nine credits towards the degree); and IVSP 420, Senior Paper/ Project, required for all students during the final semester. The project is evaluated by three faculty members.

More information on requirements and procedures is available from Lisa Tenley, IVSP Coordinator, 1117 Hornbake Library, (301) 314-9403 or (301) 314-9881.

Course Code: IVSP

## PRE-PROFESSIONAL PROGRAMS

(Pre-Dental Hygiene, Pre-Dentistry, Pre-Biomedical Science Research and Medical Technology, Pre-Nursing, Pre-Occupational Therapy, Pre-Optometry, Pre-Osteopathic Medicine, Pre-Pharmacy, Pre-Physical Therapy, PrePhysician Assistant, Pre-Podiatric Medicine, Pre-Veterinary Medicine)

Advising for Law and the Health Professions
Division of Letters and Sciences
Assistant Director for Pre-Professional Advising: Harriet Nokuri
0110 Hornbake Library, (301) 405-2793, Preprof@deans.umd.edu
Health Professions Advisors: Christy Botdorf, Harriet Nokuri
Law Advisor: J eff VanCollins
http:/ / www.inform.umd.edu/ ugradstudies/ LettersSciences/ lawhealth.html

## General Information

Pre-professional programs are designed to provide the necessary academic foundation required for entrance into professional schools. Some students may be admitted to professional programs after two to three years of study but most students are admitted only after the completion of a bachelor's degree.

All pre-professional programs are advisory ONLY and, except in certain limited circumstances as described herein, these programs may not be declared as the official undergraduate major. No specific major is required, favored, or preferred by professional schools. The pre-professional advisers can provide guidance concerning the choice of major. Undecided students may enter the Division of Letters and Sciences until they select a major.

Of particular interest to health professions students, the University of Maryland, College Park, offers the opportunity to complete courses required for admission into professional programs. However, the University of Maryland, College Park, does not offer an academic degree (nor certificate/ diploma) in any of the aforementioned pre-professional areas. Students who intend to apply to a professional curriculum must adhere to the policy set forth by the University of Maryland which states that students have until the accumulation of 56 credits to declare a degree granting major.

Pre-professional students may select from any of the degree-granting majors offered at the University of Maryland, College Park, in deciding an appropriate major. Most professional schools tend to allow student discretion in selecting a major and do not give preference to one major over another. Popular majors for each of the pre-professional areas have been indicated within each subcategory. The academic advisors in the Division of Letters and Sciences and the pre-professional advisors can assist students in this process.

Successful completion of a pre-professional program at College Park does not guarantee admission to any professional school. Each professional school has its own admissions requirements and criteria, which may include grade point average in undergraduate courses, scores on admissions tests, a personal interview, faculty recommendations, and/ or an evaluation from the pre-professional adviser. For admissions requirements, the student is urged to study the catalog of each professional school to which they will be applying.

All students are welcome to use the Law and Health Professions Resource Room in 0110 Hornbake for information on careers and professional schools across the country.

## Pre-Dental Hygiene <br> Advisor: Christy Botdorf

Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

The Pre-Dental Hygiene program is designed to prepare students for entrance into a professional curriculum for Dental Hygiene at institutions that offer Bachelor of Science in Dental Hygiene programs. Pre-Dental Hygiene is not intended as a Pre-Dental major. Pre-Dental Hygiene is not a degree-granting program at the University of Maryland, College Park.

A Baccalaureate degree program for a Bachelor's of Science in Dental Hygiene (BS-DH) follows a $2+2$ model program. Students may complete two years of prerequisite courses at the University of Maryland, College Park, and then apply for admission into a professional school to complete two years of professional coursework, which includes classroom, laboratory, and clinical education.

University of Maryland students also have the option of completing a fouryear degree at College Park in their selected major, in addition to completing dental hygiene prerequisites. This is the $4+2$ model program. In this case, students who complete degree requirements in their chosen major as well as the pre-dental hygiene prerequisites, would have a degree from the University of Maryland, College Park in their chosen major in addition to the professional school prerequisites necessary for entrance into a professional dental hygiene program. Upon completion of a professional dental hygiene program, the student would be conferred a Bachelor's of Science in Dental Hygiene degree from said program.
Popular majors for students interested in dental hygiene include biology, health, and nutrition and food science. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change; therefore, students are strongly encouraged to contact professional programs for the most current requirements. Contact the American Dental Hygienists' Association or the American Dental Association for specific information about individual BS-DH program prerequisites. Students may also visit the Health Professions resource library in 0110 Hornbake for professiona school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College Park. Note: The University of Maryland at Baltimore offers a professional-level dental hygiene program

American Dental Hygienists' Association
444 N. Michigan Avenue, Suite 3400
Chicago, IL 60601
http:/ / www.adha.org
American Dental Association
211 E. Chicago Avenue
Chicago, IL 60611-2678
http:/ / www.ada.org

Some prerequisite courses usually required by most professional phase Dental Hygiene programs include, but are not limited to:

## General Biology

Human Anatomy and Physiology
Inorganic and Organic Chemistry
Microbiology
Principles of Nutrition
Public Speaking
English Composition
Statistics
Introduction to Sociology
Introduction to Psychology

## Pre-Dentistry

## Adviser: Nokuri

The pre-professional program for pre-dental students is a program of advising for students preparing to apply to dental school. The advice is based on requirements and recommendations of American dental schools and the requirements for a baccalaureate at College Park.

The recommendations made during advising are meant to prepare the student to take the Dental Admissions Test (DAT) in the spring of the junior year. Application to dental school is made during the summer-fall of the senior year. In addition to faculty letters of recommendation, most admissions committees request or require an evaluation from the student's pre-dental adviser. It is important, therefore, for the student to contact the pre-dental adviser early in the academic career and to become familiar with the proper procedures necessary in the evaluation and application process.

For more information on the pre-dental advising program, contact the PreDental Adviser, 1117/0110 Hornbake Library, University of Maryland, College Park, MD, 20742, (301) 405-2793.

There are two ways to prepare for admission to dental school: a four-year program is preferable, but a three-year program is possible.

## Four-Year Baccalaureate Program

Most pre-dental students at College Park complete a four-year undergraduate degree prior to entrance into dental school. Students are encouraged to pursue a diversified curriculum, balancing humanities courses with science and mathematics courses. No specific major is required, favored, or preferred by dental school admissions committees.

The four-year student will plan an undergraduate experience which includes courses to satisfy major and supporting area requirements, general education requirements, and the dental school admission requirements. The student's academic adviser will advise about the first two topics, while the Pre-Dental Adviser will advise about dental school admission requirements.

Although specific admission requirements vary somewhat from dental school to dental school, the undergraduate courses which constitute the basic admission requirements and which prepare the student for the DAT are the following:

Semester Credit Hours
ENGL 101 and 391-English Composition
CHEM 103,113-General Chemistry I, II
3, 3
CHEM 233, 243-Organic Chemistry I, II
PHYS 121, 122 or PHYS 141, 142-Physics
4, 4

Biology, minimum*
4, 4
4, 4

* Although the minimum biology requirement is eight credits, the successful applicant will have more, including advanced training in biological sciences at the 300- to 400-level. BIOL 101, 102, and 124, and MICB 100 should not be taken to meet this requirement.


## Three Year Arts-Dentistry Degree Program

At the beginning of their third year, students whose performance during the first two years is exceptional may consider applying to the University of Maryland School of Dentistry after three years of college work rather than the usual four, under the combined arts-dentistry program. By the end of the third year at College Park, the student must have earned 90 academic credits, the last 30 of which must have been earned in residence. Within the 90 credits, the student must have completed all the general education requirements. In addition, because there are certain basic admission requirements which also prepare the student for the Dental Admissions Test, the 90 credits would include the following:

Semester Credit Hours
CHEM 103,113-General Chemistry I, II 4,4
(or CHEM 143, 153-General and Analytical Chemistry I, II) 5,5
CHEM 233, 243-Organic Chemistry I, II 4,4
PHYS 121, 122-Fundamentals of Physics I, II 4,4
(or PHYS 141, 142-Principles of Physics I, II) 4,4
*Biological Science (minimum)
8

* Although the minimum biology requirement is eight credits, the successful applicant will likely have more, including advanced training in biological sciences at the 300-400 level. PBIO 100 and 101, BIOL 101 and 102, and MICB 100 may not be taken to meet this requirement. It should also be noted that many other schools of dentistry require mathematics (Calculus). Additional courses in biological ciences are suggested.

Incoming students interested in this three-year combined degree program are strongly urged to consult the pre-dental adviser before registration for the first semester at College Park

Students accepted in the combined arts-dentistry program receive the B.S. degree (Arts-Dentistry) after satisfactory completion of the first year at the University of Maryland School of Dentistry upon the recommendation of the Dean of the School of Dentistry and approval of the University of Maryland, College Park. The Bachelor of Arts degree is awarded by the University of Maryland, College Park in August following the first year of dental school. The courses of the first year of dental school constitute the major; the courses listed above constitute the supporting area.

Participation in the first three years of the combined degree program at College Park in no way guarantees admission to the University of Maryland School of Dentistry. Three-year students compete with four-year students for admission. It is therefore desirable to ensure that the work of the first three years be selected in such a way that the requirements of one of the normal College Park majors can be completed during a fourth year at College Park.

## Pre-Law

1117 Hornbake Library, (301) 405-2793/ (301) 314-8418
Adviser: Jeff VanCollins
Most law schools prefer applicants with a B.A. or B.S. degree; however, in some cases law schools will consider truly outstanding applicants with only three years of academic work. Most law schools do not prescribe specific courses which a student must present for admission, but do require that the student follow one of the standard programs offered by the undergraduate college. Law schools require that the applicant take the Law School Admission Test (LSAT), preferably in July, October, or December of the academic year preceding entry into professional school.

## Four-Year Baccalaureate Program

No particular undergraduate major or special undergraduate courses are prerequisites for admission into law school. Students are encouraged to select a major in which they have a strong interest and expect to perform well. Course selections should be guided by the need to develop skills which are essential in preparing to perform well in law school, on the Law School Admissions Test (LSAT), and ultimately as a lawyer. These skills include imaginative and coherent thinking, critical reasoning, accurate and perceptive reading, and a strong command of the spoken and written language, including grammar. A broad liberal arts background with evidence of a high quality of work will provide a strong foundation for law school.

## Three-Year Arts-Law Degree Program

The University of Maryland, College Park, has cooperative agreements with the University of Maryland, School of Law and the University of Baltimore Law School that allow College Park students enrolled in any recognized major who meet certain requirements to enter law school before obtaining the undergraduate degree.

Requirements that must be completed before the beginning of the first semester of law school are (1) at least 90 undergraduate credits, 30 of which must be earned at College Park; (2) completion of all university and general education requirements; (3) 18 credits in one department applicable to a recognized major with at least six of those credits at the 300/400 level; and (4) minimum grades of $C$ achieved in courses in the major field.

Students who fulfill these requirements may apply directly to the University of Maryland, School of Law and/ or the University of Baltimore Law School. If applying to either of these programs, the optimal time to take the LSAT is the June preceding the student's junior year. Application to law school is then made in the fall semester of the junior year.

If accepted by the law school, the student begins law school without an undergraduate degree. Upon successful completion of the first year of law school, the student may apply for the baccalaureate by returning to the College Park campus and providing official transcripts of the first year of law school. Credits earned during the first year of law school are treated as if they had been earned at College Park. If the student's total credits meet the above requirements and total at least 120, the student will be awarded an undergraduate degree certifying completion of the Arts/ Law program.

This accelerated program is available only with University System of Maryland schools and will not be an option for all students. Students considering this program should make an appointment to meet with the prelaw adviser as soon as possible.

For additional Information, contact the Pre-Law Adviser, 1117/0110 Hornbake Library, (301) 405-2793.

## Pre-BioMedical Science Research and Medical Technology Advisor: Christy Botdorf

Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

The pre-biomedical science research and medical technology program is designed to prepare students for entrance into the professional curriculum for medical technologists and biotechnologists. Pre-Medical Technology is not a degree-granting program at the University of Maryland, College Park.

A Baccalaureate degree program for a Bachelor's of Science in Medical Technology (BS-MT) generally follows a $2+2$ model program. Students may complete two years of prerequisite courses at the University of Maryland, College Park and then apply for admission into a professional school to complete two years of professional coursework, which includes classroom, laboratory, and clinical education.

University of Maryland students also have the option of completing a fouryear degree at College Park in their selected major, in addition to completing medical technology prerequisites. This is the $4+2$ model program. In this case, students who complete degree requirements in their chosen major as well as the pre-medical technology prerequisites, would have a degree from the University of Maryland, College Park, in their chosen major in addition to the professional school prerequisites necessary for entrance into a professional medical technology program. Upon completion of a professional medical technology program, the student would be conferred a Bachelor's of Science in Medical Technology degree from said program.

Popular majors for students interested in medical technology include biology, cell and molecular biology, chemistry, and microbiology. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change; therefore, students are strongly encouraged to contact professional programs for the most current requirements. Contact the American Medical Technologists or the National Accrediting Agency for Clinical Laboratory Sciences for specific information about individual BS-MT program prerequisites. Students may also visit the Health Professions resource library in 0110 Hornbake for professional school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College

Park. Note: The University of Maryland at Baltimore offers a professionallevel medical technology program.

American Medical Technologists
710 Higgins Road
Park Ridge, IL
60068-5765
847-823-5169
Some prerequisite courses usually required by most professional phase Medical Technology programs include, but are not limited to:

General Biology<br>Human Anatomy and Physiology<br>Inorganic and Organic Chemistry<br>Microbiology<br>Statistics<br>English Composition<br>Humanities Courses<br>Behavioral \& Social Science Courses

## Pre-M edicine

Adviser: Nokuri
The pre-professional program for pre-medical students is a program of advising for students preparing to apply to medical school. The advice is based on requirements and recommendations of American medical schools and the requirements for a bachelor's degree at College Park. The premedical adviser is prepared to assist students in setting career objectives, selecting undergraduate course work to meet the admissions criteria of the professional schools, and in all phases of the application process itself.

The recommendations made during advising are meant to prepare the student to take the Medical College Admission Test (MCAT) in the spring of the junior year or the following summer. Application to medical school is made during the summer-fall of the senior year. Medical school admissions committees generally request or require an evaluation from the student's pre-medical adviser. It is important, therefore, for the student to contact the pre-medical adviser early in the academic career and to become familiar with the proper procedures necessary in the evaluation and application process.

For more information on the pre-medical advising program, contact the Premedical Adviser, 1117/0110 Hornbake Library, The University of Maryland, College Park, MD 20742, (301) 405-2793.

There are two ways to prepare for admission to medical school; a four-year program is preferable, but a three-year program is possible.

## Four-Year Baccalaureate Program

Most pre-medical students at College Park complete a four-year undergraduate degree prior to entrance into medical school. Students are encouraged to pursue a diversified curriculum, balancing humanities courses with science and mathematics courses. No specific major is required, favored, or preferred by medical school admissions committees.

The four-year student will plan an undergraduate experience which includes courses to satisfy major and supporting area requirements, general education requirements, and the medical school admission requirements. The student's academic adviser will advise about the first two topics, while the pre-medical adviser will advise about medical school admission requirements.

Although specific admission requirements vary somewhat from medical school to medical school, the undergraduate courses which constitute the basic admission requirements and which prepare the student for the MCAT are the following:

Semester Credit Hours
ENGL 101 AND 391, 393, or 395-English Composition
CHEM 103, 113-General Chemistry I, II
CHEM 233, 243-Organic Chemistry I, II 4, 4
PHYS 121, 122, or PHYS 141, 142-Physics
MATH 220, 221, or MATH 140, 141-Calculus
or
Biology, minimum**
8

* Although calculus is not an entrance requirement of all medical schools and is not included in the MCAT, one year of calculus is strongly recommended for the pre-professional student.
** Although the minimum biology requirement is eight credits, the successful applicant will have more, including advanced training in biological sciences at the $300-400$ level. BIOL 101, 102 and 124, and MICB 100 should not be taken to meet this requirement.


## Three-Year Arts-M edicine Degree Program

At the beginning of their third year, students whose performance during the first two years is exceptional may consider applying to the University of Maryland School of Medicine after three years of college work rather than the usual four, under the combined Arts-Medicine program. By the end of the third year at College Park, the student must have earned 90 academic credits, the last 30 of which must have been earned in residence. Within the 90 credits, the student must have completed all the general education requirements. In addition, because there are certain basic admission requirements which also prepare the student for the Medical College Admissions Test (MCAT), the 90 credits would include the following:

Semester
Credit Hours
CHEM 103,113-General Chemistry I, II .4,4
or CHEM 143, 153-General and Analytical Chemistry I, II .5,5
CHEM 233, 243—Organic Chemistry I, II ...............................................4,4
PHYS 121, 122-Fundamentals of Physics I, II ....................................................4,4
or PHYS 141, 142-Principles of Physics I, II ............................................4,4
MATH 220, 22
.3,3
or MATH 140, 141-Calculus .............................................................................4,4

* Biological Science (minimum) ................................................................... 8
* Although the minimum biology requirement is eight credits, the successful applicant will likely have more, including advanced training in biological sciences at the 300-400 level. PBIO 100, 101, BIOL 101 and 102, and MICB 100 may not be taken to meet this requirement. It should also be noted that the best preparation for the MCATs and for admission to most schools would include additional courses in biology.

Incoming students interested in this three-year combined degree program are strongly urged to consult the pre-medical adviser before registration for the first semester at College Park.

Students accepted in the combined Arts-Medicine Program receive the B.S. degree (Arts-Medicine) after satisfactory completion of the first year at the University of Maryland School of Medicine upon recommendation of the Dean of the School of Medicine and approval of the University of Maryland, College Park. The Bachelor of Arts degree is awarded by the University of Maryland, College Park in August following the first year of medical school. The courses of the first year of medical school constitute the major; the courses listed above constitute the supporting area.

Participation in the first three years of the combined degree program at College Park in no way guarantees admission to the University of Maryland School of Medicine. Three-year students compete with four-year students for admission. It is therefore desirable to ensure that the work of the first three years be selected in such a way that the requirements of one of the normal College Park majors can be completed during a fourth year at College Park.

## Pre-Nursing

Advisor: Christy Botdorf
Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

The Pre-Nursing program is designed to prepare students for entrance into a professional curriculum for Nursing at institutions that offer Bachelor of Science in Nursing programs. Pre-Nursing is not a degree-granting program at the University of Maryland, College Park.

A Baccalaureate degree program for a Bachelor's of Science in Nursing (BSN) follows a $2+2$ model program also known as a "Traditional Baccalaureate" program. Students may complete two years (about sixty credits) of prerequisite courses at the University of Maryland, College Park, and then apply for admission into a professional school to complete two years of professional coursework, which includes classroom, laboratory, and clinical education.

University of Maryland students also have the option of completing a fouryear degree at College Park in their selected major, in addition to completing about twenty to twenty-five credits of nursing prerequisites. This is the "Second Degree" or "Accelerated Second Degree" model program. In this case, students who complete degree requirements in their chosen major as well as the pre-nursing prerequisites, would have a degree from the University of Maryland, College Park, in their chosen major in addition to the
professional school prerequisites necessary for entrance into an accelerated BSN program. Accelerated Baccalaureate Nursing programs usually take thirteen to sixteen months to complete, whereas the Traditional Nursing programs usually take two years to complete. Upon completion of a professional nursing program, the student would be conferred a Bachelor's of Science in Nursing degree from said program.

Popular majors for students interested in nursing include biology, health, nutrition, physiology and neurobiology, and psychology. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change; therefore, students are strongly encouraged to contact professional programs for the most current requirements. Contact the National League for Nursing for specific information about individual nursing program prerequisites. Students may also visit the Health Professions resource library in 0110 Hornbake for professional school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College Park. Note: The University of Maryland at Baltimore offers a professionallevel nursing program.

## National League For Nursing

61 Broadway
New York, NY 10006
800-669-1656 or 1-212-363-5555
http:/ / www.nln.org
Some prerequisite courses usually required by most professional phase, "Traditional" Nursing programs include, but are not limited to:

## General Biology

Human Anatomy and Physiology
Inorganic and Organic Chemistry
Microbiology
Principles of Nutrition
English Composition or Literature
Mathematics
Introduction to Psychology
Introduction to Sociology
Human Growth and Development

## Pre-Occupational Therapy <br> Advisor: Christy Botdorf

Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

Pre-Occupational Therapy is not a degree-granting program at the University of Maryland, College Park. The Pre-Occupational Therapy program is designed to prepare students for entrance into a professional curriculum for Occupational Therapy at institutions that offer professional advanced degrees, such as master's or doctoral degrees.

Community colleges and technical schools offer associate's degrees or certificates to students who wish to become occupational therapy assistants. Certain colleges offer Bachelor degrees in Occupational Therapy, while some schools offer combined Bachelor's and Master's degree programs.

There are several educational pathways for students who wish to enter the occupational therapy field. University of Maryland students have the option of completing a four-year degree at College Park, in their selected major, in addition to completing occupational therapy prerequisites. After completion of their bachelor's degree and the occupational therapy prerequisites, students can choose to complete a Post-Bachelor's certificate, Master of Science program, or doctoral degree program in Occupational Therapy offered by professional schools. Students should thoroughly research the different educational pathways to determine the best route for their career goals. Some states require a degree in occupational therapy prior to approving licensure to work as an occupational therapist in that state. The certificate cannot be used as a degree. You should be familiar with the laws of the state in which you wish to work if you opt to go the certificate route.

Popular majors for students interested in occupational therapy include biology, health, kinesiology, physiology and neurobiology, and psychology. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change; therefore, students are strongly encouraged to contact professional programs for the most current requirements. Contact the American Occupational Therapy Association for specific information about individual program prerequisites. Students may also visit the Health Professions resource library in 0110 Hornbake for professional school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College Park.

The American Occupational Therapy Association
4720 Montgomery Lane, P.O. Box 31220
Bethesda, MD 20824-1220
301-652-2682
http:/ / www.aota.org

## Pre-Optometry

Adviser: Nokuri
Requirements for admission to schools and colleges of optometry vary somewhat, and the pre-optometry student should consult the catalogs of the optometry schools and colleges for specific admission requirements. A minimum of two years of pre-optometry studies is required for admission to all accredited schools, and about half of the schools require a minimum of three years. At present, more than two-thirds of successful applicants hold a bachelor's or higher degree. Students who contemplate admission to optometry schools may major in any program that the University offers, but would be well-advised to write to the optometry schools of their choice for specific course requirements for admission. In general, pre-optometry students should follow a four-year baccalaureate program which includes the following:

|  | Semester <br> Credit |
| :--- | ---: |
| Bours |  |

For additional information on pre-optometry studies, contact the Pre-medical Adviser, 1117 Hornbake Library, the University of Maryland, College Park, MD 20742, (301) 405-2793.

## Pre-Osteopathic Medicine <br> Adviser: Nokuri

The pre-professional requirements for osteopathic medical school are essentially identical to those for allopathic medical school, and the student is referred to the pre-medicine discussion above.

For additional information on pre-osteopathy studies, contact the Pre-medical Adviser, 1117/0110 Hornbake Library, the University of Maryland, College Park, MD 20742, (301) 405-2793.

## Pre-Pharmacy

Advisor: Christy Botdorf
Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

The Pre-Pharmacy program is designed to prepare students for entrance into a professional curriculum for Pharmacy at institutions that offer a Doctor of Pharmacy (Pharm.D.) degree program. Pre-Pharmacy is not a degree-granting program at the University of Maryland, College Park.
A Doctor of Pharmacy (Pharm.D.) degree program follows a $2+4$ model program. Students may complete two years of prerequisite courses at the University of Maryland, College Park and then apply for admission into a professional pharmacy school to complete four years of professional coursework, which includes classroom, laboratory, and clinical education.

University of Maryland students also have the option of completing a fouryear degree at College Park in their selected major, in addition to completing pharmacy school prerequisites. This is the $4+4$ model program. In this case, students who complete degree requirements in their chosen major as well as the pre-pharmacy prerequisites, would have a degree from the University of Maryland, College Park in their chosen major in addition to the prerequisites
necessary for entrance into a professional pharmacy program. Upon completion of a professional pharmacy program, the student would be conferred a Doctor of Pharmacy (Pharm.D.) degree from said program.

Popular majors for students interested in pharmacy include biology, biochemistry, chemistry, microbiology, and nutrition. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change therefore students are strongly encouraged to contact professional programs for the most current requirements. Contact the American Association of Colleges of Pharmacy for specific information about individual Pharm.D. program prerequisites. Students may also visit the Health Professions resource library in 0110 Hornbake for professional school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College Park. Note: The University of Maryland at Baltimore offers a professional-level pharmacy program.

## American Association of Colleges of Pharmacy

1426 Prince Street
Alexandria, VA 22314-2841
703-739-2330
http:/ / www.aacp.org
Some prerequisite courses usually required by most professional phase Pharm.D. programs include, but are not limited to:

## Inorganic and Organic Chemistry

Physics
General Biology
Microbiology
Calculus
English Composition
Public Speaking
Ethics or Philosophy
Humanities Courses
Behavioral \& Social Science Courses

## Pre-Physical Therapy <br> Advisor: Christy Botdorf

Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

The Pre-Physical Therapy program is designed to prepare students for entrance into a professional curriculum for Physical Therapy at institutions that offer professional advanced degrees, such as master's or doctoral degrees. Pre-Physical Therapy is not a degree-granting program at the University of Maryland, College Park.

The track a student follows in order to obtain a Master's in Physical Therapy (MPT) degree varies depending on the professional schools to which the student intends on applying and, more importantly, the expected year of matriculation into the professional phase of Physical Therapy. Currently, the accepted, entry-level clinical degree to practice as a Physical Therapist is the MPT. Students currently can enter Master's level professional programs by two routes. The first route or educational pathway could be completing sixty to ninety credits of prerequisites and then applying to the MPT programs for which the student has completed the requirements. The length of time to complete the Masters level coursework is about two to three years. The second educational pathway option could be completing a Baccalaureate degree at the University of Maryland, College Park, in addition to the prerequisites required by individual professional schools. Students who decide on this option then complete two to three years of Master's level coursework. In both the first and second routes, the end result would be receiving a MPT from the professional school the student attends. Students should thoroughly research the different educational pathways to determine the best route for their career goals.

Popular majors for students interested in physical therapy include biology, kinesiology, physiology and neurobiology, and psychology. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change; therefore, students are strongly encouraged to contact professional programs for the most current requirements. Contact the American Physical Therapy Association for specific information about individual program prerequisites. Students may also visit the Health Professions resource library in 0110

Hornbake for professional school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College Park. Note: The University of Maryland at Baltimore offers a professional-level physical therapy program.

The American Physical Therapy Association
1111 North Fairfax Street
Alexandria, VA 22314
703-684-2782
http:/ / www.apta.org
Some prerequisite courses usually required by most professional phase Physical Therapy programs include, but are not limited to:

## General Biology

Human Anatomy and Physiology
Chemistry
Physics
Exercise Physiology
Pre-Calculus or Calculus
Statistics
Psychology
Human Growth and Development
Ethics or Philosophy
English Composition
Public Speaking
Humanities Courses
Pre-Physician Assistant
Advisor: Christy Botdorf
Please read the General Information concerning pre-professional programs under the Pre-Professional Programs subcategory.

Pre-Physician Assistant is not a degree-granting program at the University of Maryland, College Park. The Pre-Physician Assistant program is designed to prepare students for entrance into a professional curriculum at institutions that offer professional advanced degrees or post-baccalaureate certificates. At the University of Maryland, students can complete the necessary prerequisite courses required by the professional physician assistant programs to which they will be applying.

There are several educational pathways for students who wish to enter the physician assistant field. Due to the many variables in the educational pathway options, students are encouraged to thoroughly research this profession and determine which educational pathway is the best route to reach their particular career goals.

Most physician assistant programs require applicants to have previous health care experience and some college education. The typical applicant already has a bachelor's degree and at least four years of health care experience. Commonly nurses, EMT's, and paramedics apply to PA programs. Check the particular prerequisites of the PA educational programs that interest you.

Popular majors for students interested in a career as a physician assistant include biology, physiology and neurobiology, and psychology. However, any major is suitable as long as all prerequisite courses are completed. The Health Professions advisors will assist students in making an appropriate major selection.

Prerequisites of professional schools are subject to change; therefore, students are strongly encouraged to contact professional programs for the most current requirements. Contact the American Academy of Physician Assistants for specific information about individual program prerequisites. Students may also visit the Health Professions resource library in 0110 Hornbake for professional school information. Admission to professional schools is competitive and is not guaranteed by the University of Maryland, College Park.

American Academy of Physician Assistants
950 North Washington Street
Alexandria, VA 22314-1552
703-836-2272
http:/ / www.aapa.org

## Pre-Podiatric Medicine

Adviser: Nokuri
The pre-professional requirements for podiatric medical school are essentially identical to those for allopathic medical school, and the student is referred to the pre-medicine discussion above.

For additional information on pre-podiatry studies, contact the Pre-medical Adviser, the University of Maryland, 1117/0110 Hornbake Library, College Park, MD 20742, (301) 405-2793.

## Pre-Veterinary M edicine <br> Advisers: Loizeaux, Stephenson

University of Maryland, College Park students interested in veterinary medicine are eligible for a special degree program offered through the College of Agriculture and Natural Resources. Through this program (see College of Agriculture and Natural Resources entry in chapter 6), students may earn a combined Bachelor of Sciences degree in Agriculture and Veterinary Medicine.

Students within any major also may prepare for admission to veterinary school by completing required courses. Students should consult catalogs from the veterinary schools in which they are interested. Minimum requirements for most programs include the following:

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University of Maryland, College Park, CORE Requirements
BIOL 105, 106, }22
CHEM 103, 113, 233, }24
BCHM 261 or 461; MICB 200
PHYS }121\mathrm{ (or 141), 122 (or 142)
MATH }220\mathrm{ (or 140) and 3 credits of other mathematics
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Students should seek pre-veterinary advising through the Director, Center for Government and Corporate Veterinary Medicine, 1213 Avram Gudelsky Veterinary Center, University of Maryland, College Park, MD 20742-3711, (301) 935-6083, ext. 116 or 106.

## CERTIFICATE PROGRAMS

## Afro-American Studies Certificate College of Behavioral and Social Sciences 2169 LeFrak Hall, (301) 405-1158

The Afro-American Studies Certificate program offers the opportunity to develop a specialization in African-American studies while pursuing a major in another field. Certificate students learn about the social, economic, political, and cultural history of African-American people through a concentration of courses ( 21 credit hours). Courses taken toward the certificate also may be used to satisfy CORE requirements and electives.

Undergraduates in good standing may apply for the program by contacting the academic adviser of the Afro-American Studies Program in 2169 LeFrak Hall. Students pursuing the certificate must meet the University's general education (CORE) and department requirements.

See the complete description in the alphabetical list of programs.

## EAST ASIAN STUDIES CERTIFICATE

## College of Arts and Humanities <br> 2101B Francis Scott Key Hall, (301) 405-4309

The Undergraduate Certificate in East Asian Studies is a 24 -credit course of instruction designed to provide specialized knowledge of the cultures, histories, and contemporary concerns of the peoples of China, Japan, and Korea. It will complement and enrich a student's major. The curriculum focuses on language instruction, civilization courses, and electives in several departments and programs of the university. It is designed specifically for students who wish to expand their knowledge of East Asia and demonstrate to prospective employers, the public, and graduate and professional schools a special competence and set of skills in East Asian affairs.

Upon satisfactory completion of the courses, with a grade of $C$ or better in each course, and recommendation by the chairperson of the Committee on East Asian Studies, a certificate will be awarded. A notation of the award of the certificate will be included on the student's transcript. The student must have a bachelor's degree awarded previous to or simultaneously with an award of the certificate.

## Certificate Requirements

CORE Courses: The student is required to take:

1. HIST 284—East Asian Civilization I
2. HIST 285-East Asian Civilization II
3. Six semester hours of introduction to one of the following East Asian languages (Chinese, Japanese, or Korean):
CHIN 101-Elementary Chinese I
JAPN 101-Elementary Japanese I
KORA 211-Introductory Reading for Speakers of Korean I
KORA 212-Introductory Reading for Speakers of Korean II
Students with language competence equivalent to these language courses are exempted from the language requirement; such students are required to complete an additional six hours of electives in East Asian courses to fulfill the 24-credit requirement for the certificate.

Electives: Students must complete at least 12 hours of electives selected from four regular formally approved courses on East Asia in at least two of the following categories: (1) art history, (2) geography, (3) government and politics, (4) history, (5) language, linguistics, and literature, (6) music, and (7) women's studies. Nine of the 12 hours of electives must be upperdivision (300-400 level) courses. A maximum of three credit hours of special topics courses on East Asian will be allowed with the approval of the student's certificate adviser. No more than nine credits from any one department may be applied toward the certificate. No more than nine credits applied to the student's major may also apply to the certificate. In addition, no more than nine credits of the courses applied toward the certificate may be transferred from other institutions. Students are asked to work with their adviser in ensuring that the electives maintain an intercollegiate and interdisciplinary focus (at least three disciplines are recommended).

Interested students should contact Dr. Marlene Mayo, Department of History, Francis Scott Key Hall, (301) 405-4309.

## Latin-American Studies Certificate

## College of Arts and Humanities

Latin-American Studies Center
4205 Jimenez Hall, (301) 405-6456
The new multidisciplinary certificate program in Latin-American Studies is open to University of Maryland, College Park undergraduates in any major who are interested in international studies and Latin America. The undergraduate Certificate in Latin-American Studies will be awarded to students who have completed 21 credits with a grade of $C$ or better in the following areas.

## Requirements for Certificate

A. Core curriculum for all certificate students ( 12 credits)

LASC/ SPAN/ PORT 234 Issues in Latin-American Studies I
LASC/ SPAN/ PORT 235 Issues in Latin-American Studies II
HIST 250 or HIST 251 Latin American History I or II
LASC/ SPAN/ PORT 458 Senior capstone course in Latin-American Studies

## B. Additional courses in Latin-American Studies (9 credits)

Nine credits is additional courses to be chosen from an approved list and from at least two different departments. At least six credits must be at the 300- or 400-level. See Latin-American Studies adviser for details.

## C. Foreign Language Competency

All certificate students must demonstrate their competence in either Spanish or Portuguese. Competency may be proven with a grade of $C$ or better in an intermediate-level course (PORT 203, SPAN 201) or higher. Native speakers of Spanish or Portuguese or students with extensive experience in these languages should consult with the Latin-American Studies adviser.

Interested students should contact Dr. Eyda Merediz, 2225 Jimenez Hall, by phone, (301) 405-6459, or by E-mail (emerediz@wam.umd.edu); or contact Christina Guidorizzi in the Latin-American Studies Office, 4205 Jimenez Hall, by phone (301) 405-6459 or by e-mail guido@wam.umd.edu.

## Science, Technology and Society Certificate

1108 Chestertown Hall, 301-405-0527
www.sts.umd.edu/ certificate

## Certificate Requirements:

The Science, Technology, and Society (STS) Undergraduate Certificate program offers students an excellent opportunity to advance their understanding of the complex relationships between science, technology, and society by concentrating their CORE and elective courses (like a college "minor"). STS courses have been carefully chosen to fit closely into CORE and major field requirements of most students. Therefore, almost all College Park undergraduates can fulfill the certificate requirements without taking additional courses by careful selection of the courses that fulfill their CORE and elective requirements.

The STS Certificate program is comprised of 21 credits of coursework (including a capstone course), a monthly colloquium, and an internship opportunity. This mixture of learning experiences helps to cultivate an intellectual and personal forum in which students and faculty can work closely together. This program provides students with an interdisciplinary thematic link for their general education requirements, and it offers a chance for mentored research in areas of personal interest.

## Certificate Requirements

21 credits are necessary to complete the STS Certificate: 9 credits of Fundamental Courses and 12 credits of Elective Courses.

## Fundamental Courses (9 credits):

- A natural science or technology course satisfying CORE or a major and approved by the program director
- A history of science and technology course (see approved list)
- The senior STS capstone course (UNIV 401)


## Elective Courses (12 credits):

- Students can choose from a list of over sixty approved courses representing a variety of topic areas relevant to the STS field from a host of disciplines (e.g., AMST, AREC, CPSP, ECON, GEMS, GVPT, HIST, HONR, MICB, NRSC, PHIL, SOCY, ZOOL). Over half of the electives also satisfy CORE Distributive Studies requirements. Two of the electives must be upperlevel courses. (Please note: CORE Advanced Studies requires that two upperlevel courses be taken outside the major after 56 credits. Upper-level STS courses satisfy this requirement. Check with your academic advisor in your major.) See program website for the complete list of electives.

Students must obtain advice and approval from the program director for their course choices. Students must maintain a minimum grade of " $C$ " in each STS course. The STS program of study must include a minimum of 9 credits in upper division courses, 2 of which must be electives. It also may not exceed the following maximums: 9 credits of STS courses applied to the student's major; 3 credits of "Special Topics" or "Selected Topics" courses applied to the STS certificate; 9 credits of approved courses taken outside UMCP. Only 6 credits from courses with the AREC, ECON and GVPT prefixes may be used to satisfy the STS Certificate requirements.

## The History and Philosophy of Science and Technology Track

## A. HPST Track Fundamental courses:

1. One course from the SPSST track fundamental course list drawn from areas 3 or 4 , or any SPSST track elective which is NOT listed as an HPST course.
2. One introductory course in the history of science or technology or introductory philosophy of science:
HIST 174- (Introduction to the History of Science)
HIST 175-(Science and Technology in Western Civilization)
PHIL 250-(Philosophy of Science I)
PHIL 256-(Philosophy of Biology I)
3. Three advanced courses in the history of science or technology or philosophy of science, approved by the STS policy committee, with no more than two drawn from each department.
HIST 401-The Scientific Revolution: From Copernicus to Newton
HIST 402 - The Development of Modern Physical Science:
From Newton to Einstein
HIST 403-Twentieth Century Revolutions in the Physical Sciences
HIST 404-History of Modern Biology
HIST 406-History of Technology
HIST 407-Technology and Social Change in History
PHIL 450-Scientific Thought I
